July 18, 1944. M. L. DODGE ET AL. 2,353,816

GUN AND AMMUNITION

Filed Jan. 31, 1941 7 Sheets-Sheet 1

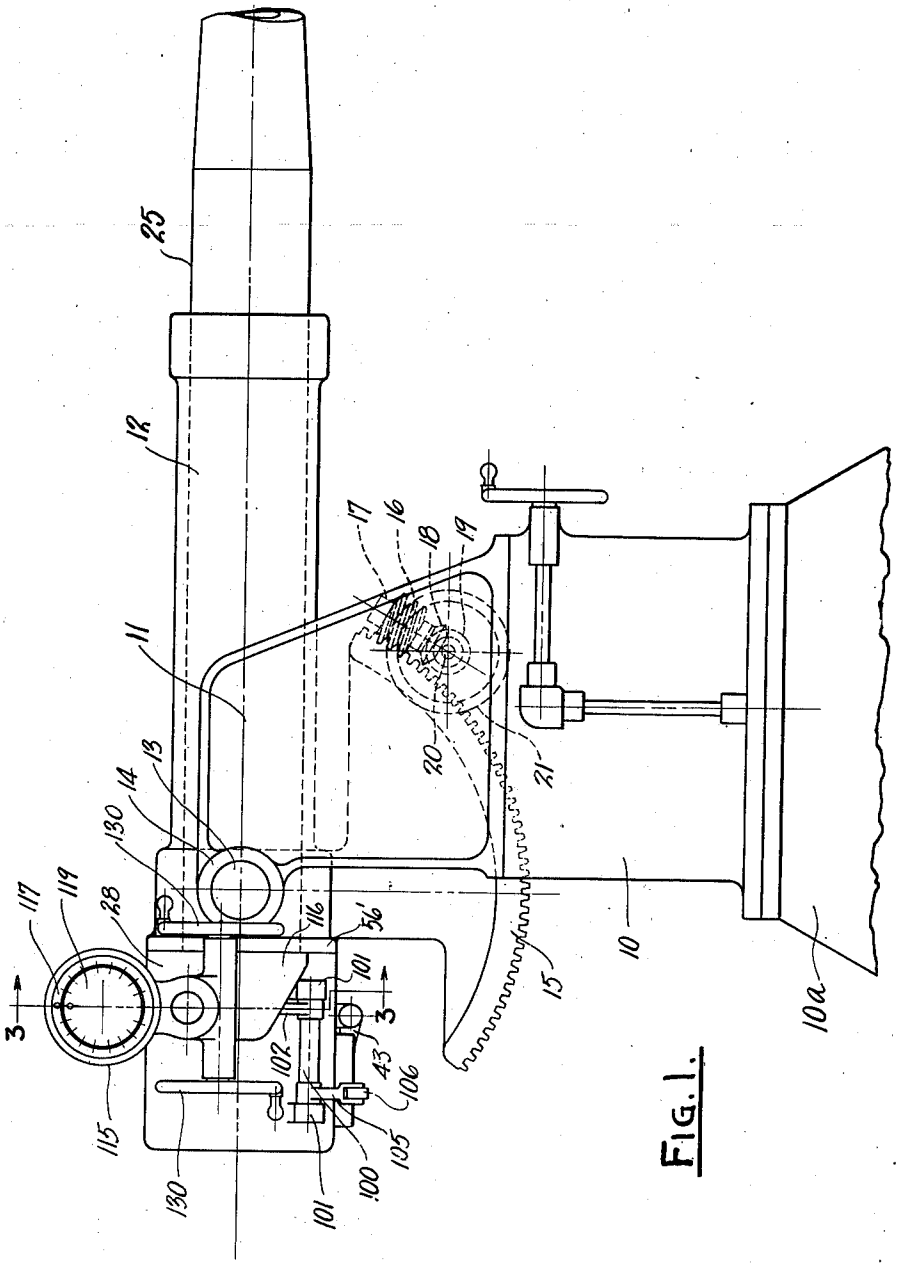


FIG. 1.

INVENTOR.
MERTON L. DODGE
WILLIAM V. BAKER.

BY Cook & Robinson

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GUN AND AMMUNITION

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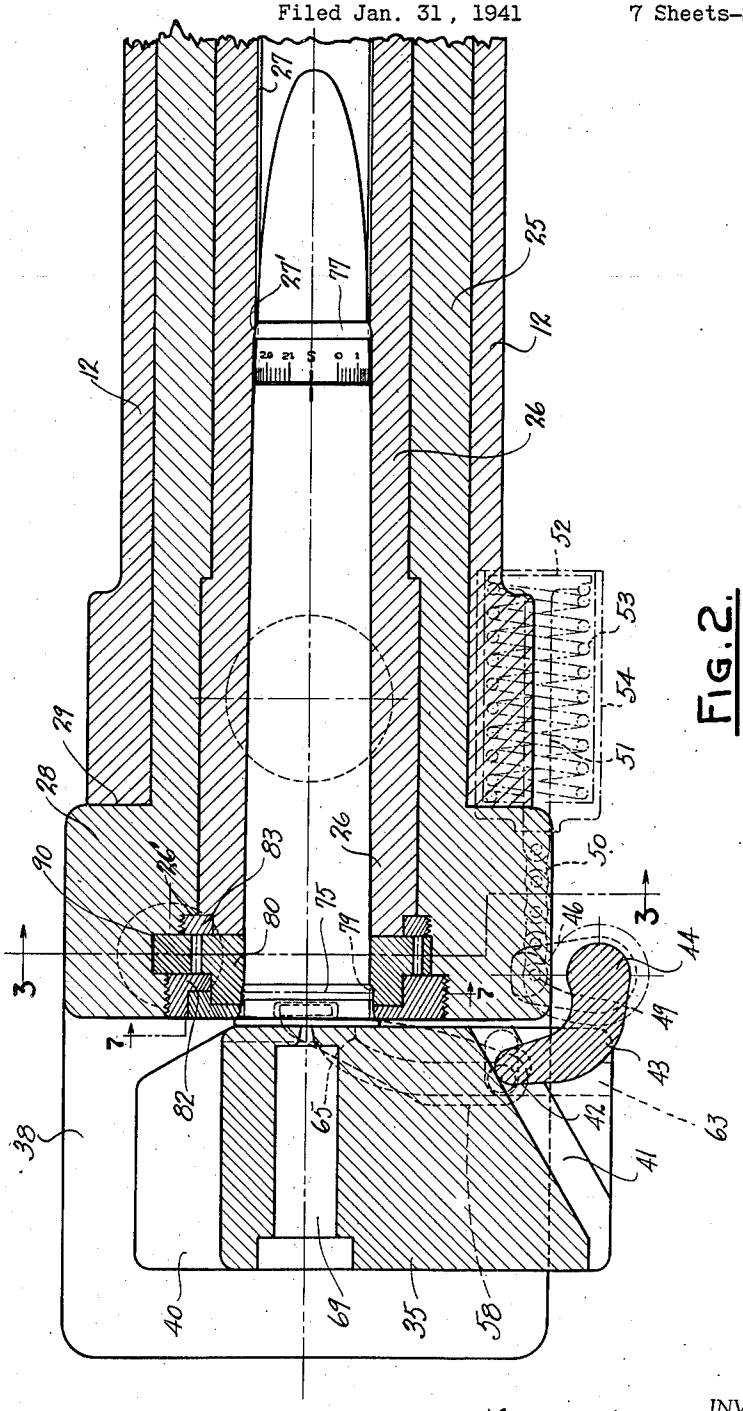


FIG. 2.

INVENTOR.
MERTON L. DODGE
WILLIAM V. BAKER
BY Cook & Robinson

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GUN AND AMMUNITION

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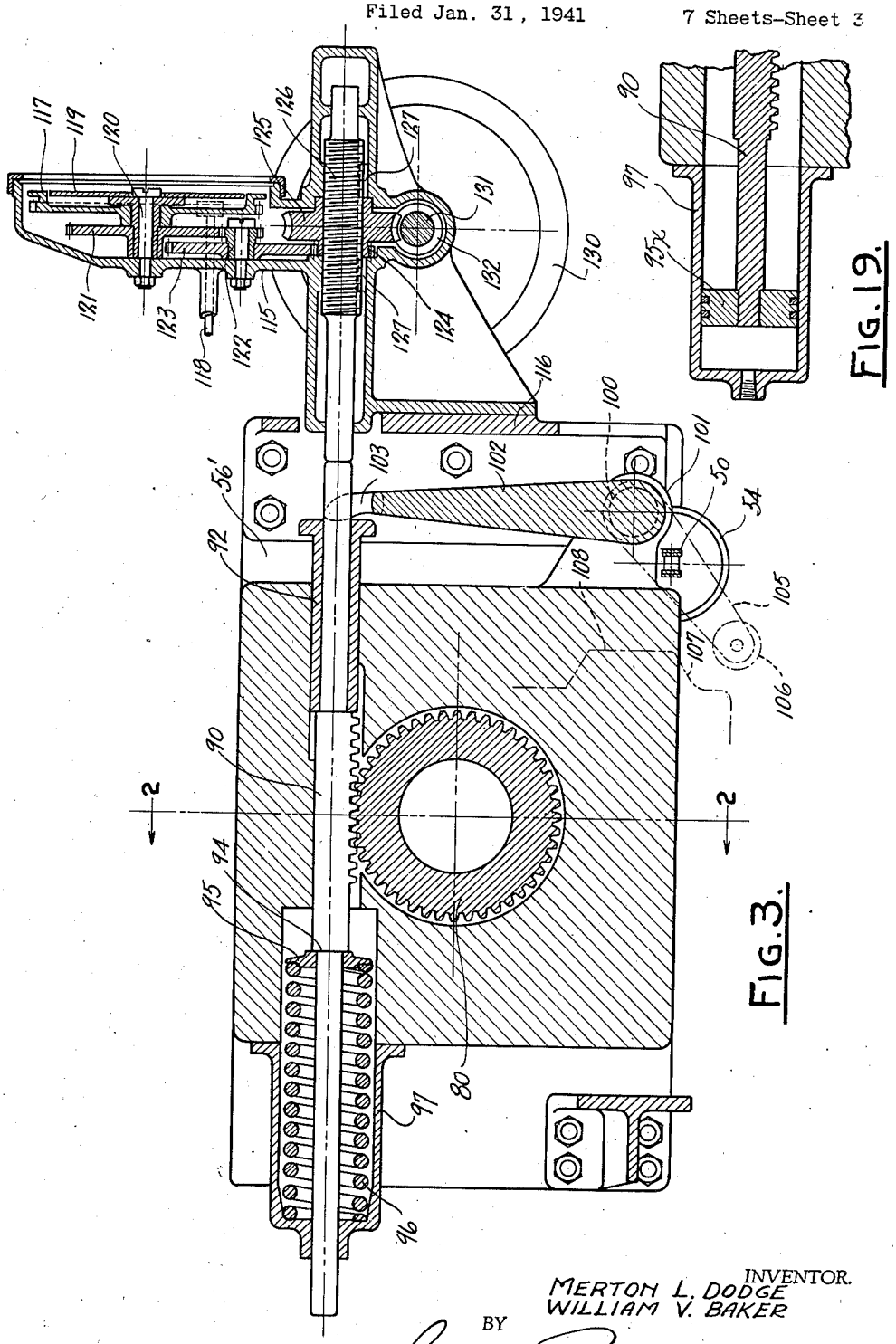


FIG. 19.

FIG. 3.

INVENTOR.
MERTON L. DODGE
WILLIAM V. BAKER

BY

Cook & Robinson

July 18, 1944. M. L. DODGE ET AL 2,353,816

GUN AND AMMUNITION

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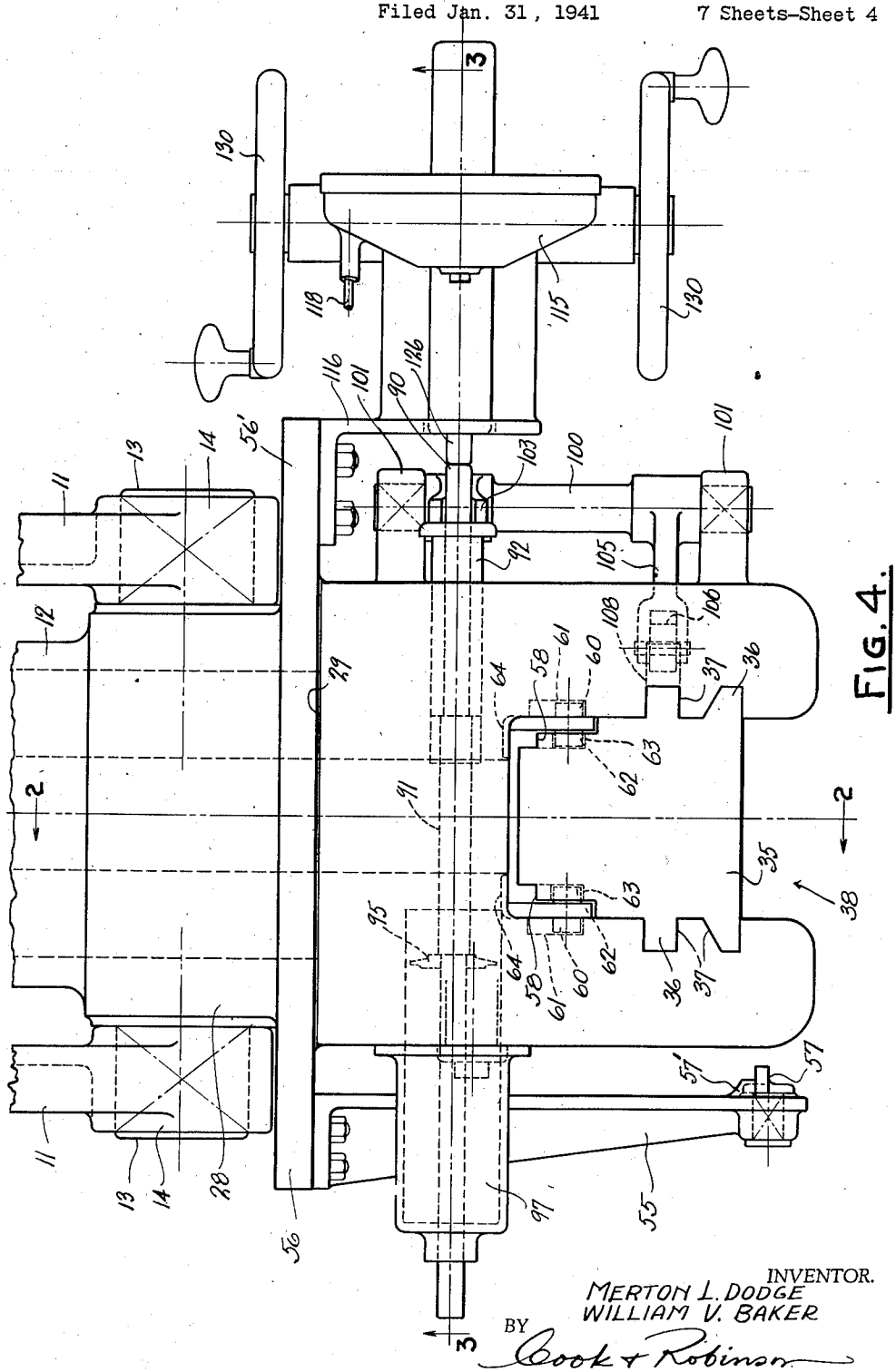


FIG. 4.

INVENTOR.
MERTON L. DODGE
WILLIAM V. BAKER
BY Cook & Robinson

July 18, 1944. M. L. DODGE ET AL 2,353,816

GUN AND AMMUNITION

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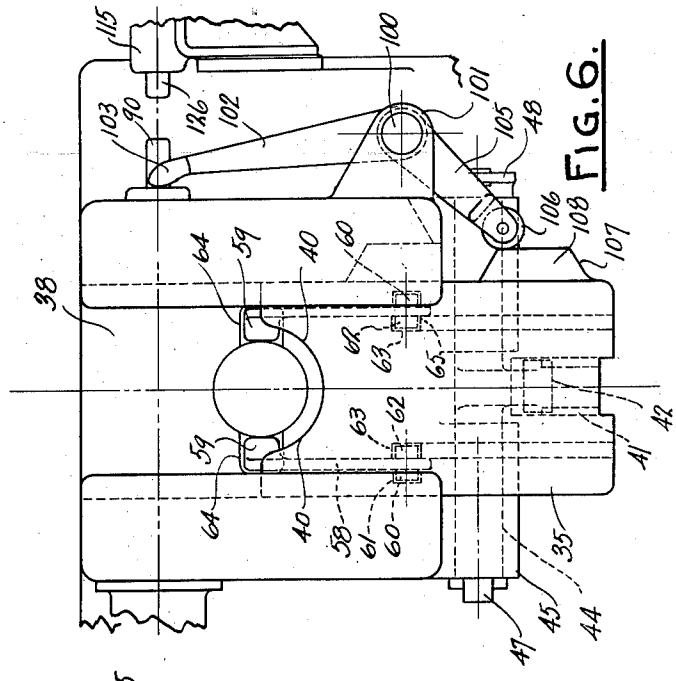


FIG. 6.

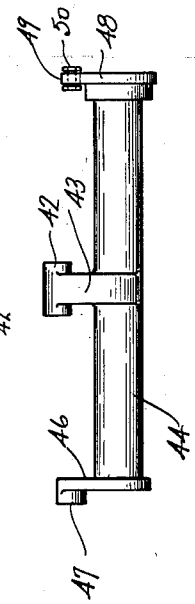


FIG. 18.

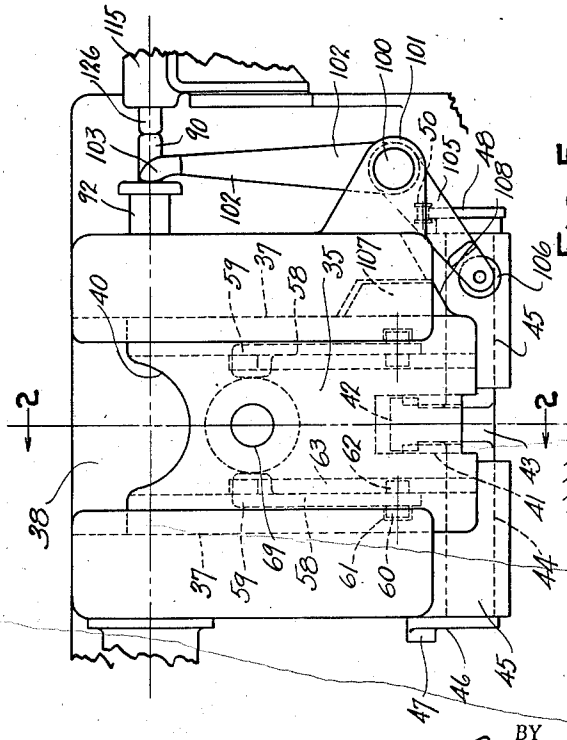


FIG. 5.

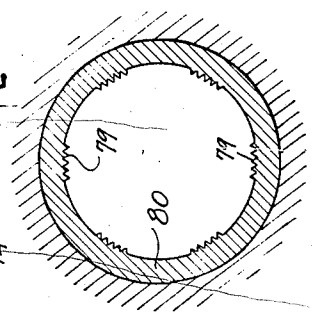


FIG. 7.

INVENTOR.
MERTON L. DODGE
WILLIAM V. BAKER

BY

Cook & Robinson

July 18, 1944. M. L. DODGE ET AL 2,353,816

GUN AND AMMUNITION

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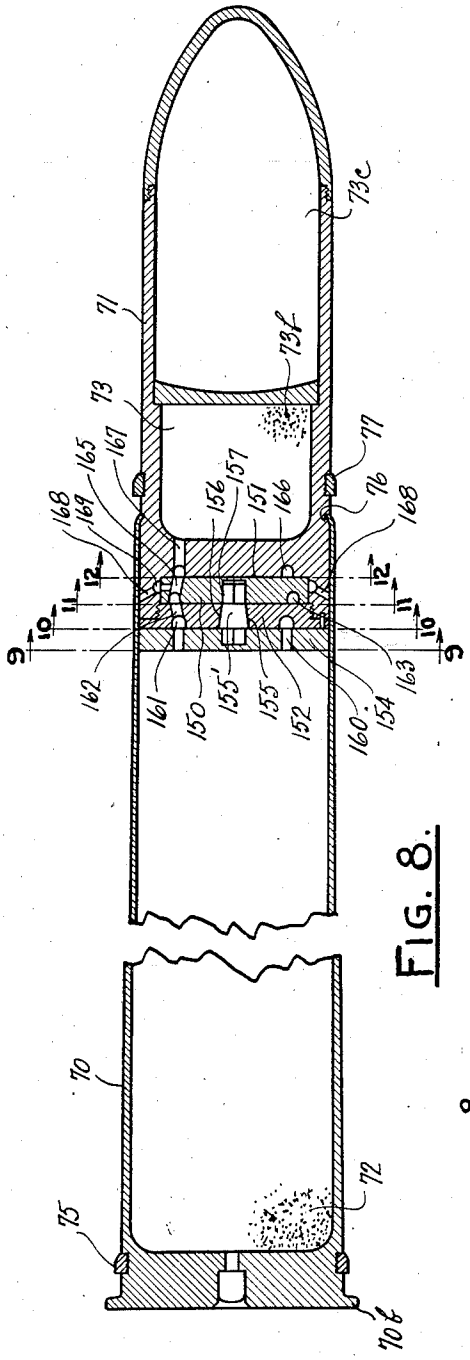


FIG. 8.

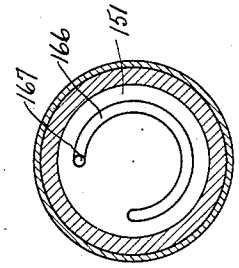


FIG. 12.

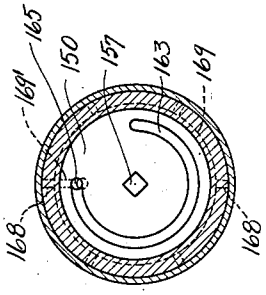


FIG. 11.

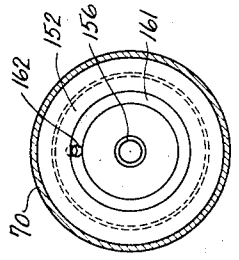


FIG. 10.

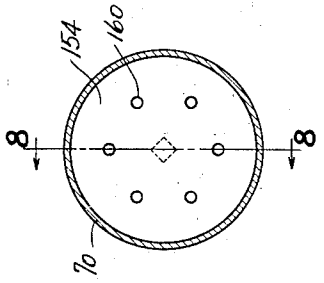


FIG. 9.

INVENTOR.
MERTON L. DODGE
WILLIAM V. BAKER

BY Cook & Robinson

July 18, 1944. M. L. DODGE ET AL 2,353,816

GUN AND AMMUNITION

Filed Jan. 31, 1941 7 Sheets-Sheet 7

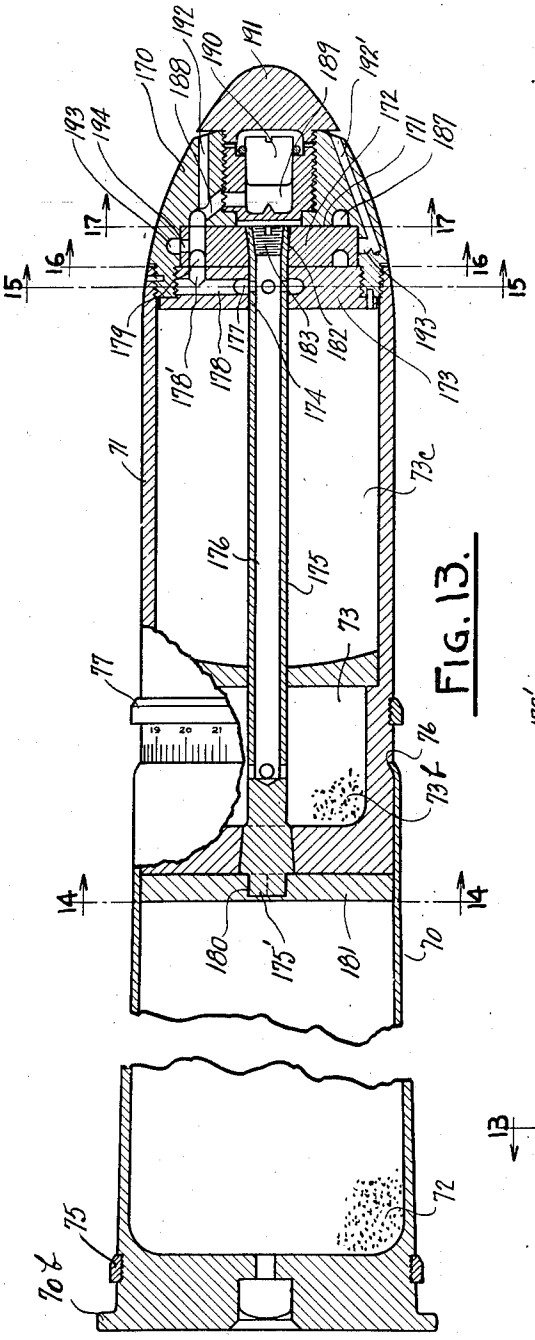


FIG. 13.

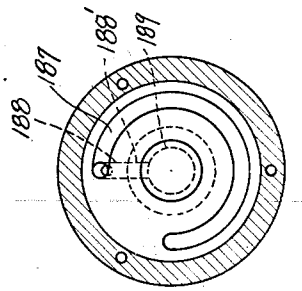


FIG. 17.

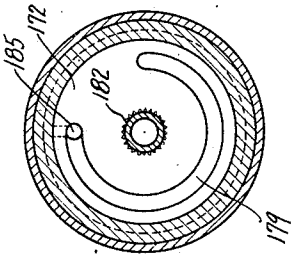


FIG. 16.

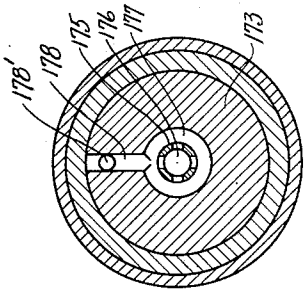


FIG. 15.

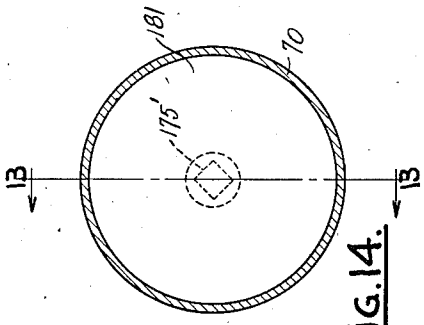


FIG. 14.

INVENTOR.
MERTON L. DODGE
WILLIAM V. BAKER

BY Cook & Robinson

Patented July 18, 1944 2,353,816

UNITED STATES PATENT OFFICE

2,353,816

GUN AND AMMUNITION

Merton L. Dodge and William V. Baker,
Seattle, Wash.

Application January 31, 1941, Serial No. 376,800

7 Claims. (Cl. 89—1)

This invention relates to improvements in guns, and ammunition therefor, and has reference more particularly to improvements in means for the setting, or what may also be termed the "cutting" of fuses, as used in timing the bursting of projectiles as fired by anti-aircraft guns and the like; it being the principal object of the present invention to provide certain novel features in the fuse timing parts as incorporated in the shell itself, and also to novel features in the gun in which the shell is to be fired, whereby the fuse timing parts may be set or adjusted after the shell has been placed in the gun and the breech block closed.

More specifically stated, the objects of the present invention reside in the provision of mechanical fuse setting means embodied in the breech portion of the gun, and whereby the time setting of the shell fuse may be automatically and accurately accomplished and continually maintained after the shell has been loaded into the gun and the breech block closed to provide that the gun may be instantly fired upon complete setting, or at will any time thereafter.

It is also an object of the present invention to provide a novel mechanism embodied in the breech end of the gun for rotating the shell case to effect the time setting of the fuse, and in conjunction therewith to provide means in the gun liner for engaging and holding the projectile while the case is rotated for setting of the fuse.

It is also an object of this invention to provide fuse timing means, as above stated, that may be operated manually or under control of, or in conjunction with a present-day "Sperry director" or similar device.

Still further objects of the invention reside in the provision of novel fuse timing parts in the shell both for base and nose setting of the fuse.

Still further objects of the invention reside in the details of construction and in the combination of parts, and in their mode of use, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, we have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevation of a gun mounting showing the breech end portion of a gun of the anti-aircraft type in which devices embodied by the present invention, have been incorporated.

Fig. 2 is an enlarged, sectional view of the breech end portion of the gun, taken in the vertical plane of line 2—2 in Figs. 3 and 4.

Fig. 3 is a cross sectional detail taken on the line 3—3 in Fig. 2, showing the means for rotating and for determining the extent of rotation of the shell case while the shell is held in the gun.

Fig. 4 is a top view of the breech end portion of the gun as equipped with parts embodying the present invention.

Fig. 5 is a breech end elevation of the gun, showing the breech block in closed position.

Fig. 6 is a view similar to that of Fig. 5, showing the breech block in open position.

Fig. 7 is a cross-sectional detail, taken on the line 7—7 in Fig. 2, showing the rotating ring whereby a shell case is rotated, while contained in the gun, for timing the fuse.

Fig. 8 is a longitudinal, sectional view of a base timed shell embodying means in accordance with the present invention for timing the fuse.

Figs. 9, 10, 11 and 12 are face views, each showing a face view of one of the fuse timing parts used in the shell of Fig. 8.

Fig. 13 is a longitudinal sectional view of a nose-timed shell showing another type of fuse timing mechanism.

Figs. 14, 15, 16 and 17 are face views of parts of the fuse timing means in this latter shell.

Fig. 18 is a view of the breech block actuating shaft of the gun.

Fig. 19 is a longitudinal, sectional view of a cylinder and piston to be used as an alternate means of actuating the shell rotating mechanism of the gun.

Referring more in detail to the drawings—

In Fig. 1, we have shown, in side elevation, an anti-aircraft gun of a type to which the present invention is applicable, and in Figs. 8 and 13, we have illustrated two different types of shells that may be used in guns of the type shown when equipped with fuse setting means according to our invention.

It is to be understood, however, that we do not intend that the present invention shall be restricted to this particular type of gun, or to guns of any particular caliber. Therefore, the present drawings are to be considered more as illustrative of structures that might be used as shown or modified in certain respects as to detail without departing from the spirit of the invention.

Briefly described, the gun as heretofore constructed and as herein illustrated, comprises a supporting structure 10 which, in most instances, would be mounted upon a base, or foundation, 10a in such manner as to permit it to be rotated about a vertical axis for firing in different di-

rections as the need might arise. Fixed on the structure 10 are spaced pivot yoke frames 11—11, between which the gun mounting cradle 12 is located. This cradle is equipped at its opposite sides with trunnions 13—13 which are rotatably fitted in bearings 14—14 formed integrally with the upper ends of the frames 11—11.

Fixed to the under side of the cradle 12, parallel with and between the frames 11—11, is an arcuate elevating rack 15, and meshing with this rack is the elevating worm 16 of a worm shaft 17. The shaft 17 is equipped at one end with a bevel gear wheel 18 that meshes with a bevel gear wheel 19 fixed on a transversely extending elevating gear shaft 20. This latter shaft is revolubly mounted in suitable bearings in the side frame structure and is equipped at one side of the gun with a turning wheel 21. Rotation of the wheel 21 in opposite directions changes the elevation or angle of the gun accordingly, as will be understood.

The gun proper comprises the jacket 25, fitted with a liner 26, as noted in Fig. 2, which is provided with the customary riflings 27. The jacket is contained for recoil travel in the cradle and is formed at its breech end with an enlargement, as at 28, providing a forwardly facing shoulder 29 that will abut the rear end of the cradle to limit forward return of the gun after recoil. The usual recoil and cushion springs are not herein shown, but may be of suitable kind and provided to bring the gun back to normal position, as shown in Fig. 1, after it is fired.

The breech block is designated at 35, and, as here shown, is of the vertically sliding, wedge type, equipped at opposite sides with vertical ribs 36 which are fitted in corresponding slots 37 in the walls at the opposite sides of the breech recess 38. These slots are inclined at slight angle to the plane of the end of the gun so that the block will shift slightly forward in closing and thus, upon engaging the end of the cartridges, will force the latter into the seat as will be understood by reference to Fig. 2.

The upper part of the block is cut away as at 40 to permit insertion of the cartridge in the chamber when the breech is open, and as noted in Fig. 2, there is a T-shaped slot 41 formed in the lower part of the block, inclined upwardly and toward the front face of the block. This slot contains the T-shaped end portion 42 of an operating arm 43 which is operable for the raising and lowering of the breech block. The operating arm 43 is an integral part of a transversely mounted operating shaft 44 rotatable in horizontal bearings 45 fixed to the breech of the gun, as noted in Figs. 5 and 6, and at one end of the shaft 44 is an upwardly directed crank arm 46 formed at its end with an outwardly extended lug 47. Also, on the shaft 44 is a collar 48 equipped with a lug 49 to which one end of a closing chain 50 is attached; the chain being wrapped about the collar and fixed at its forward end to the end of a piston rod 51 having a piston 52 at its forward end, bearing against a coiled spring 53 enclosed in a spring housing 54 which is attached to the jacket 25. When the gun is driven rearwardly in recoil, the shaft 44 moves with it.

As observed in Fig. 4, a rearwardly extending, horizontal bracket 55 is fixed to a lateral flange 56 on the gun cradle and rotatably mounted in this bracket, at its rear end, is a cam lever 57; this cam is in the line of travel of lug 47 on recoil action of the gun and is held by a spring against a stop lug 57', and is free to move backward for passage of the lug 47 of crank arm 46 on recoil of the gun. Then, on return of the gun to normal position after recoil, the lug 47 directly engages the held cam to rotatably actuate the shaft 44 in such manner as to cause the lever 43 to pull the breech block down.

The latching of the breech block in its down position is effected through the action of shell extractor fingers. These fingers 58—58 are located at opposite sides of the breech block, in the breech recess and are provided at their upper ends with inwardly directed lips 59 for engaging beneath the rim of the shell case or base flange when the shell is seated. At their lower ends, these fingers have outside lugs 60 inserted in slotted depressions 61 in the gun jacket at opposite sides of the breech chamber 38. Also, these fingers have inside lugs 62 at their lower ends adapted to be guided in cam grooves 63 in the breech block.

With the breech block closed, ready for firing, the lips 59 of the extracting fingers are disposed in recesses or depressions 64 in the breech end of the shell chamber, as noted in Figs. 2 and 6.

When the gun is fired, and after recoil and counter-recoil movement has taken place, and during the opening action of the breech block by shaft 44, the inside lugs 62 of the fingers following in the grooves 63, until the end lugs lay over the block shoulders 65, thus latching the block in its down position. With this movement of the extractor fingers, the shell is extracted from the gun chamber. When a new shell is inserted into the gun chamber, the base rim or flange of the case engages the toe of the extractors and releases them from their seats in the breech block, and the spring 53 then acts to raise the breech block to its closed position. Firing is by means of the usual firing pin mechanism in the breech block and indicated, in general, by numeral 69 in Fig. 2.

The mechanism of the present invention, insofar as it applied to the structures embodied in the gun itself, is shown best in Figs. 2, 3 and 4. The ammunition for the gun, made in accordance with this invention, is illustrated in detail in Figs. 8 to 17.

First, describing in a general way the shells of Figs. 8 and 13: Each comprises the shell case 70 and the projectile 71. The case of each shell contains the propelling charge, designated at 72, and the projectile body in each instance has a base end chamber 73 containing a bursting charge, designated at 73b. Each shell case also is provided about its base end with an extractor flange 70b and just forwardly of the flange is fitted with a rotating band or ring 75 of relatively soft metal. The forward end portion of the shell case is fitted about the base end portion of the projectile, with its edge or rim curled inwardly and seated in a buttress type groove 76 encircling the projectile body. Just ahead of the groove 76, the projectile body has a rotating band 77 of soft metal fitted thereto. When a shell, as above described, is loaded into the gun, the band 77 engages with the beveled and pointed ends 27' of the barrel riflings, as seen in Fig. 2, and the projectile is thereby held against rotation in the gun. Likewise, in seating a shell in the gun, the soft ring 75 is interlocked with inwardly directed teeth or serrations 79 of a rotatable timing gear 80, of annular form that is contained rotatably in the rear end of the shell chamber.

As seen in Figs. 2 and 3, the ring gear 80 is

fitted within the gun jacket between the flat, rear end surface of the liner 26 and a retaining ring nut 82 that is threaded into the rear end of the jacket at the base of the breech recess 38; there being also a locking ring, or nut 83 threaded into the gun jacket to engage the end shoulder 26' of the liner as noted in Fig. 2, and this nut is flush with the end surface of the liner and serves as a bearing surface for the inner face of the ring gear 80.

With the shell seated in the gun chamber, as shown in Fig. 2, and with the soft metal rings 75 and 77 engaged respectively with the serrations of ring gear 80 and the barrel riflings, it will be understood that upon rotation of the gear 80, the shell case will be rotated accordingly, while the projectile is retained against rotation in the gun.

In the present instance, the rotation of the shell case relative to the projectile effects the setting of the fuse timing mechanism which is contained at the base of the projectile and which will be described in detail after describing the means which we have incorporated in the gun for rotating the ring gear to time the fuse. This mechanism is disclosed best in Figs. 3 and 4, and comprises a horizontally disposed rack bar 90 contained slidably in a transverse guideway 91 in the gun and fitted at one end with a collar or sleeve 92 which extends from the side face of the gun jacket, with the corresponding end portion of the rack bar extending somewhat beyond the end of the sleeve. At its other end, the bar 90 is shouldered, as at 94, and seats a washer 95 which engages one end of a coiled spring 96 contained in a spring housing 97 fixed to the gun jacket. The spring is under compression and operates to urge the rack bar in one direction, that being toward the right-hand side in Fig. 3, sufficient to rotate the shell casing one or less revolutions.

Now, by reference to Figs. 3 and 4, it is to be noted that there is a short horizontally disposed shaft 100 rotatably supported lengthwise of the gun in bearing 101—101 extending from the side of the gun jacket at the breech end. On one end of the shaft is an upwardly extended lever arm 102 with forked end 103 engaging the outer end of sleeve 92 at opposite sides of the extending end of bar 90. On the other end of shaft 100 is a downwardly extending lever arm 105 mounting a roller 106 at its end. This roller is in alinement with a cam surface 107 on a lug 108 formed on the side of the breech block. Thus, when the breech block is moved to open position, this cam engages the roller 106 and actuates the lever arm 105 to rotate shaft 100 and cause lever arm 102 to push the rack bar 90 inwardly to its limit of travel, where it will be held until the breech block is raised.

When a loaded shell is introduced into the gun, and the breech block released and lifted, the cam 108 then releases the lever 105 and the spring 96 moves the rack bar outwardly until it is stopped. This stopping point may be varied by mechanism now to be described, thus to determine the time setting of the shell fuse.

This fuse setting control mechanism is shown in Figs. 3 and 4, and is contained in a housing 115 carried by a bracket 116 attached to a lateral flange 56' of the gun cradle 12. The fuse setting mechanism is intended to be operated manually or in accordance with or under control of a "Sperry director" or a like device through reference to a dial 117 rotatably mounted in the housing 115 and operated in the usual manner of the fuse timing dial as used on guns of the type described. During the usual use of the gun, the dial 117 is turned, by suitable electrical means, through a connection as designated at 118, by the "director" and is "kept on the target," indicating proper length of fuse for timing the bursting position of the projectile. Another dial 119 of smaller diameter concentrically overlies the dial 117 and this rotates on a fixed supporting stud 120. Dial 119 is operated through suitable gear reduction, indicated by the gear wheels at 121, 122 and 123, by a gear wheel 124 that is integral with or fixed coaxially to a worm gear 125. The worm gear 125 is threaded on a timing pin 126 that is held in its guides by keys 127 for longitudinal travel and against rotation. The pin 126 is therefore adjustable longitudinally to different positions by rotation of the worm gear 125, and since it is alined with the rack bar 90, it serves to limit extent of outward travel of the latter, as will be understood by reference to Fig. 3.

Gear 125 is manually rotated to adjust the timing pin 126 and to actuate the dial 119 by turning of hand wheels 130 fixed on the ends of a shaft 131 extending transversely through the housing 115, and equipped with a worm 132 meshing with the gear 125.

In operation of this timing mechanism, the operator sits before the indicator dials 117 and 119, and by turning the wheels 130, manually adjusting the dial 119 so that a given mark or character thereon matches up with a given mark on the dial 117, which is under control of the "director". The gearing before described will move the dial 119 substantially through one revolution for the full endwise travel of the timing pin 126 and likewise, the "director" will move dial 117 substantially one complete revolution for the total range or distance through which the gun is intended to operate.

It is apparent then that through the controlled extent of rotation of the gear 80, by the position of the timing pin 126, the fuse can be cut or timed to regulate the bursting point of the projectile as decided by the "director" without regard to the human element of time, which must be considered in cutting fuses and placing the ammunition in the gun by the present day methods.

It should also be understood that the breech block may be closed and the gun made ready for firing, yet a delayed action may be permitted to take place without in any way interfering with timing of the fuse, since the operator will be able to continue matching the dials up to the actual firing time.

Now, describing the fuse timing or cutting means as incorporated in the shells, first giving consideration to the shell of Fig. 8, which is of the base timed type, and bearing in mind that the projectile and shell case are relatively rotatable and that the fuse cutting is determined by the extent of rotation of the case relative to the projectile as held in the gun:

The fuse cutting means as incorporated in the shell of Fig. 8 comprises a timing ring 150 that is rotatably fitted in a rearwardly opening base recess 151 in the projectile body. This ring is held in place by an overlying retainer ring 152 that is threaded into the recess and secured against turning. Secured in the shell case, closely adjacent the retainer ring is a closure plate 154 and at the center of this plate, a shaft 155 is fixed and extends rotatably through a central opening 156 in the retainer ring 152 and at its outer end has a

squared portion slidably fitted in a square socket 157 on the timing ring 150. Thus, on rotation of the shell case, the timing ring will be rotatably adjusted accordingly.

A feature of this arrangement of parts resides in the fact that the shaft 155 has a tapered portion 155' and that the hole 156 in the retainer ring is tapered accordingly with looseness sufficient for turning. However, when the projectile is discharged by the explosion of the propelling charge in the shell, the tapered portion of the shaft will be forcibly wedged into the hole, and thus a gas-tight seal is made and the timing ring locked in its finally adjusted position.

The closure plate 154 has a plurality of eccentric ports 160 that open therethrough in communication with an annular channel or groove 161 in the adjacent face of the retainer ring 152. Also, there is a port 162 from this channel of the retainer ring, opening through the ring into an arcuate groove 163 in the adjacent face of the timing ring 150, and from the end of this arcuate groove, a port 165 opens through the plate into an arcuate channel 166 in the bottom surface of the projectile body recess 151, and from this groove, a port 167 opens into projectile chamber 73 containing the bursting charge.

As will be observed in Figs. 8 and 11, there are provided a plurality of gas vents or outlet ports 168 that are directed outwardly and rearwardly from a channel 169 that encircles the timing disk 150, and with which channel, a port 169', which leads from the passage 165, communicates. As soon as the projectile leaves the shell, the ports 168 are uncovered for the exhaust of gas from the fuse train.

Assuming that a powder train fills the various ports and channels above mentioned, it is quite apparent that, on ignition of the powder train incident to firing the propelling charge in the case, the flame will follow therealong to the bursting charge, and the time for this travel can be controlled by the rotary adjustment of the timing ring 150 to increase or decrease the effective length of the connecting channels.

In the shell of Fig. 14, which is of the nose timed type, the nose body 170 is formed with a base socket or recess 171 in which a timing ring 172 is rotatably fitted and secured by a retainer ring 173 threaded into the recess. Extending rotatably through a central opening 174 on the ring 173 and through the base end of the projectile body is a shaft 175. This has a longitudinal bore 176 open at one end into the bursting charge chamber 73, and at its other end to an encircling pocket 177 in the retainer 173 from which chamber a radial channel 178 extends. From the channel 178, a port 178' opens forwardly from the face of the retainer, into an arcuate groove 179 in the adjacent face of the timing disk 172. The shaft 175 has a squared end portion 175', as seen in Fig. 13, extending beyond the base wall of the projectile, and this is fitted in a squared socket 180 in a closure plug or plate 181 fitted and secured in the shell case. At its forward end, the shaft is extended into a central bore 182 in the ring 172 and is fixedly secured by a wedge screw 183 that is threaded into the shaft end. Thus, on turning the shell case, the timing ring 172 will be rotatably adjusted accordingly through the mediacy of the shaft 175.

The timing ring 172 has a port 185 opening from the end of channel 179 and this communicates with an arcuate channel 187 in the base of recess 171 from which a passage 188 leads to a port 188' opening into the concussion powder socket 189 in which the concussion plunger 190 is confined by the closing cap 191.

Also, there are gas vents as at 192 leading from the channel 187, and vents 192' leading from channel 193 that encircles the ring 172. A port 194 connects the passage 193 with channel 179 for venting the gases from the channels and ports for the fuse train.

Assuming the fuse channels and ports to be filled with the proper fuse powder, it is quite apparent that, on igniting the powder pellet in port 188' by the action of the concussion plunger, the fire will advance through port 188, channel 187, port 185, groove 179, port 178', channel 178, chamber 177 and through tube 175 to the bursting charge. The time of burning of this fuse is determined by the lengthening or shortening of the channel as effected by the rotary adjustment of the timing ring 172 as effected by the turning of the shell case in the gun relative to the projectile body.

With the gun so constructed, and the shells thus equipped with the fuse setting or cutting means, it is quite readily apparent that the cutting may be accomplished in the gun. Furthermore, the setting will be in accordance with the degree of accuracy of the operator in matching dials, since with the opening of the gun breech block, the setting mechanism in the gun breech is brought to a zero position against the pressure of the rack bar spring and then, on closing the breech block, the extent of rotation of the shell is determined by the extent of outward travel of the bar which, in turn, is determined by the setting of the pin 126.

It is contemplated in the construction of guns of this kind that the rack bar 90 might be actuated by gas or fluid pressure in lieu of the spring 96. To accomplish this, the structure of Fig. 19 would be employed. In this, the washer 95 is replaced by a piston 95x fitted in the cylindrical spring housing, and gas or fluid medium under pressure would be confined in the housing to act against the piston, thus to produce the same effect as is produced by the spring.

In order to simplify the claims and to impart a better understanding of what is intended to be covered thereby, it will here be stated that ammunition of the kind suitable for use in this gun will be referred to as "fixed ammunition" and this term shall apply to that ammunition which has been illustrated in detail in Figs. 8 and 13, or to various modifications that might be employed. The thought to be imparted is that all those claims drawn on the gun structure shall be applicable for any ammunition embodying a timing fuse that is designed to be set by a relative rotation of the shell case and projectile and means is provided on these parts whereby this may be accomplished.

Having thus described our invention, what we claim as new therein and desire to secure by Letters Patent is—

1. A gun for the firing of fixed ammunition of the character described having the shell case and projectile each equipped with rotating bands for effecting relative rotation of these parts for timing the fuse; said gun having a breech block movable between open and closed positions and having abutments in the barrel for holding engagement with the rotating band of the projectile, a ring rotatably contained in the barrel to receive the shell case therein and having projections to holdingly engage with the rotating

band of the shell case, a bar movably mounted in the gun to rotate the said ring for timing the fuse, resilient means acting against the bar to move it for rotating the said ring and shell case, a manually adjustable stop for determining and limiting travel of the bar in rotating the ring gear for fuse setting, and means operable incident to moving the breech block to open position to adjust the ring to an established starting position, and operable incident to closing the breech block to release the said bar for travel under influence of said resilient means and to the extent permitted by the said manually adjustable stop.

2. A gun for the firing of fixed ammunition having the shell case and projectile each equipped with rotating bands and assembled for relative rotation to effect setting of the fuse; said gun having a breech block movable between open and closed positions and having riflings in the barrel to be engaged by the rotating band of the projectile to hold it against rotation for fuse setting, a ring gear rotatably fitted in the barrel at its breech end to receive the shell case therein and having projecting parts to be engaged by the rotating band of the shell case for rotation of the latter, a rack bar slidable in the gun and engaging the ring gear for its actuation, a spring held under compression and acting against the bar for rotating the ring gear and shell case to set the fuse, a manually adjustable stop for limiting travel of the rack bar in a fuse setting operation, and means actuated incident to shifting of the breech block to open position for moving the rack bar and ring gear to an established starting position and for releasing the bar incident to moving the breech block to its closed position for travel to the extent permitted by the said manually set stop.

3. A gun as in claim 2 wherein the breech block has a cam formed thereon and wherein the means for actuating the rack bar to starting position comprises a lever pivotally mounted on the gun and positioned to be actuated by the said cam on the breech block.

4. In a round of base timed ammunition of the character described, a shell case, a projectile assembled with the case for relative rotative adjustment therein, and formed with a rearwardly opening socket in its base end wall, a fuse timing ring rotatably fitted in the socket, a cover plate for the socket overlying the said ring and having a central opening, a closure plate fixed in the shell case adjacent the said cover plate, and a shaft extending through the central opening of the said cover plate and having one end fixed against rotation in the said timing ring and its other end fixed against rotation in the said closure plate.

5. A round of ammunition as in claim 4, wherein said central opening of the cover plate is forwardly tapered, and said shaft has a correspondingly tapered portion adapted to be wedged in said opening in a gas-tight joint under the influence of the exploding propelling charge, and for locking the timing ring against rotation.

6. In ammunition of the character described, a shell case, a projectile assembled therewith for relative axial rotation, and having an inwardly tapered conical opening in the base wall, a fuse and a timing mechanism therefor mounted in the projectile, a closure member for the shell fixed therein against relative rotation, and a rotary shaft for setting the timing mechanism, extended from the base end of the projectile, and having a non-rotating connection with the said closure plate, and having a part adapted to be wedged into said conical base opening of the projectile under the force applied against the closure plate by explosion of the propelling charge.

7. In a round of nose timed ammunition, a shell case, a projectile assembled therewith for relative rotative adjustment for setting a fuse, a fuse setting mechanism mounted at the nose of the projectile and including a rotatable timing ring, a closure plate fixed in the shell case and a rotating shaft for the ring extending axially of the projectile and through the base wall thereof, and having its end fixed against rotation in the said closure plate; said shaft having a powder channel longitudinally thereof, open at its ends respectively to the timing fuse and to the detonating charge for the projectile; said base wall of the projectile having a conically tapered opening through which the shaft extends, and said shaft having a conical collar fixed thereon and adapted to be wedged into the said opening in a gas-tight joint by the action of the exploded propelling charge.

MERTON L. DODGE.
WILLIAM V. BAKER.