Feb. 16, 1926. 1,572,998

R. HARRIS

INTERNAL COMBUSTION ENGINE STARTING MECHANISM

Filed April 16, 1923 3 Sheets-Sheet 1

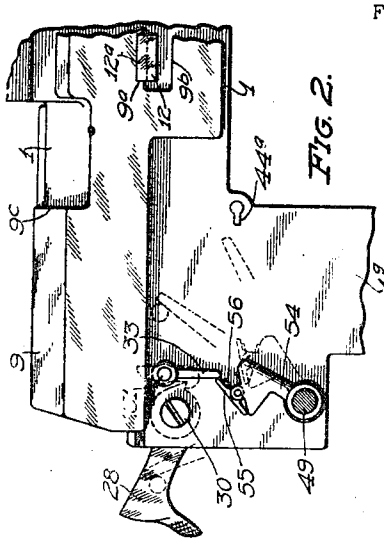


Fig. 2.

Fig. 1.

Fig. 3.

Fig. 4.

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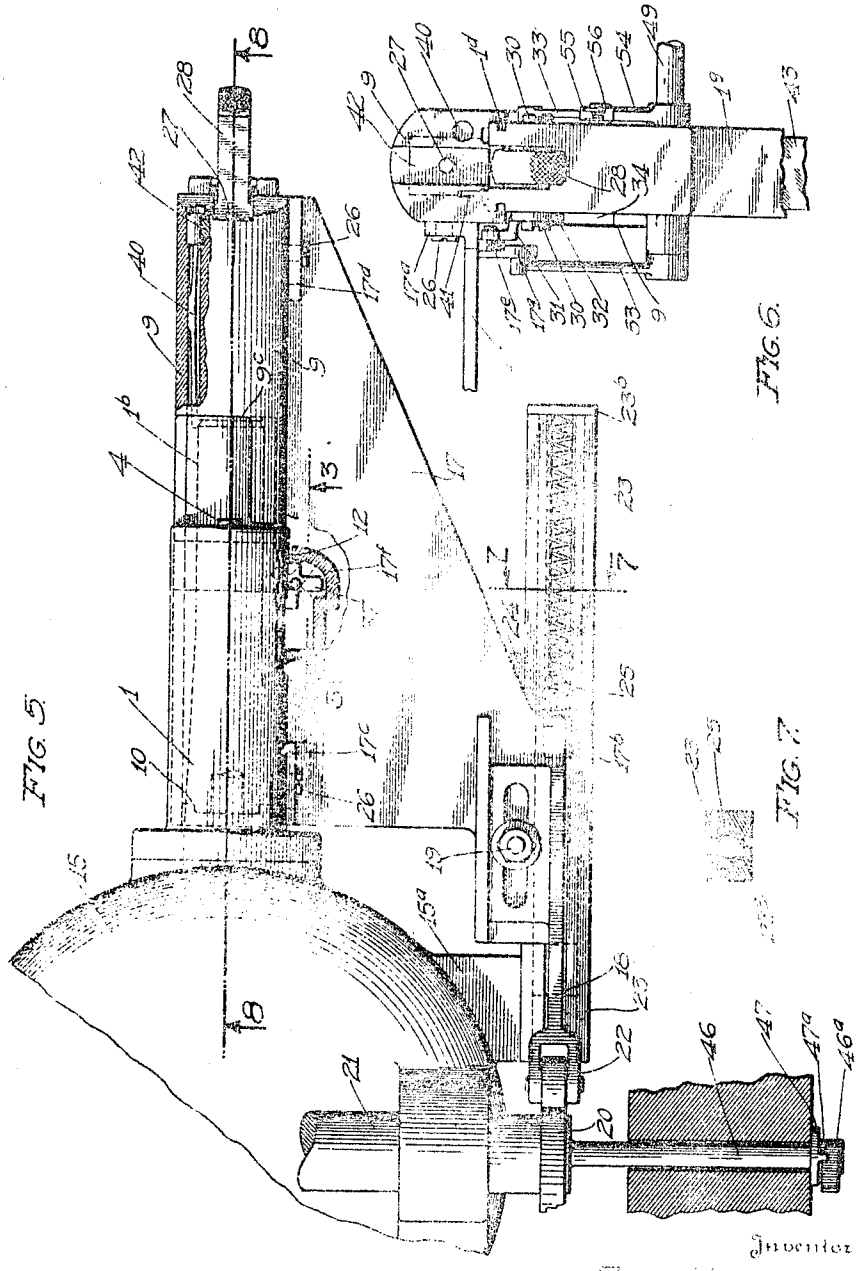


FIG. 5

FIG. 6.

FIG. 7.

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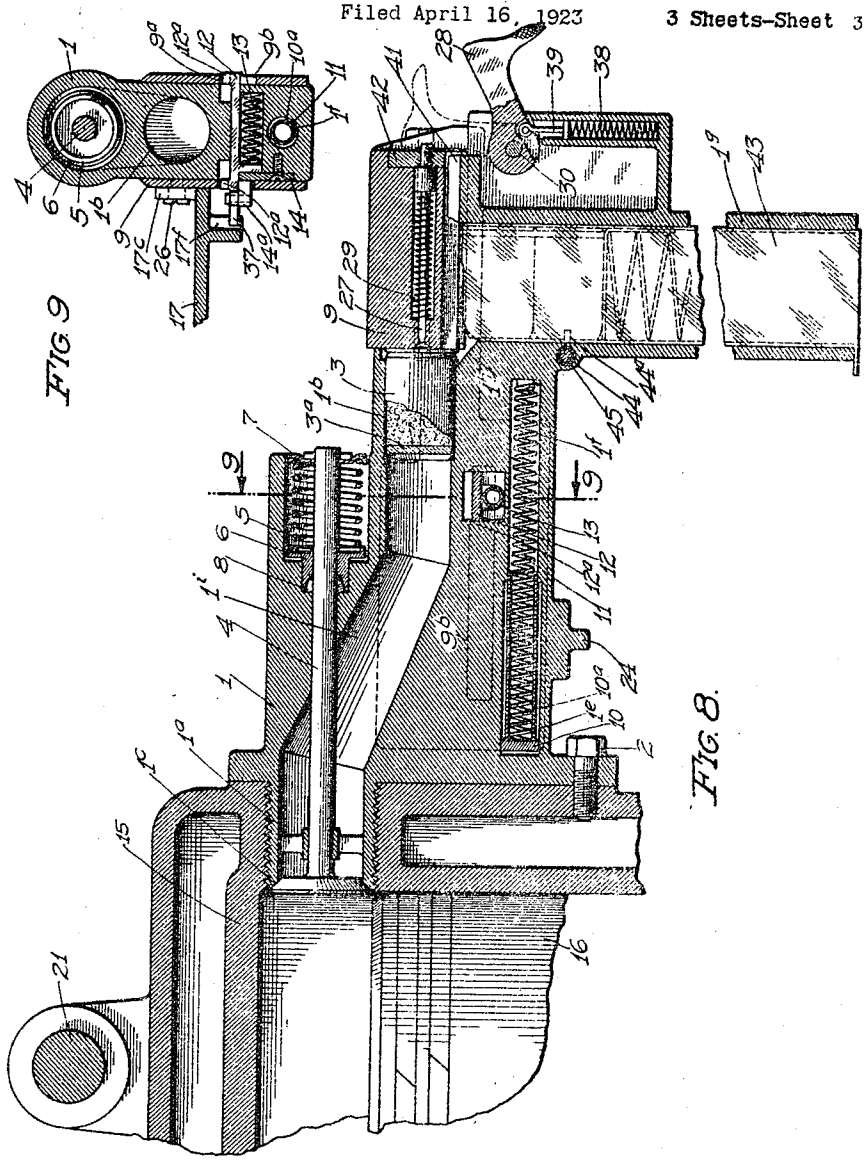


FIG 9

FIG. 8.

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1,572,998

UNITED STATES PATENT OFFICE.

REX HARRIS, OF SAN DIEGO, CALIFORNIA.

INTERNAL-COMBUSTION-ENGINE-STARTING MECHANISM.

Application filed April 16, 1923. Serial No. 632,356.

To all whom it may concern:

Be it known that I, REX HARRIS, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented a certain new and useful Internal-Combustion-Engine-Starting Mechanism, of which the following is a specification.

My invention relates to an internal combustion engine starting mechanism, and the objects of my invention are: First, to provide a mechanism of this class which is particularly light of weight and compact and therefore adapted for airplane engine starting; second, to provide a mechanism of this class which will function properly irrespective of the position of the engine, and a mechanism in which no battery is used, therefore being especially adaptable for airplane engine starting; third, to provide a mechanism of this class which is adapted to rotate the engine a number of revolutions, which is shifted in operative position from the driver's or pilot's seat and which may be shifted in disengaged or inoperative position from the operator's or pilot's seat when desired; fourth, to provide a mechanism of this class in which the starting force is directed against the piston of one of the engine cylinders; fifth, to provide a mechanism of this class in which the gases of the starting mechanism are directed through the wall of the engine cylinder into the combustion chamber thereof; sixth, to provide a mechanism of this class in which a novelly constructed cartridge is used for providing the energy for rotating the engine; seventh, to provide a mechanism of this class in which the explosion chamber of the mechanism is adapted to communicate with and automatically sealed from the combustion chamber of the engine cylinder after the explosion of a cartridge in the starting mechanism; eighth, to provide a mechanism of this class containing a plurality of such cartridges for successively directing an explosive force against the engine piston every other revolution of the engine; ninth, to provide a mechanism of this class which is timed with the engine and operated by the cam-shaft thereof; tenth, to provide a means in connection with a mechanism of this class for indicating the starting position of the engine for the starting mechanism; eleventh, to provide a mechanism of this class which will heat the engine cylinder and therefore facilitate the starting of the engine; twelfth, to provide a mechanism of this class which will provide effective means for igniting the gases in the engine cylinder; thirteenth, to provide a novelly constructed mechanism of this class, and fourteenth, to provide a mechanism of this class which is very simple and economical of construction, durable, and which will not readily deteriorate or get out of order.

With these and other objects in view as will appear hereinafter, my invention consists of certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon which form a part of this application, in which:

Figure 1 is a fragmentary, left side elevational view of my internal combustion engine starting mechanism supported by the front cylinder of an engine and positioned on the left-hand side thereof, showing the engine cylinder fragmentarily and showing certain other parts and portions broken away and in section to facilitate the illustration, also showing by dotted lines certain shifted positions of various members thereof; Fig. 2 is a fragmentary, right side elevational view thereof, showing by dotted lines certain shifted positions of certain members; Fig. 3 is a fragmentary, sectional elevational view thereof taken through 3—3 of Fig. 5; Fig. 4 is an elevational view of the quadrant means for shifting the mechanism in certain positions; Fig. 5 is a plan view thereof showing certain parts and portions thereof and of the engine broken away and in section to facilitate the illus-

tration; Fig. 6 is a fragmentary, rear elevational view thereof; Fig. 7 is a sectional view thereof taken through 7—7 of Fig. 5; Fig. 8 is a sectional, elevational view thereof taken through 8—8 of Fig. 5 showing certain parts and portions in elevation to facilitate the illustration and showing certain shifted position of certain movable parts, and Fig. 9 is a transverse sectional, elevational view thereof taken through 9—9 of Fig. 8.

The main frame 1, screw 2, cartridge 3, tappet valve 4, spring 5, ring compression member 6, washer 7, sealing ring 8, breech member 9, spring actuating member 10, spring 11, breech locking member 12, spring 13, plate 14, engine cylinder 15, piston 16, operating members 17 and 18, bolt 19, cam member 20, cam-shaft 21, roller 22, guide member 23, bracket 24, spring 25, screws 26, firing pin 27, trigger 28, spring 29, screws 30, pawl 31, trigger member 32, arm 33, spring 34, tripping member 35, spring 36, breech lock shifting member 37, trigger spring 38, plunger 39, extractor 40, ejector 41, retaining plate 42, magazine 43, magazine latch member 44, spring 45, indicating finger supporting arm 46, arm support 47, quadrant member 48, operating rod 49, lever 50, catch member 51, catch spring 52, arms 53 and 54, pawl 55, and the pawl spring 56, constitute the principal parts and portions of my engine starting mechanism.

When using my starting mechanism in connection with airplane engines the mechanism is preferably connected with the cylinder near the propeller to reduce the strain on the crank-shaft and is also preferably positioned on the left-hand side of the engine. The main frame 1 is supported by the engine cylinder by the hollow, externally threaded, extended portion 1^a, which is adapted to be screwed through the wall of the engine cylinder, the hollow portion thereof communicating with the combustion chamber of the engine. Said frame member 1 is locked in position by the screw 2 at the lower end thereof. Said frame member 1 is provided near its opposite end with a bore 1^b which is adapted to receive the cartridge 3 and which bore is offset from and communicates by means of a diagonal port 1^c with the hollow portion at the opposite end of the member 1. Centrally in the hollow portion 1^a of said member is reciprocally mounted a tappet valve 4 which is seated against the seat portion 1^c at the end of the extended portion 1^a and is retained against said seat by means of the spring 5 interposed between the ring compression member 6 and the spring retaining washer 7 positioned at the end of the stem of said valve. Positioned around the stem of said valve between a shoulder of the frame 1, outside of the explosion chamber, and the ring compression member 6, also positioned around the stem of said valve, is the split, conical, sealing ring 8, which is compressed around the stem of the valve by the member 6 and the spring 5. The breech member 9, which retains the cartridge 3 in position in the bore of the main frame 1, is reciprocally mounted on said frame and guided by the grooves 1^d at the sides near the outer end and top face of said frame and is further guided by the spring actuating member 10 secured to the bifurcated portions at the other end of the breech member 9 and reciprocally mounted in the slot 1^e at the lower portion of the main frame 1. Said breech member 9 is retained in a forward position, or towards the engine cylinder, by the spring 11 positioned in a recess 1^f in the lower portion of the main frame 1 in which is reciprocally mounted the cylindrical portion 10^a of the spring actuating member 10 in which is positioned the other end of the spring 11. The breech member 9 is locked in said forward position by the breech locking member 12 which is reciprocally mounted transversely in the frame member 1 and provided with upwardly extending lugs 12^a adapted to engage similar slot portions 9^a on the under side of the longitudinally slotted portions 9^b in the bifurcated or side portions of the breech member 9, as shown best in Figs. 2 and 9. The lugs 12^a of the breech locking member 12 are held in engagement with the recess portion of the breech member 9 by means of the compression spring 13, positioned between a downwardly extending lug of the breech locking member and the wall of the main frame 1, as shown in Fig. 9. Said breech locking member is retained in said main frame by the plate 14, positioned against the downwardly extending lug of said breech locking member.

It will be noted that the cartridge explosion chambers of my mechanism communicate with the combustion chamber of the engine cylinder 15 between the cylinder head thereof and the piston 16, reciprocally mounted therein, as shown best in Fig. 8 of the drawings.

The breech is unlocked and forced backwardly by the operating members 17 and 18, which are adjustably secured together by means of a bolt 19, fixedly positioned in one of said members and extending through a slotted portion of the other of said operating members, the adjustment being provided for different engines. The operating member 18, together with the member 17, is reciprocated by means of the cam member 20, secured to the end of the cam shaft 21 revolubly mounted above the engine cylinders, said cam member engaging a roller 22, revolubly mounted at the upper end of the extended arm 18^a of the member 18. The

operating members 17 and 18 are provided with downwardly extending, T-shaped portions 17^a and 18^b, which portions are reciprocally mounted in the guide member 23, which is supported at its one end by a lug 15^a, secured to the engine cylinder and near its other end by a bracket 24, secured preferably to the main frame 1, as shown best in Figs. 1 and 5 of the drawings. The rear portion of the guide member 23 is provided with a circular hole 23^a, shown in Fig. 7, in connection with the T-shaped slotted portion thereof, extending a considerable distance into the same from its outer end, in which is positioned the compression spring 25, which engages at its rear end the plate 23^b at the end of said guide member, and at its forward end a downwardly extending lug 17^b at the rear end of the downwardly extending, T-shaped portion of said member. It will be noted that the spring 25 is adapted to keep the operating members 17 and 18 in engagement with the cam member 20, which cam is so shaped to operate and time the starting mechanism with the engine. The operating member 17 is provided at the portion adjacent the breech member 9 with slotted, upwardly extending lugs 17^c and 17^d, through which slotted portions extend the screws 26, which are secured at the front and rear portions of the breech member 9, as shown best in Figs. 1 and 5 of the drawings.

In the rear, head portion of the breech member 9 is reciprocally mounted the firing pin 27, which extends through said head member, its forward end being adapted to engage the detonating cap of the cartridge and it rear end being adapted to be engaged by the trigger 28, substantially as shown in the drawings, a spring 29 being positioned around said firing pin to retain the same in an outward position. The trigger 28 is pivotally mounted at the rear end of the main frame 1 by means of the screws 30 and the trigger member 32, and is adapted to be cocked by the breech member 9 being forced backwardly by the operating member 17. Said trigger is retained in its cocked position by means of the pawl 31 engaging a lug 32^a on the trigger member 32, positioned on the outside of the frame 1 and secured to the trigger 28 by the screw 30. Said pawl 31 is pivotally mounted in the main frame 1 and extends through said frame, at the opposite end of which is provided and arm 33. Said pawl is retained in engagement with the trigger member 32 by means of the spring 34 and is released from engagement with the lug of said trigger member by the tripping member 35, pivotally supported on the lug 17^e on the under side of the operating member 17. The portion of the tripping member 35 engaging the pawl 31 is held in engagement therewith or in a downward position by the spring 36 secured to the member 17.

The breech lock retaining plate 14 is provided with an outwardly extending lug 14^a, on the upper side of which is pivotally mounted the breech lock shifting member 37, which is substantially T-shaped, the one leg of which engages one end of the breech locking member 12 for disengaging the lugs 12^a thereon from the slotted portions of the breech member as shown in Figs. 8 and 9, and the opposite leg of which serves as a stop against the main frame. The outwardly extending leg of said member 37 is adapted to be engaged by the cam portion 17^f on the under side of the operating member 17 for rotating said member 37, whereby said breech locking member is shifted in disengagement with the breech member 9, and also to facilitate the return of the member 37 to its original position.

When the trigger 28 and trigger member 32 are released by the pawl 31, said trigger 28 is forced in engagement with the firing pin by reason of the spring 38 positioned in a recess at the rear porton of the main frame and connected with the trigger 28 by means of a plunger member 39, the lower end of which is positioned in said recess against the spring, and the upper end of which is pivotally connected with the trigger 28.

After the cartridge is exploded the breech member 9 is shifted backwardly and the resilient extractor 40, positioned in the breech member 9 and engaging the annular channel portion of the cartridge, withdraws the empty, discharged cartridge from the bore 1^b of the main frame 1. As the empty cartridge shell is drawn backwardly by the extractor a certain distance, it is ejected by the ejector 41 engaging the edge of the shell and forcing the same through the opening 9^e at the upper portion of the breech member 9. Said extractor and firing pin are retained in the head of said breech member by the retaining plate 42, substantially as shown in the drawings.

The main frame 1 is provided at its rear portion with a downwardly extending, hollow portion 1^g, in which is adapted to be positioned the magazine 43, containing the cartridges, and is locked in position in said hollow portion by means of the latch member 44 extending through said main frame, the one side of which is provided with an extended portion adapted to be manually depressed, and the opposite end of which is provided with an inwardly extending lug 44^a for engaging a corresponding slotted portion of the magazine 43. Said inwardly extending lug 44^a is retained in engagement with the slotted portion of the magazine by a spring 45, positiond between the enlarged, extended portion of the latch member and a shoulder in the recess through

which it extends. As the empty shell is ejected and the breech member 9 is drawn backwardly, the uppermost cartridge in the magazine is forced upwardly and retained in a position substantially half above and half below the upper end of the magazine by reason of an inwardly bent portion at both sides of the upper end of said magazine. As the breech member 9 is forced forwardly the same engages the rear end of the cartridge, thus positioned in the magazine, and forces the same forwardly into the bore 1^b of the frame 1, it being noted that the forward end of the cartridge while in the magazine is slightly higher than its rear end and is facilitated in entering the bore 1^b by reason of the beveled portion 1^b of the main frame 1 adjacent the bore, substantially as shown in Fig. 8 of the drawings.

It will be noted that in order to start the engine the same is turned so that the piston in the cylinder to which my mechanism is connected has passed the top dead center of its explosion stroke, or until the cylinder is in a retarded firing position. To indicate this position of the engine I have provided an extended arm 46 secured centrally to the cam-shaft 21 of the engine, which arm preferably extends through a recess in the radiator or forward of the engine, and is provided on the end extending there-through with an indicating finger 46^a which, when aligned with a lug portion 47^a on the arm supporting member 47, which supports the extended end of the arm 46 in front of the radiator, indicates such position for starting, as shown by dotted lines of the indicating finger in Fig. 1 of the drawings. The positions shown by solid lines of said indicating finger and the positions shown by solid lines of the other members of the mechanism indicate a position of the mechanism after the mechanism is loaded, the trigger cocked and in a position ready to fire the cartridge.

To shift my starting mechanism in operating and out of operating position I have provided a quadrant and lever means to be positioned near the driver's or pilot's seat. The quadrant member 48 consists of an annular member with a plurality of notches 48^a, indicating respectively the safe position of the mechanism or that the breech is open, the position indicating a locked breech and a firing position of the lever and mechanism. Revolubly mounted in the central portion of the quadrant 48 is a rod 49 on which is mounted the lever 50, which lever is provided at its handle portion with a catch member 51 pivotally supported thereon with its one end engaging the periphery of the quadrant member and the notched portions provided therein, a spring 52 being provided between the other end of said catch member and the handle portion of said lever to retain said catch member in said notched portions. Said rod 49 extends through and is revolubly supported at its other end in the main frame 1, at the end of which is secured an arm 53 which is adapted to engage a lug 17^e on the under side of the operating member 17, as shown best in Figs. 1 and 6 of the drawings. On the other side of the main frame 1 and on the rod 49 is secured an arm 54, at the extended end of which is pivotally mounted a pawl 55, which is adapted to engage the end of the arm 33, secured to the opposite end of the pawl 31 extending through the main frame. A torsion spring 56 is interposed between the pawl 55 and the outer end of the arm 54 to retain the pawl 55 in an outward position and permit the same to be depressed when the arm 54 is rotated in the backward direction.

To start the engine it is necessary first to line up the indicating finger 46^a with the lug 47^a shown in Fig. 5, it being assumed that the mechanism is in a disengaged and inoperative position, as indicated by the lever 50 relative to the quadrant member 48 in Fig. 4 of the drawings, which position is also indicated by the position of the breech member, operating members and operating member shifting arm 53 by dotted lines in Fig. 1 of the drawings. The lever 50 is then shifted to the notch indicated by "Breech locked" on the quadrant 48, which breech, when shifted from its open to its closed position, takes the uppermost cartridge 3 in the magazine 43 and positions the same in the bore of the main frame 1, which will permit the breech member 9 to be carried to its foremost position by the spring 11 and which will permit the operating members 17 and 18 to be carried forwardly until the roller 22 engages the cam member 20 on the cam-shaft 21, the point of engagement of the roller with the cam member at this instant being at 20^a; thus the operating members will not be in their extreme forward positions. However, the breech lock shifting member 37 will be released by the cam portion 17^f of the operating member 17 and permit the breech locking member to engage the breech member, thus locking the same, and also the pawl tripping member 35 will not be moved forward sufficiently to positively engage the pawl 31, said pawl having been retained in engagement with the trigger member 32 by the spring 34, retaining the trigger in a cocked position. When the lever 50 is shifted from the position indicated by "Breech locked" to the firing position indicated by "Fire," the pawl 55 at the end of the arm 54 will engage the downwardly extending arm 33, secured to the pawl 31, disengaging said pawl 31 from the trigger member 32 and permitting the trigger to fly forwardly by reason of the spring 38 behind the same,

forcing forwardly the firing pin and discharging the cartridge. The cartridge 3 is composed of a shell with highly explosive powder and preferably a paraffin wad 3^a, which will readily burn up by the explosion. The gases from the explosion of the cartridge passing through the bore, the diagonal, hollow portion, and the hollow portion at the extended end of the main frame 1, will open the tappet valve, reciprocally mounted therein, permitting the gases to enter the combustion chamber and forcing the piston of the engine downwardly, rotating the engine. When the engine is rotated the cam member 20 will force the operating members 17 and 18 outwardly, shifting the breech locking member from engagement with the slotted portions of the breech member, by means of the breech lock shifting member 37, actuated by the cam portion 17^f, permitting the breech member to be carried outwardly with the operating member 17 when the slotted portions in the upwardly extending lugs thereof engage the screws 26 on the breech member. The breech, when moving backwardly carrying the extractor, will extract the cartridge from the bore of the main frame 1, and when the same is carried a sufficient distance outwardly, the ejector 41 will engage the edge of the shell of the cartridge, forcing the same through the opening 9^c in the breech member. Also the breech member moving backwardly will rotate the trigger 28 about its pivotal mounting and cock the same, permitting the pawl 31 to engage the notch in the trigger member 32. There being no means to prevent forward movement of the breech member and operating members, the springs 11 and 25 will carry said members forwardly towards the engine cylinder, depositing another cartridge in the bore of the main frame, and the operating members 17 and 18 being permitted to move a greater distance inwardly than in the first cycle, will permit the tripping member 35 to engage the end of the pawl 31. When the members 17 and 18 are forced outwardly by the cam, the initial raise in the cam will permit the operating members to be moved outwardly a slight distance without the breech member, by reason of the slots in the lugs 17^c and 17^d, tripping the pawl 31, releasing the trigger, discharging the cartridge, and again forcing downwardly the piston of the engine cylinder. The operating member 17, when the cartridge is discharged, will not have moved the full distance permitted by the slots in the lugs 17^c and 17^d, and permits the cam portion 17^f to actuate the breech lock shifting member 37, unlocking the breech. By the time the breech is unlocked, the inner ends of the slotted portions in the lugs 17^c and 17^d will have engaged the screws 26, carrying with the same the breech member and continuing the cycle of operation. To disengage the mechanism from the cam 20, the lever 50 is shifted from the firing position to the safe position indicated by "Breech open," as shown on the quadrant member 48.

Though I have shown and described a particular construction, combination and arrangement of parts and portions, I do not wish to be limited to this particular construction, combination and arrangement, but desire to include in the scope of my invention the construction, combination and arrangement substantially as set forth in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a mechanism of the class described, the combination with an internal combustion engine cylinder and a piston reciprocally mounted therein, of a cartridge exploding mechanism communicating with said engine cylinder and operative in connection with the mechanism of said engine, a piston position indicating means in connection with said mechanism, and a lever means in connection with said cartridge exploding mechanism for shifting said mechanism in disengaged position from said engine mechanism.

2. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston and the cam-shaft for actuating the valves of said cylinder, of a frame supported contiguous to said engine cylinder and provided with a bore adapted to receive a cartridge and communicating with said engine cylinder, and a means in connection with the engine cam-shaft for firing said cartridge.

3. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston and the cam-shaft for actuating the valves of said cylinder, of a frame supported contiguous to said engine cylinder and provided with a movable breech adapted to receive a cartridge and communicating with said engine cylinder, and a lever means in connection with said breech for variously positioning the same relatively to said engine cylinder and for exploding said cartridge.

4. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston and the cam-shaft for actuating the valves of said cylinder, of a frame supported contiguous to said engine cylinder and provided with a bore adapted to receive a cartridge and communicating with said engine cylinder, a means in connection with the engine cam-shaft for firing said cartridge, and a lever

means for shifting said cartridge exploding means from disengagement with said engine cam-shaft.

5. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston and the camshaft for actuating the valves of said cylinder, of a frame supported contiguous to said engine cylinder and provided with a bore adapted to receive a cartridge and communicating with said engine cylinder, a breech reciprocally mounted on said main frame, and a means in connection with said breech and said main frame for firing said cartridge.

6. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston and the camshaft for actuating the valves of said cylinder, of a frame supported contiguous to said engine cylinder and provided with a bore adapted to receive a cartridge and communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a means in connection with said breech and said main frame for firing said cartridge, and a cartridge extracting and ejecting means.

7. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston and the camshaft for actuating the valves of said cylinder, of a frame supported contiguous to said engine cylinder and provided with a bore adapted to receive a cartridge and communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a means in connection with said breech and said main frame for firing said cartridge, a cartridge extracting and ejecting means, a magazine in connection with said main frame, and means in connection with said magazine, said main frame and said breech, for removing individual cartridges from said magazine and positioning the same in the bore of said main frame.

8. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston reciprocally mounted therein and a cam means in connection with said engine, of a frame provided with a cartridge-receiving bore communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a breech locking means, a cartridge firing means in connection with said breech member.

9. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston reciprocally mounted therein and a cam means in connection with said engine, of a frame provided with a cartridge-receiving bore communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a breech locking means, a cartridge firing means in connection with said breech member, and means in connection with the cam means of said engine for operating said firing means and actuating said breech locking means and said breech member.

10. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston reciprocally mounted therein and a cam means in connection with said engine, of a frame provided with a cartridge-receiving bore communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a breech locking means, a cartridge firing means in connection with said breech member, an operating member in connection with the cam means of said engine, a means for reciprocally supporting said operating member, and trip means in connection with said operating member for actuating said firing means.

11. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston reciprocally mounted therein and a cam means in connection with said engine, of a frame provided with a cartridge-receiving bore communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a breech locking means, a cartridge firing means in connection with said breech member, an operating member in connection with the cam means of said engine, a means for reciprocally supporting said operating member, trip means in connection with said operating member for actuating said firing means, and cam means in connection with said operating member for actuating said breech locking means.

12. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston reciprocally mounted therein and a cam means in connection with said engine, of a frame provided with a cartridge-receiving bore communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a breech locking means, a cartridge firing means in connection with said breech member, an operating member in connection with the cam means of said engine, a means for reciprocally supporting said operating member, trip means in connection with said operating member for actuating said firing means, cam means in connection with said operating member for actuating said breech locking means, and means in connection with said operating member for shifting said breech member.

13. In a mechanism of the class described, the combination with an internal combustion engine cylinder, a piston reciprocally

mounted therein and a cam means in connection with said engine, of a frame provided with a cartridge-receiving bore communicating with said engine cylinder, a breech reciprocally mounted on said main frame, a breech locking means, a cartridge firing means in connection with said breech member, and lever and quadrant means in connection with said breech member for shifting the same in inoperative position.

In testimony whereof, I have hereunto set my hand at San Diego, California, this 7th day of April, 1923.

REX HARRIS.