To all whom it may concern:

Be it known that I, Aris D. Chronis, lieutenant, a subject of the King of Greece, residing at Larissa, Greece, have invented certain new and useful Improvements in Breech Mechanism for Automatic Firearms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to automatic firearms with fixed barrel and locked breech block, in which the recoil is effected by the recoil of the whole weapon as set forth in my Patent No. 1,066,670, and the object is to reduce to a minimum the effort required for unlocking the block.

The advantages of the device consist in:

1. The fact that the mass of the displaceable member can be considerably reduced and also the unlocking can be effected in weapons in which the recoil is not sufficient to bring about the automatic action. The locking is positive and is not due to friction, which would cause an immediate shifting of the cartridge case on firing due to gas pressures.

The invention is illustrated by way of example in the accompanying drawings.

Figure 1 is a longitudinal section through a weapon provided with a locked breech block at the moment of firing. Fig. 2 is the same view after firing, when the breech is unlocked and has reached its most rearward position. Fig. 3 is a horizontal longitudinal section after firing when the breech block is unlocked. Fig. 4 is the same section at the moment of firing, corresponding to the condition shown in Fig. 1. Figs. 5, 6, 7 and 8 are cross sections on the lines 5-5, 6-6, 7-7 and 8-8 of Figs. 1, 2, 3 and 4. Figs. 9 and 10 are front, side and rear views of the fore and rear parts of the breech block. Fig. 11 shows two views of the firing pin. Fig. 12 shows three views of one of the locking bolts. Fig. 13 is a diagrammatic representation of the forces acting on the bolts.

The breech block consists of two relatively movable parts, a fore part a (Figs. 1, 2, 3, 4 and 9) and a rear part c (Figs. 1, 2, 3, 4 and 10). The closing spring g is situated in the after part c (Figs. 1 and 2).

The fore part of the breech block a (Fig. 5) is provided with an internal space i to receive the locking bolts e (Figs. 1, 2, 3, 4, 5, 6, 7 and 8) which can turn on the pins h (Figs. 3 and 4) on the fore part a of the block. In both bolts there are recesses q with inclined surfaces q', q'' (Figs. 3, 4 and 12). The firing pin m engages in these recesses q, and is connected with the rear part c of the breech block by the pin n (Figs. 1, 2, 3 and 4).

The connection between the two parts a and c of the breech block is such that the parts can be pushed one into the other after the firing pin m and the locking bolts e are inserted in the fore part a and the firing pin m connected to the after part through pin n. All these parts are then held in their places. When the rear part c of the breech block moves to the rear, the locking bolts e are drawn together by the engagement between the inclined surfaces q' thereof and the correspondingly inclined surfaces m' of the firing pin m and are forced apart, when the rear part c of the breech block is moved forward again by a spring f (Figs. 1, 2, 3, 4, 5, 6).

The action is as follows: When the breech block is closed the parts are in the positions shown in Figs. 1 and 4, that is, the two parts a and c of the breech block are maintained in contact by the closing spring g and the locking bolts e are held in breech locking position by the spring f and the firing pin m. When the weapon is fired, the backward impulse on the breech block, due to the power of the gasses, is exerted on the fore part a of the breech-block and transmitted to the pins h, and by the engagement of the locking bolts e this force is transmitted to the inclined surface k' of the frame. This force D'e—indicated in Fig. 13, in which 1 represents a pin h and 2 the machine surface k'—gives rise to a reaction B, which can be resolved into two components B', B'', of which B' is at right angles to the surface k' and B' is tangential to the surface, and draws the bolt e inward. B' will depend upon the inclination of the surface k', that is, upon the angle γ between the direction of the force B and the normal to the surface k'. The force of the recoil is thus transmitted, not only from the part a, but, in the same way as in my Patent No.
by the firing pin and the part c, to the locking bolts. At the instant at which the gun is stopped, the part c continues to move farther taking with it the firing pin, which then acts through the oblique surfaces $\eta$, on the locking-bolts. In consequence of the shape of the locking surfaces $\lambda'$ and the action caused thereby, the element c has only a part of the unlocking work to perform and can consequently be less massive than in my before mentioned patent.

The angle $\gamma$ can be so determined, that $B'$ is equal to the force required for overcoming friction or equal to the effort necessary for unlocking. The invention causes the work necessary for the unlocking of the weapon by the movable member c to be reduced to the lowest limit and the member c can be held with less force, since the effort required for unlocking is diminished.

In weapons in which the gas pressure produced on firing quickly disappears, for instance with pistols and the like in which the initial velocity is very high, so that a premature unlocking is not likely to occur, the angle $\gamma$ can be made so great that the force $B'$ can be not only as great as the force necessary for unlocking, but somewhat greater, so that the unlocking can be effected without the assistance of any replaceable member. With this assumption the breech block can consist of a single piece. If the unlocking is completed before the weapon comes to rest, that is before the recoil of the whole weapon has been received on the shoulder, the breech block would perform the same function as the moving member.

The velocity of the breech block, which is the same as the velocity of the recoiling weapon, drives the block farther to the rear and the weapon has been brought to rest on the shoulder, so that the empty cartridge case can be ejected and the closing spring compressed. If the unlocking were completed after the weapon has come to rest against the shoulder, the block would possess no backward velocity at the moment of unlocking, so that the closing spring would not be compressed. A premature fire is impossible; if the locking bolts c are not properly locked, the firing pin cannot be urged forward. By the act of firing the bolts are forced into their position by the firing pin.

Besides the simplicity of the arrangement, there is the additional advantage that the cartridge case is not in the least shifted by the gas pressure during the unlocking of the breech block. It is known that with weapons in which there is a large gas pressure and cross locking the friction between the locking surfaces is so great that no force is sufficient to unlock the breech block at the right time, and that therefore the force available for unlocking is soon used up. In order to avoid this drawback, the inclination of the locking surfaces was limited to $9^\circ$ (the limit of automatic locking) to diminish the work spent in unlocking and in order that in the breech block might be more easily moved backward. In such constructions two drawbacks arise, which are not easily overcome, in the first place the danger that after some hundreds of shots have been fired, the breech block would become a friction block, in which the wear of the locking surfaces would always increase so that the breech block would gradually be unlocked more quickly. In the second place the cartridge cases would always be slightly shifted and this shifting would gradually increase with the wear of the bolts, so that the cartridge cases after fire would no longer fit in the cartridge chambers. These drawbacks are entirely obviated by the present invention.

The effort required can be lessened by the proper choice of the angle $\gamma$ (Fig. 13) without any shifting of the cartridge case.

Since according to the invention the cartridge cases remain in their chambers until the unlocking is completed and the breech block after the unlocking is suddenly set in motion, it might happen that the cartridge cases might not be extracted by the cartridge extractor, but remain in the barrel. To remedy this drawback the extractor $r$ (Figs. 1 and 2) can be displaced in the axial direction by about a millimeter, and the breech block after the unlocking is moved gradually inwardly in engagement with a relatively fixed portion of the firearm, the cooperating surfaces of the locking bolt and said relatively fixed portion of the firearm being on a plane inclined to the longitudinal axis of the weapon so that the forces acting on the locking bolt will exert a turning moment for initiating the unlocking of the breech, and means movable independently of the breech block after the recoil of the firearm for driving the said locking bolt inwardly to complete the unlocking of the bolt.
2. In an automatic firearm designed to recoil as a whole, a breech-block which is designed to remain in its breech-closing position until such recoil is arrested, a locking-bolt having a member pivoted at its rear end and movable laterally at its forward end, said bolt being designed to engage a relatively fixed part of the firearm, the cooperating surfaces of the bolt and the firearm being on a plane inclined to the longitudinal axis of the firearm, and a firing pin movable relatively to the breech block after the recoil of the firearm for withdrawing the locking bolt and unlocking the breech.

3. In an automatic firearm designed to recoil as a whole, a breech-block which is designed to remain in its breech-closing position until such recoil is arrested, said breech-block being composed of two parts, a movable member carried by one of said parts, a locking bolt carried by the other part for normally holding the breech-block to a relatively fixed portion of the firearm, and means carried by said movable member for engaging the locking bolt to free the breech-block from the relatively fixed portion of the firearm, after the recoil of the latter.

4. In an automatic firearm designed to recoil as a whole, a breech-block which is designed to remain in its breech-closing position until such recoil is arrested, said breech-block being composed of two parts, one of which has an independent relative movement at the completion of the recoil, a firing pin carried by said part, a locking bolt carried by the other part for normally holding the breech-block to a relatively fixed portion of the firearm, and means carried by the firing pin for engaging the locking bolt to free the breech-block from the relatively fixed portion of the firearm after the recoil of the latter.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

ARIS D. CHRONIS.

Witnesses:

CONSTANTINE M. CORAFA,

DEURETRIOS BOYZEAL.