J. H. PARSONS.

CENTRIFUGAL GUN.

APPLICATION FILED OCT. 16, 1918.

1,408,137. Patented Feb. 28, 1922.

3 SHEETS—SHEET 1.

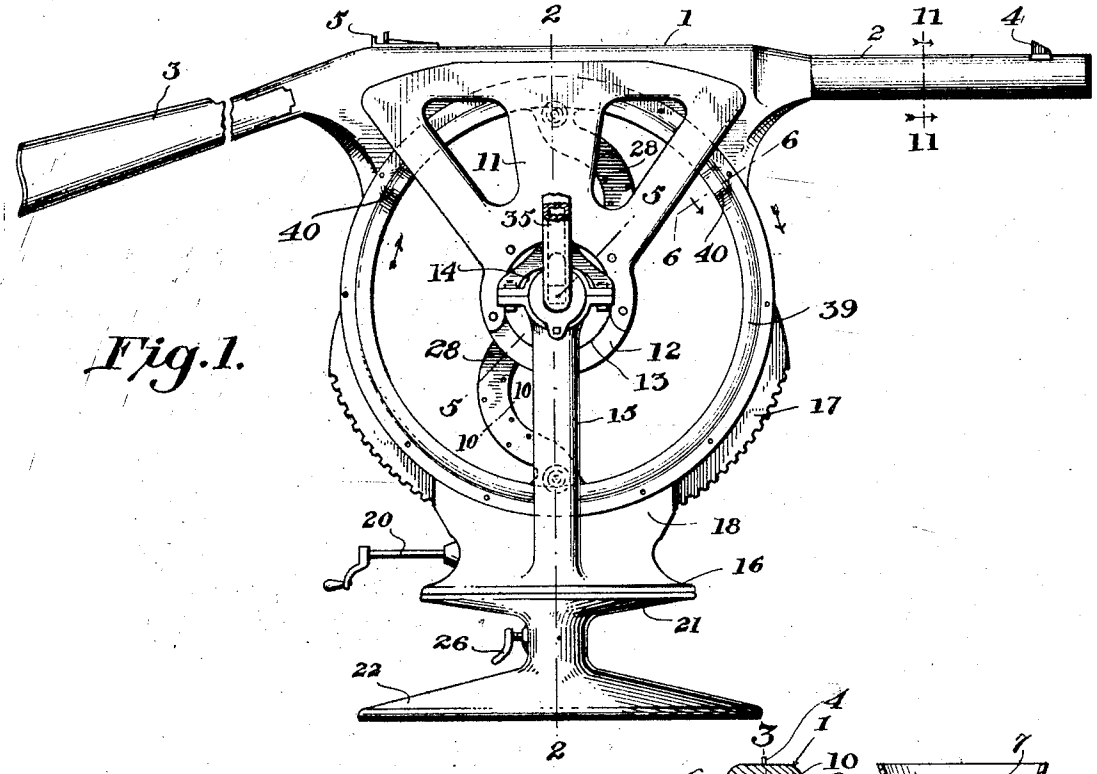


Fig. 1.

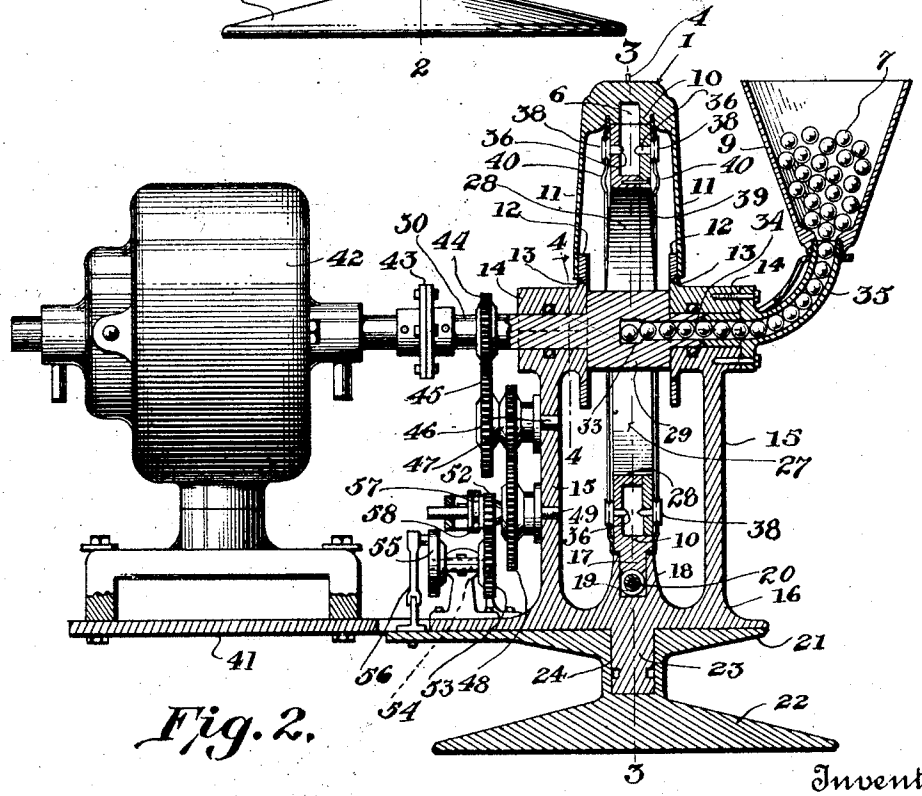


Fig. 2.

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Witnesses

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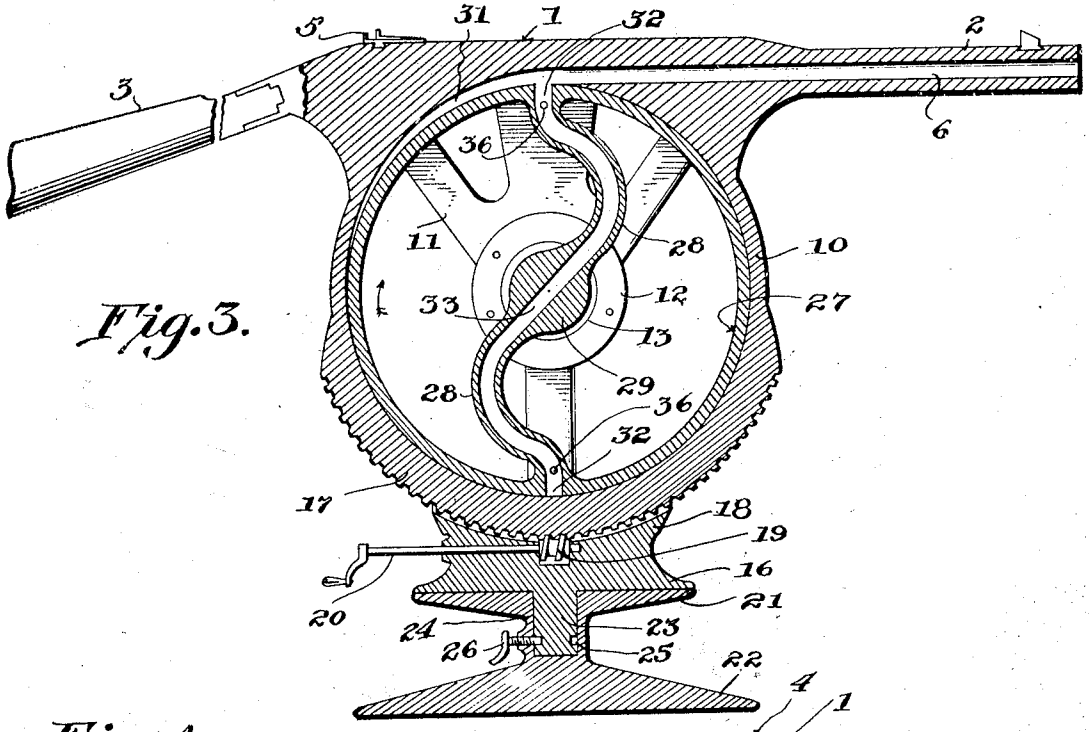
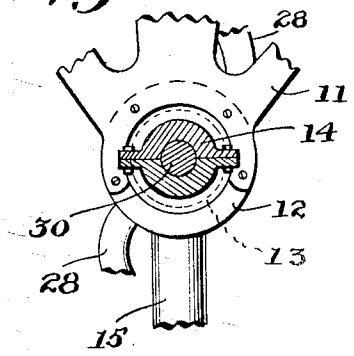


Fig. 3.

Fig. 4.



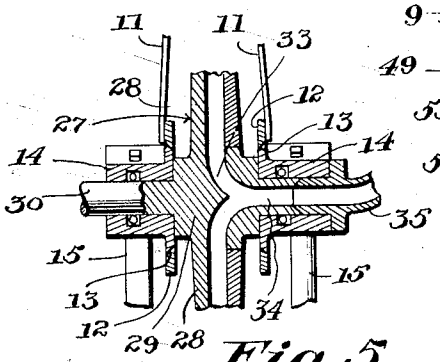
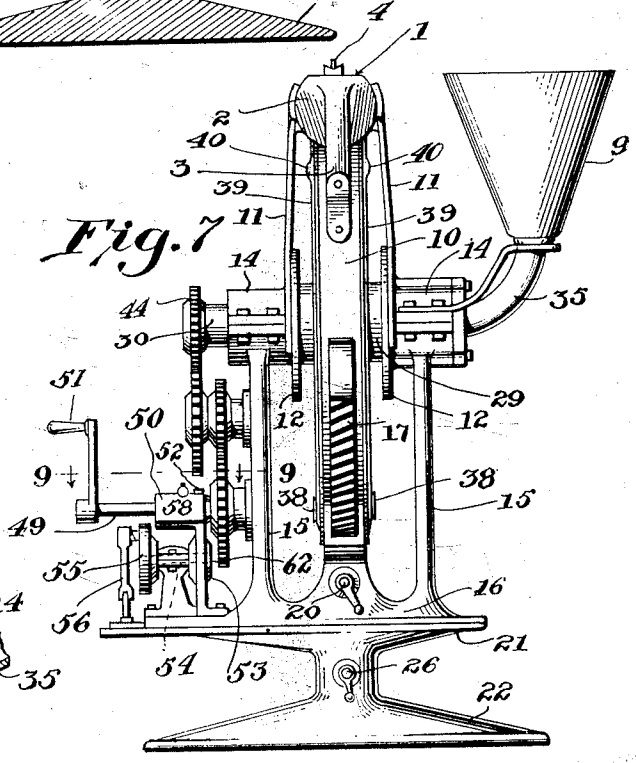


Fig. 5.

Fig. 7



Witnesses

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3 SHEETS—SHEET 3.

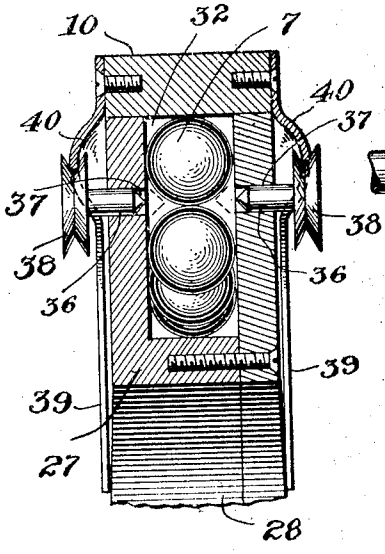
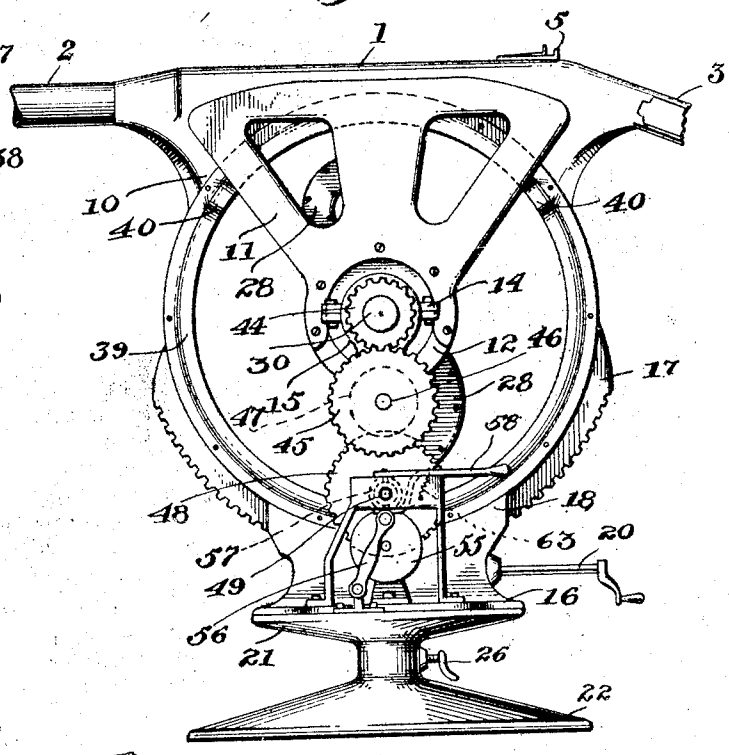


Fig. 6.

Fig. 8.



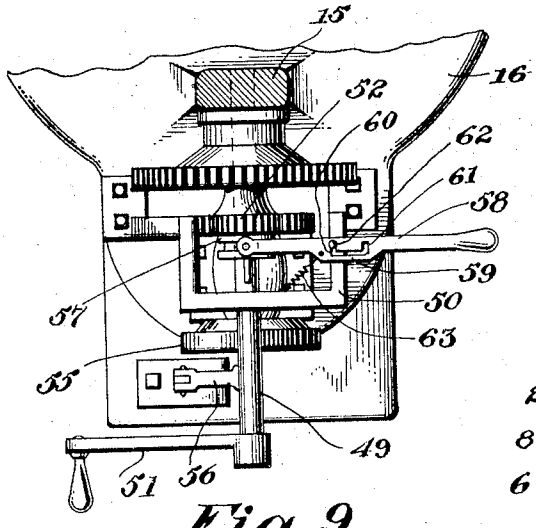


Fig. 9.

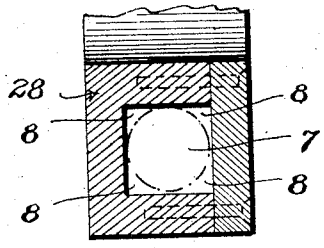


Fig. 10.

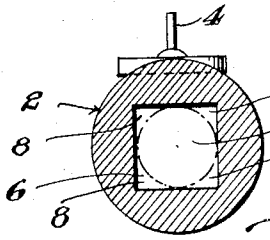


Fig. 11.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN H. PARSONS, OF RIDLEY PARK, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO ARTHUR C. BUNNELL, OF RIDLEY PARK, PENNSYLVANIA, AND ONE-FOURTH TO DANIEL J. NORMOYLE, OF PHILADELPHIA, PENNSYLVANIA.

CENTRIFUGAL GUN.

1,408,137. Specification of Letters Patent. Patented Feb. 28, 1922.

Application filed October 16, 1918. Serial No. 258,320.

To all whom it may concern:

Be it known that I, JOHN H. PARSONS, a citizen of the United States, residing at Ridley Park, in the county of Delaware and State of Pennsylvania, have invented new and useful Improvements in Centrifugal Guns, of which the following is a specification.

This invention relates to guns of the centrifugal type, and one object of the invention is to provide a gun of this character which is light in weight, simple of construction, reliable and efficient in action, and composed of a comparatively small number of parts, whereby a gun capable of being operated by hand, electric or other power is produced, and one which is freely portable and capable of being used by troops entrenched or in motion for discharging missiles with great force and rapidity.

Another object of the invention is to provide a centrifugal gun which is compact and in operation ensures the firing of a constant stream of bullets without liability of clogging or choking, and which, while not liable to easily get out of order, may be readily, quickly and conveniently cleaned and repaired when occasion requires.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a view in side elevation of a centrifugal gun embodying my invention.

Figure 2 is a vertical transverse section on line 2—2 of Figure 1.

Figure 3 is a vertical longitudinal section on line 3—3 of Figure 2.

Figure 4 is a detail section on line 4—4 of Figure 2.

Figure 5 is a detail section on line 5—5 of Figure 1.

Figure 6 is a detail section on line 6—6 of Figure 1.

Figure 7 is a view in rear elevation of the gun, showing the substitution of a hand crank in place of an electric motor for driving the machine.

Figure 8 is a view in elevation looking toward the side of the gun at which the drive gearing is arranged.

Figure 9 is a sectional plan view on line 9—9 of Figure 7.

Figure 10 is a detail section on line 10—10 of Figure 1.

Figure 11 is a detail section on line 11—11 of Figure 1.

Referring to the drawings, 1 designates the body or stock of the gun which also forms the breech, and which is provided with the barrel 2, shoulder butt 3, and suitable front and rear sights 4 and 5, the structure being such as to adapt the gun to be trained and sighted after the manner of a rifle or other similar shoulder firearm, although it is to be understood that any suitable type of gun structure per se may be employed. The bore or chamber 6 of this gun extends from the rear of the stock 1 to and through the barrel and may be of any suitable cross-sectional form according to conditions and the form of the projectiles 7 to be used. In the present instance, however, I have shown the use of ordinary round (spherical) balls or projectiles and a bore 6 of square or other angular form in cross section. As a result of such formation of the bore and projectiles, portions of the surfaces thereof will be free from contact (see Figure 11), thus reducing friction and wear and tear upon the gun, and also reducing heat generation and producing air passages 8 for a cooling effect. Furthermore, these passages permit of the more ready and convenient use of a lubricant, whereby friction, wear and tear may be further reduced. This applies also to the form of the other channels or passages through which the projectiles travel from a hopper 9, or other suitable storage chamber, to the bore 6.

The gun is mounted so as to be both vertically and horizontally (laterally) adjustable for training and sighting actions. To this end the stock 1 is rigid with a channeled guide ring 10 and is provided with depending side pieces or bracket plates 11 secured to bearing rings 12 journaled to turn upon and about bearing surfaces 13 formed upon

spaced bearing members 14. These bearing members 14 form part of a supporting carriage, including spaced pedestals 15 projecting upwardly from a bed plate 16, on which carriage the gun and guide ring are adapted to swing as a unit for tiltably adjusting the gun in a vertical plane. Formed upon the underside of the periphery of the guide ring is a rack segment 17 movable in a grooved guideway 18 upon the bed plate 16, the teeth of which rack mesh with a worm 19 on an adjusting shaft 20, mounted on said bed plate, whereby the gun may be vertically adjusted and locked in adjusted position. The bed plate 16 rests upon a stationary supporting plate 21 carried by a base or stand 22 and is provided with a depending stud 23 journaled in a bearing recess 24 in said supporting plate. The plates 16 and 21 constitute the relatively movable elements of a turntable on which the gun and carriage may be swung or turned to adjust the gun horizontally (laterally) in either direction, the gun itself being employed as a power lever for such adjustments. The stud 23 is formed with an annular groove 25 receiving an adjustable clamping screw 26 on the base, whereby the turntable plate may be locked and released whenever desired. As hereinafter described, this rotary movement of the gun in a horizontal plane on a vertical axis also permits of an oscillating action of the gun for a sweeping fire in an arc of a determined radius.

Arranged to revolve within the guide ring 16 is a high-speed rotary impeller 27. This impeller consists of a ring or annulus carried by hollow or tubular spokes or frame arms 28 extending from a central hub 29 mounted upon or forming part of a shaft 30 journaled in the spaced bearing members 14. As shown, the impeller ring 27 fits snugly within the guide ring 16, and the ring 16 is formed with a discharge groove or channel 31 communicating with the rear end of the bore 6, while the ring 27 is provided at diametrically opposite sides with peripheral pockets 32 which successively communicate, at a determined point in the path of rotation of said ring 27, with the channel 31.

Formed in and extending diametrically through the hub 29 of the impeller 27 is a bore 33, and extending from the opposite ends of this bore to the respective pockets 32 are radial feed passages formed by the hollow or tubular spokes or frame arms 28. Communicating with the bore 33 is a bore 34 extending at right angles therefrom through one end of the shaft 30, and extending from the bottom of the hopper 9 to said bore 34 is a feed tube 35, whereby provision is made for a continuous feed by gravity of the projectiles 7 from the hopper to keep the radial conductors constantly filled each with a continuous series or column of projectiles for centrifugal discharge from the impeller to the groove or channel 31.

In the operation of the gun the impeller 27 is rotated at high speed, e. g., from six to seven thousand or more revolutions per minute, and in the rotation of said impeller, as each pocket 32 comes opposite a prescribed point in the channel 31, the projectile contained therein will be discharged by centrifugal force into said channel and outward through the bore 6 of the gun. It will be observed that the channel 31 is arranged tangentially to the periphery of the impeller 27 and eccentric to the axis thereof, and is of minimum depth at one, its rear, end and gradually increases in depth toward its opposite, or forward, end, which corresponds in diameter with the bore 6 and communicates with the rear end thereof. The purpose of so forming the channel 31 is to permit of the easy and gradual discharge of the projectile from the pocket 32, in such a manner that it quickly but smoothly passes from minimum to maximum velocity without objectionable fluctuations of speed and without grinding or causing undue friction on the walls of the channel. Any tendency of the projectiles to choke or bind, no matter how rapid their rate of discharge, is thus prevented.

In order to properly control and check the feed of the projectiles on their passage from the distributing bore 33 to the pockets 32 and channel 31, so as to avoid jamming of the projectiles in the conductors, or tendency of the projectiles to be propelled violently along said conductors by centrifugal force in the rotation of the impeller, each conductor 28 is preferably curved, provided with an offset portion, or made serpentine-shaped, as shown, in order to retard the projectiles in their travel and avoid the tendency to rapid centrifugal propulsion, such as would be liable to occur if the conductors extended in a straight line, either radially or tangentially between the distributing bore and passages. By extending the conductors on a curved line the tendency of the projectiles to be thrown toward the periphery of the impeller by centrifugal force is reduced to such degree that the centrifugal feed action is just sufficient, in connection with the force of gravity, to ensure a constant, easy and regular feed of the projectiles from the hopper to the pockets. It will be observed that the conductors 28 are offset in opposite directions to properly balance the impeller wheel, the weight of the projectiles in one conductor being balanced by the weight of the projectiles in the other conductor, thus overcoming any resistance which might otherwise be caused thereby to the operation of the impeller at an even and uniform rate of speed.

In order to further provide for the reten-

tion of the columns of projectiles in the conductors 28 detents 36 are provided for individually controlling the discharge of the projectiles from each conductor 28 to the cooperating pocket 32. Each of these detents consists of a pair of opposed detent pins arranged in longitudinal alinement and movable through guide openings 37 in the opposite sides of the conductor 28. The pins have inner conical or reduced ends to lie in the path of the outer ball or projectile in each conductor, and adapted upon the recession of the pins to permit such ball to pass into the pocket and to then interpose themselves between such ball and the succeeding ball, to hold the succeeding ball from discharge into the pocket until the time for its discharge arrives. The pins 36 are also rotatably mounted in openings 37 and provided at their outer ends with grooved pulleys 38 to travel upon annular track rails 39 arranged parallel with the sides of the periphery of the rotary impeller and fixedly secured to the annular guide 10. The track rails are so arranged as to normally hold the detents in inwardly projected or detaining position, but are provided at one or more points, properly related with respect to the channel 31, with outwardly offset or cam portions 40 for shifting the pulley 38 outwardly and thereby momentarily retracting the pins 36 to permit the outer projectile of the series to pass into the pocket 32. The offset portions 40 are comparatively short or of just sufficient extent to retract the pins for the proper amount of time to permit the foremost ball to discharge, whereupon the pulleys 38 pass therefrom on the main portions of the track rails and move the pins inwardly in advance of the next succeeding projectile to hold the same from discharge. I may provide but a single set of these detents for normally holding and releasing the projectiles at a predetermined point in the path of revolution of the rotary impeller, but, if desired, may employ a plurality of such detents at proper points around the path of rotation of the impeller to positively effect and ensure the release of the foremost projectile in each conductor 28, thus securing a positive release of a projectile from each conductor on each revolutiton of the impeller. It will be understood, therefore, that as each pocket 32 approaches the rear end of the channel 31 in the rotation of the impeller 27, the direction of the rotation of which is indicated by the arrows in Figures 1 and 3, the projectile contained in the pocket will be gradually and progressively thrown out, owing to the gradual increasing depth of the channel 31, thus enabling the projectile to gradually attain its full velocity for discharge without liability of impedance.

The impeller may be driven by hand or motive power gearing. In Figure 2 I have shown the base 16 provided with an extension 41 to support the electric or other drive motor 42, the shaft of which may be directly coupled to the impeller shaft, as indicated at 43. I have also shown means for driving the impeller by hand power when desired, and also for oscillating the carriage through a determined arc of movement for a sweeping firing action of the gun. The gearing for these purposes consists of a gear member 44 on the impeller shaft, meshing with a gear 45 on a stub shaft 46 journaled on the carriage, on which stub shaft is also mounted a gear 47 meshing with a gear 48 on a combined transmission and driving shaft 49, also journaled on the carriage, and in a bracket member 50 carried thereby. The outer end of the shaft 49 is of angular or other suitable form to receive a crank 51 whereby the impeller may be driven by hand power through the gearing above described. Loosely mounted on the shaft 49 is a gear pinion 52 meshing with a gear pinion 53 on a shaft 54, journaled upon the carriage, which shaft 54 also carries a crank disk 55 coupled by a crank link 56 to the base plate 21, whereby when the gear 52 is fixed to the shaft 49 an oscillatory motion in a horizontal plane may be imparted to the carriage for a sweeping firing action as described. A clutch device 57, feathered to slide upon and rotate with the shaft 49, is provided for connecting the pinion 52 with and disconnecting it from said shaft. This clutch device is provided with an annularly grooved collar engaged by the forked end of a shipper lever 58. This lever is provided with a longitudinal slot 59 and transverse slots 60 and 61 intersecting the ends of said longitudinal slot for sliding and pivotal engagement with a combined fulcrum and locking pin 62 mounted on the bracket 50. The lever may be swung and slidably moved in one direction to bring the pin 62 into locking engagement with the end slot 60 to throw the clutch member 57 into clutching action, and may be swung and slidably moved in the opposite direction to withdraw the pin 62 from engagement with the slot 60 and move it along the slot 59 and into engagement with the slot 61, to thereby retract the clutch member 57 and lock the lever in position to hold said clutch member retracted. A spring 63 connects the shipper lever with the bracket 50 and assists in swinging the lever to clutch retracting position and to hold the pin 62 seated in one or the other of the end slots 60 or 61. It will thus be understood that the mechanism for oscillating the gun carriage may be thrown into and out of action as occasion may require, and that when desired the gun may be fixed rigidly against oscillation by means of the locking device 26.

A material and important advantage residing in my improved gun structure is that

it provides a centrifugal gun which is compact or of comparatively small dimensions and is therefore readily portable and easily handled for field or trench work. The construction also ensures ease of motion of the impeller, with a minimum of friction and heating, owing to the fact that it is arranged so as to be effectually balanced, as well as to be lubricated or mounted upon anti-friction bearings if desired, so that frictional contact between surfaces is reduced to a highly desirable degree.

Having thus fully described my invention, I claim:—

1. In a dirigible gun, a barrel, a rotary impeller provided with a feed pocket and a conductor communicating therewith, a detent controlling the feed of projectiles to said pocket, a trackway concentric with said impeller, a bulged portion in said trackway, and a wheel connected to said detent and bearing upon said trackway.

2. In a dirigible gun, a rotary impeller having a conductor for projectiles, a pair of detents arranged in the walls of said impeller and having their inner ends normally disposed in the path of projectiles in said conductor, trackways arranged concentric with said impeller, grooved wheels on the outer ends of said detents and engaged with said trackways, and offset portions on said trackways, whereby the detents will be caused to be retracted when the wheels arrive in contact with said portions.

3. In a shouldered firearm, a barrel having a bore, a circular casing depending from an intermediate portion of the firearm, a rotary centrifugal impeller journalled in said casing and having an axial inlet and a peripheral outlet, and means for intermittently discharging projectiles from the outlet of said impeller, the bore of said barrel being tangential to the periphery of said impeller and receiving projectiles discharged from the outlet thereof.

4. In a shouldered firearm, a barrel having a bore, a circular casing depending from an intermediate portion of the firearm, a rotary centrifugal impeller journalled in said casing and having an axial inlet and peripheral outlet, means for supplying projectiles to the axial inlet of said impeller, means for intermittently discharging projectiles from the outlet of said impeller, and means for rotating said impeller, the bore of said barrel being tangential to the periphery of said impeller and receiving projectiles discharged from the outlet thereof.

5. In a shouldered firearm, a barrel having a bore, a circular casing depending from an intermediate portion of the firearm, a rotary centrifugal impeller journalled in said casing and having an axial inlet and peripheral outlet, means for supplying projectiles to the axial inlet of said impeller, automatic means for intermittently discharging projectiles from the outlet of said impeller, and means for rotating said impeller, the bore of said barrel being tangential to the periphery of said impeller and receiving projectiles discharged from the outlet thereof.

6. In a firearm, a barrel having a bore, a casing depending from an intermediate portion of the firearm, a rotary impeller within said casing and having a feed pocket and a conductor communicating therewith, the bore of said barrel being tangential to the periphery of said impeller, a detent controlling the feed of projectiles to said pocket, a trackway concentric with said impeller, a bulged portion in said trackway, and a wheel connected to said detent and bearing upon said trackway.

7. In a firearm, a shouldered stock, a barrel connecting said stock and having a bore, a casing depending from an intermediate portion of the firearm, a rotary impeller within said casing and having an axial inlet and a peripheral outlet, the bore of said barrel being tangential to the periphery of said impeller, a detent for controlling the feed of projectiles to the axial inlet of said impeller, a trackway concentric with said impeller, a bulged portion in said trackway, and a wheel connected to said detent and bearing upon said trackway.

8. A shouldered firearm comprising a butt portion, a barrel portion and an intermediate portion connecting the butt and barrel portions, a circular casing depending from said intermediate portion and communicating with the bore of said barrel portion, the horizontal diameter of said circular casing being disposed in a plane parallel to the longitudinal axis of the firearm, the vertical side walls of said casing being spaced apart to a width less than the width of said intermediate portion, and a centrifugal impeller within said casing for discharging projectiles through the bore of said barrel.

9. A shouldered firearm comprising a butt portion, a barrel portion and an intermediate portion connecting the butt and barrel portions, a circular casing depending from said intermediate portion and having its horizontal diameter disposed in a plane parallel to the longitudinal axis of the firearm, said intermediate portion having a bore connecting the bore of said barrel portion with said casing, said casing having its vertical side walls spaced apart to a width less than the width of said intermediate portion, and a rotary centrifugal impeller journaled in said casing.

10. A shouldered firearm comprising a butt portion, a barrel portion and an intermediate portion connecting the butt and

barrel portions, a circular casing depending from said intermediate portion and having its horizontal diameter disposed in a plane parallel to the longitudinal axis of the fire-arm, said intermediate portion having a bore connecting the bore of said barrel portion with said casing, said casing having its vertical side walls spaced apart to a width less than the width of said intermediate portion, bracket plates depending from opposite sides of said intermediate portion and secured to the walls of said casing, and a rotary centrifugal impeller journaled in said casing.

In testimony whereof I affix my signature.

JOHN H. PARSONS.