Jan. 26, 1960 G. BARBE 2,922,338

LARGE CALIBER SMOOTH BORE MORTARS

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Fig. 1.

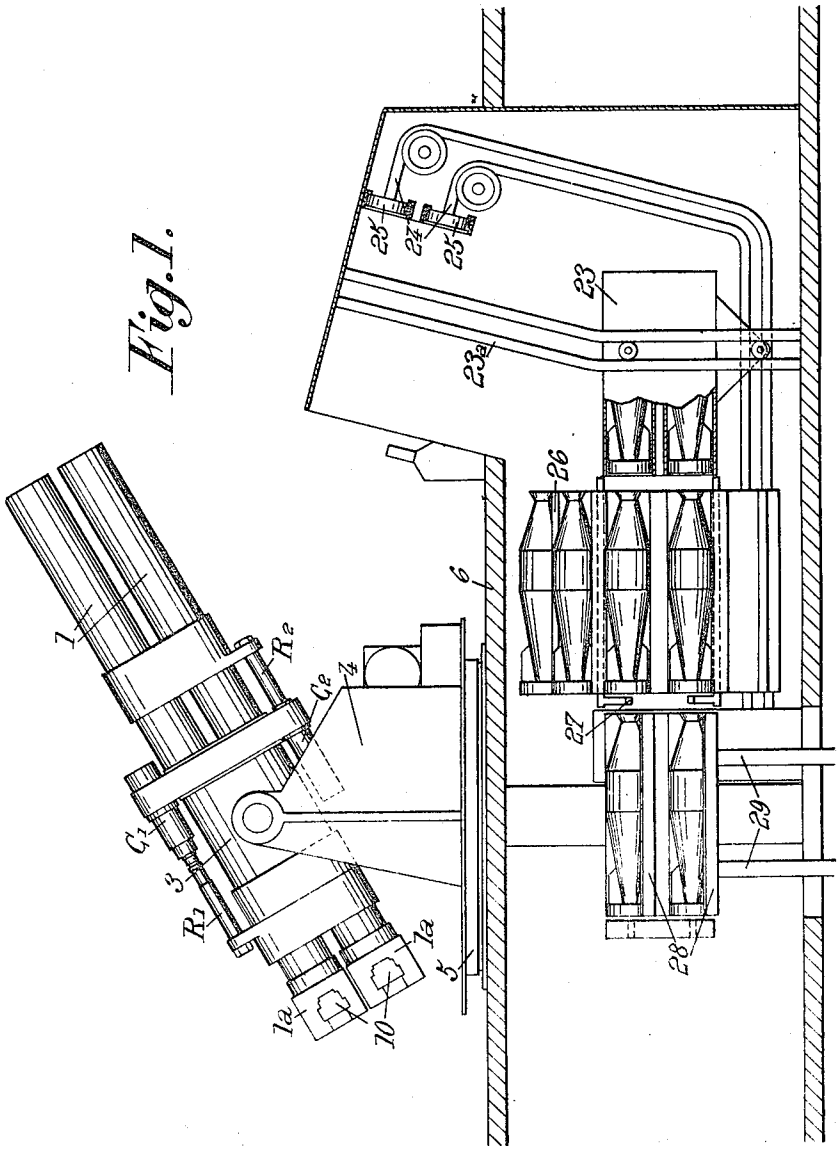

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Fig. 1a.

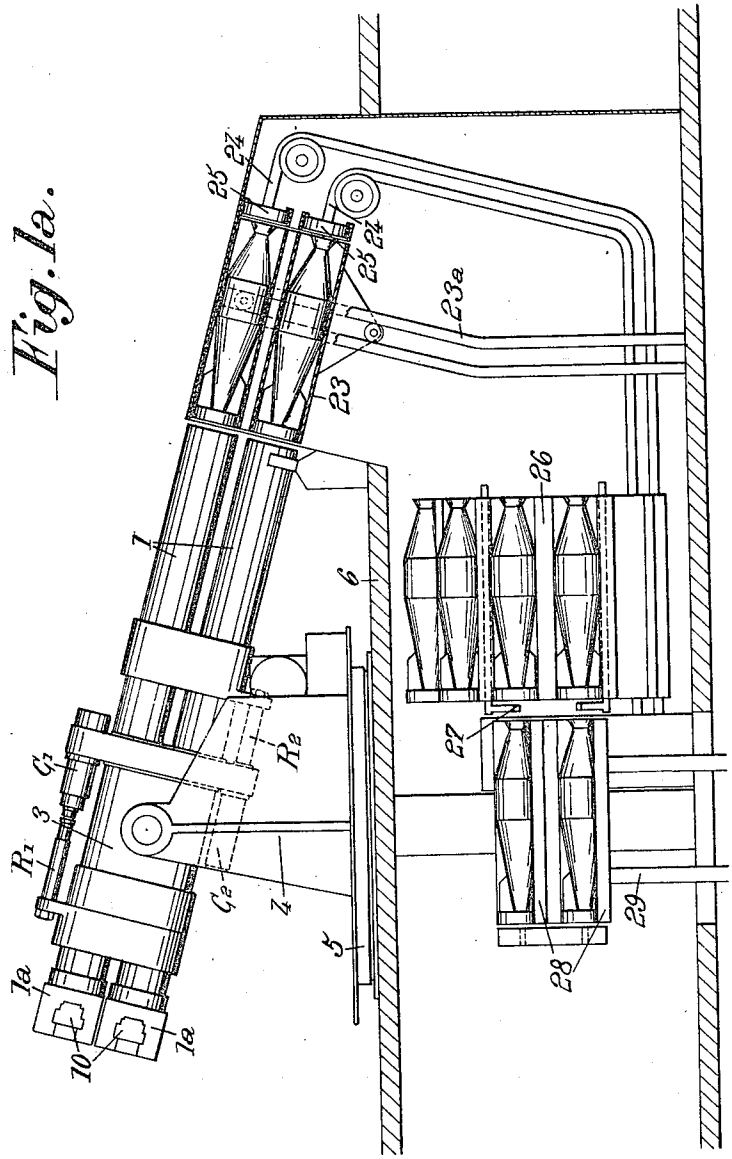

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Fig. 2.

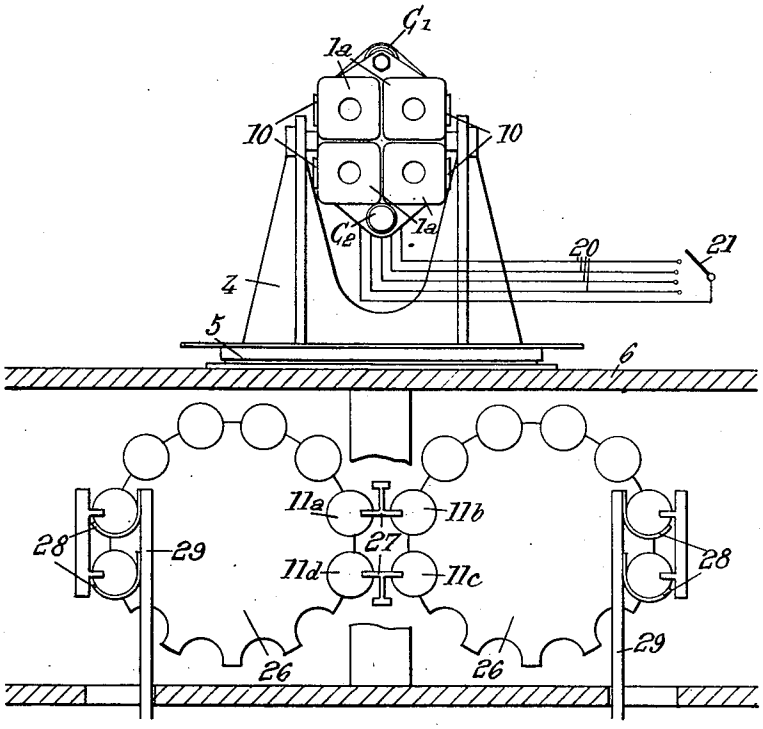
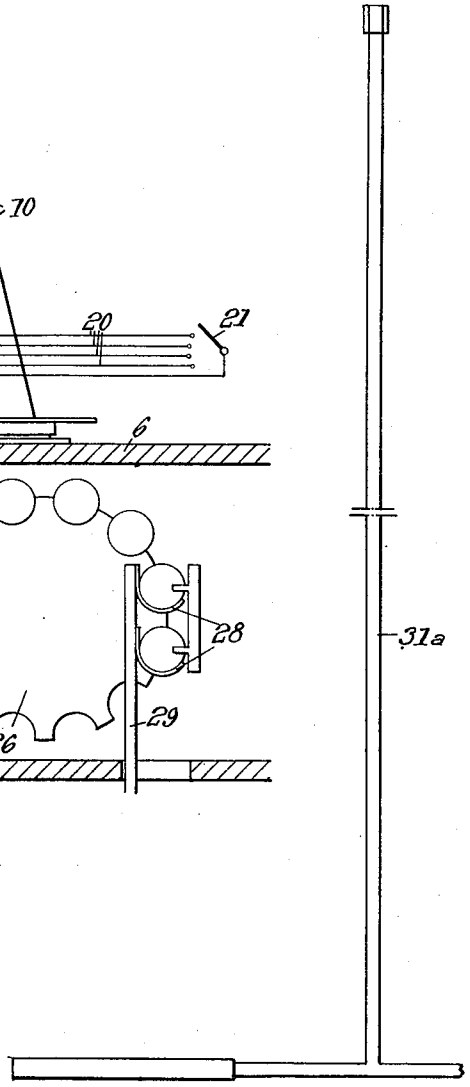


Fig. 3a



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LARGE CALIBER SMOOTH BORE MORTARS

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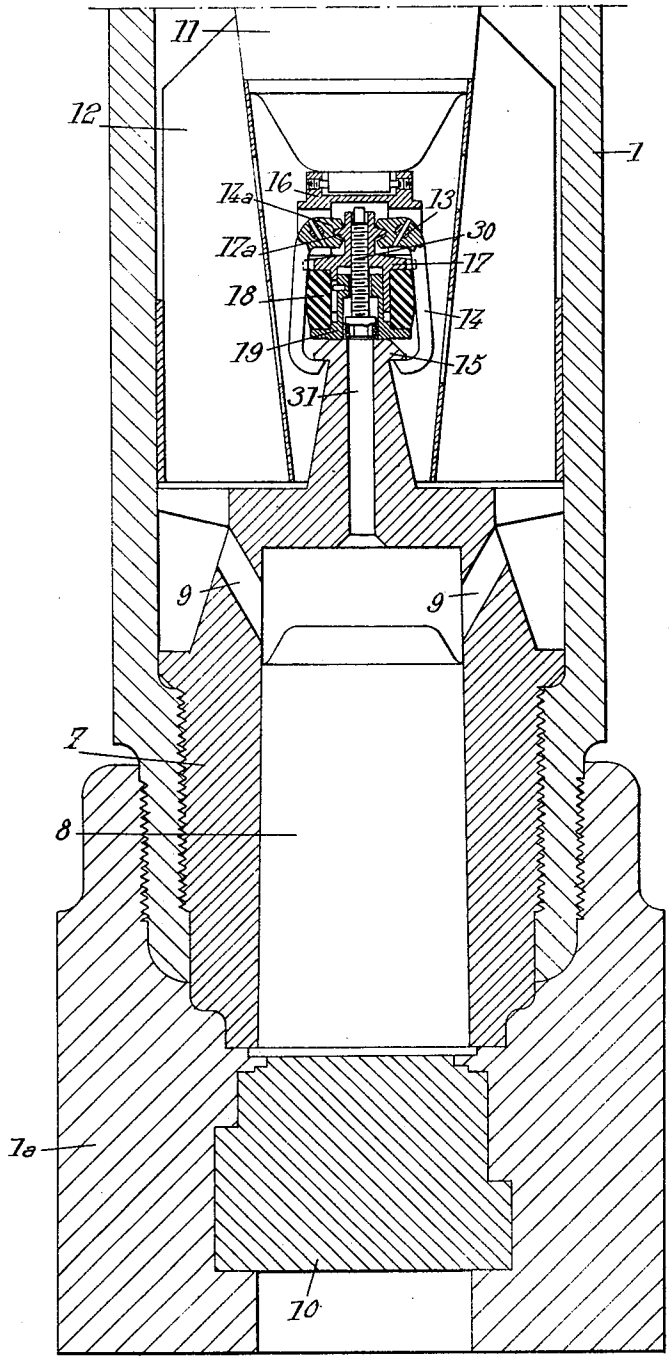

Fig. 3.

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LARGE CALIBER SMOOTH BORE MORTARS

Georges Barbe, Paris, France

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Claims priority, application France March 16, 1954

5 Claims. (Cl. 89—1)

The present invention relates to large caliber smooth bore mortars and especially mortars for launching anti-submarine projectiles.

Up to this time, such mortars had their barrel rigidly secured to the mount supporting the mortar and in view of the limited stress that can be supported by such a mount, the pressure of the propelling powder gases in the barrel could not exceed a given value (for instance 50 kg. per sq. cm.) which correspondingly limited the range of fire.

The obvious remedy to this drawback would have been to make the barrel movable for resiliently absorbed recoiling in the mount. The propelling gases pressure could then have been considerably increased without unduly stressing the mount. But such recoil systems can be used only when the recoiling unit is sufficiently heavy to have but a limited rearward velocity when a projectile is fired. This is the case with guns, the barrels of which must have thick walls and are therefore necessarily heavy. But mortar barrels require but relatively thin walls (as a rule the ratio of the external diameter to the inner diameter ranges from 1.1 to 1.2) and are therefore of insufficient weight to comply with the above condition and of course it is out of the question to make them unnecessarily thick-walled and heavy.

Therefore all known large caliber mortars having their barrels rigidly secured to the mount have a relatively low range.

The object of my invention is to provide a weapon of the above mentioned type which is free from this drawback.

For this purpose, according to an essential feature of my invention, this weapon includes a plurality of parallel large caliber smooth bore barrels rigid together to form a single recoiling unit slidable in a cradle with the interposition of a resilient recoil and counter-recoil mechanism between said unit and said cradle, said barrels being provided with respective firing means arranged to be operated successively so that, after all the barrels have been loaded, they can be fired only one after the other, and means being provided in said barrels for yieldingly locking the projectiles therein, whereby, upon one of the barrels being fired, the projectile or projectiles present in the other barrel or barrels of the recoiling unit is or are prevented from moving with respect to said unit, whereas the locking means in the barrel that is being fired yield after a short resistance to the propelling action of the powder cases therein.

Other features of my invention will become apparent in the following detailed description of some specific embodiments thereof with reference to the accompanying drawings, given merely by way of example and in which:

Fig. 1 is an elevational view of the weapon according to my invention in firing position.

Fig. 1*a* is a similar view, the weapon being in charging position.

Fig. 2 is a rear view of the weapon in horizontal position.

Fig. 3 is a longitudinal sectional view of one of the barrels of the weapon.

Fig. 3*a* is a separate view of a rod to be used in order to release the means for yieldingly locking a projectile in a barrel.

The weapon shown by the drawing includes a recoiling unit essentially constituted by four barrels **1** rigidly assembled together and the respective axes of which are located along the edges of a prism of square cross-section.

This recoiling unit is slidable in cradle **3** pivotable in a training base **4** about a horizontal axis, for elevating displacements of the barrels. This base **4** is itself pivotable about a vertical axis on a pedestal **5** carried by the ship deck **6** for traversing displacements of the barrels.

A resilient recoil and counter-recoil mechanism is interposed between cradle **3** and the recoiling unit **1**. It may be of any suitable, and for instance conventional, type, including brake and recuperator cylinders C_1 and C_2 carried by cradle **3**, and pistons cooperating with said cylinders and having their rods R_1 and R_2 fixed to the barrels **1** of the recoiling unit.

At its rear end every barrel **1** is surrounded by a sleeve **1***a* of square outer section in which a breechblock **10** is movable transversely. Furthermore in this rear end portion of said barrel **1** there is fitted a steel plug **7** forming the combustion chamber and the rear end of which is provided with a cylindrical bore adapted to receive the powder case **8**. The front portion of plug **7** forms an enlarged chamber provided with holes **9** for the passage of the powder gases to the rear part of the projectile **11**.

The projectile **11**, the rear end and the tail fins **12** of which are visible on Fig. 3, is provided, on its rear end face, with a plate **16** carrying spindles **13** on which are pivoted about their front ends, arms **14** the hooked rear ends of which engage under a mushroom-shaped projection **15** integral with plug **7**. The bent front ends **14***a* of arms **14** are provided with notches engaging on projections **17***a* of an annular piece **17** movable axially with respect to plate **16**. An annular block **18** of a resilient material is interposed between this piece **17** and another annular piece **19** slidable axially in piece **17**. Piece **19** is intended to bear on the front end face of mushroom-shaped projection **15** when the projectile is forced into the barrel. Thus after the hooked ends of arms **14** have engaged under the head of projection **15**, resilient block **18** tends to expand in the axial direction and tightly holds said hooked ends applied against the rear face of the mushroom-shaped part **15**, whereby the projectile is resiliently fixed in barrel **1**.

When the powder charge is fired, the pressure of the gases quickly reaches a value sufficient to deform rods **14**, thus releasing the projectile. The short resistance of rods **14** immediately upon firing of the charge corresponds to the forcing of the rifling band in a rifled barrel. Resilient block **18** and rods **14** are carried along by the projectile.

In piece **17** is screwed a screw-threaded rod **30** extending inside piece **19**. This rod **30** forms, at the rear end thereof, a short sleeve provided with a hole of polygonal section. On the other hand, the top end of the mushroom-shaped projection **15** is provided with an axial hole **31** through which it is possible to engage a rod **31***a* (Fig. 3*a*) the end of which is of a polygonal section corresponding to that of the hole provided in the rear end of rod **30**.

If, for some reason, it is desired to remove a projectile already fixed in the corresponding barrel, I may proceed as follows:

Breech-block **10** being opened, and powder case **8** removed, rod **31***a* is inserted through hole **31** so that the polygonal end of said rod fits in the polygonal hole of rod **30**. Then rod **31***a* is rotated about its axis so as to screw rod **30** in piece **17**. The front end of rod **30** is thus first brought into contact with the rear face of plate **16**. After

this, when rod **31***a* is further rotated, piece **17** is moved rearwardly, thus further compressing block **18**, and therefore moving the hooked ends of arms **14** slightly away from the rear face of mushroom-shaped part **15**. Simultaneously, the projections **17***a* of piece **17** cause arms **14** to pivot outwardly and to be disengaged from behind the mushroom-shaped part **15**. The projectile can then be removed from the barrel.

The charge igniting means may be of any suitable type. They are arranged so that only one of the four charges can be ignited at a time. This can be obtained in many different ways. For instance, if, as shown by the drawings, ignition is performed by electrical means of any suitable type, such as known in the art, the switch for controlling ignition includes a single operating member **21** capable of occupying four different positions in each of which it closes one of the ignition circuits **20** of the four barrels respectively.

If ignition is obtained through mechanical means, I may control the closing of the four breech mechanisms of the four barrels **1** by a single member, for instance a rotating disc, capable of occupying four active positions, in addition to a neutral position. In the first position, this disc closes the breech of the first barrel but leaves the three other breeches slightly open so that their firing pins cannot strike the charge primer. In the second position, the first barrel having been fired, the above mentioned disc closes the second breech mechanism and the corresponding barrel can be fired, and so on.

Preferably, the four barrels are charged simultaneously. For this purpose, the weapon is given (Fig. 1*a*) a suitable negative elevation (for instance −15°) where the front portion of the recoiling unit is bearing against a support. The breech mechanisms **10** are opened and the powder cases introduced in the powder chambers.

During this time, the projectiles are being charged through the barrel nozzles.

A shell elevator has brought a carrier **23**, with four projectiles thereon, along rail **23***a* from a lower position (Fig. 1) under the deck to an upper position shown by Fig. 1*a* where the four projectiles are in line with the four barrels.

The projectiles are then driven into the respective barrels by means of four rammers **24** of the chain type. The rammer heads are shown at **25**.

When carrier **23** is returned to its lower position of Fig. 1, it can be loaded with projectiles carried by two rotating barrels **26** (best visible on Fig. 2). For this purpose, four projectiles as shown at **11***a*, **11***b*, **11***c* and **11***d* on said two barrels **26** are pushed onto carrier **23** by means of push members **27**.

Fresh projectiles are supplied to barrels **26** by carriers **28** slidable along vertical rails **29**.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. A mortar which comprises, in combination, a cradle, a plurality of parallel large caliber smooth bore relatively thin-walled barrels rigidly assembled together side by side to form a unit slidable in said cradle in a direction parallel to their axes, a resilient recoil and counter-recoil mechanism interposed between said cradle and said unit, firing means for said barrels respectively arranged to be operable only separately so that only one barrel can be fired at a time, and means for yieldingly locking one projectile in each of said barrels to prevent the projectiles located respectively in barrels that are not being fired from moving with respect to said barrels, whereas the locking means of the projectile in a barrel that is being fired are arranged to yield to the pressure developed in said last mentioned barrel, whereby the inertia of all said barrels upon the firing of a single shell resists the recoil shock to a substantially greater degree than would a single barrel.

2. A mortar which comprises, in combination, a cradle, four large caliber smooth bore relatively thin-walled barrels rigidly assembled together having their axes located along the edges of a prism the cross-section of which is a square, to form a unit slidable in said cradle in a direction parallel to their axes, a recoil and counter-recoil mechanism interposed between said cradle and said unit, firing means for said barrels respectively arranged to be operable only separately so that only one barrel can be fired at a time, and means for yieldingly locking one projectile in each of said barrels to prevent the projectiles located respectively in barrels that are not being fired from moving with respect to said barrels, whereas the locking means of the projectile in a barrel that is being fired are arranged to yield to the pressure developed in said last mentioned barrel, whereby the inertia of all said barrels upon the firing of a single shell resists the recoil shock to a substantially greater degree than would a single barrel.

3. A weapon which comprises, in combination, a cradle, a plurality of parallel large caliber smooth bore barrels rigidly assembled together side by side to form a unit slidable in said cradle in a direction parallel to their axes, a recoil and counter-recoil mechanism interposed between said cradle and said unit, a breech mechanism at the rear end of each of said barrels for charging powder cases in said last mentioned barrel from the rear, the front portions of said barrels being adapted to receive the projectiles to be fired by said weapon, introduced through the muzzle of said barrels, a steel plug in each of said barrels ahead of said breech mechanism and forming a combustion chamber, firing means for said barrels respectively arranged to be operable only separately so that only one barrel can be fired at a time, and means for yieldingly locking one projectile in each of said barrels to prevent the projectiles located respectively in barrels that are not being fired from moving with respect to said barrels, whereas the locking means of the projectile in a barrel that is being fired are arranged to yield to the pressure developed in said last mentioned barrel.

4. A weapon which comprises, in combination, a cradle, four large caliber smooth bore barrels rigidly assembled together having their axes located along the edges of a prism the cross-section of which is a square, to form a unit slidable in said cradle in a direction parallel to their axes, a recoil and counter-recoil mechanism interposed between said cradle and said unit, a breech mechanism at the rear end of each of said barrels for charging powder cases in said last mentioned barrel from the rear, the front portions of said barrels being adapted to receive the projectiles to be fired by said weapon, introduced through the muzzle of said barrels, a steel plug in each of said barrels ahead of said breech mechanism and forming a combustion chamber, firing means for said barrels respectively arranged to be operable only separately so that only one barrel can be fired at a time, and means for yieldingly locking one projectile in each of said barrels to prevent the projectiles located respectively in barrels that are not being fired from moving with respect to said barrels, whereas the locking means of the projectile in a barrel that is being fired are arranged to yield to the pressure developed in said last mentioned barrel.

5. A weapon which comprises, in combination, a cradle, a plurality of parallel large caliber smooth bore barrels rigidly assembled together side by side to form a unit slidable in said cradle in a direction parallel to their axes, a resilient recoil and counter-recoil mechanism interposed between said cradle and said unit, firing

means for said barrels respectively arranged to be operable only separately so that only one barrel can be fired at a time, and means for yieldingly locking one projectile in each of said barrels to prevent the projectiles located respectively in barrels that are not being fired from moving with respect to said barrels, whereas the locking means of the projectile in a barrel that is being fired are arranged to yield to the pressure developed in said last mentioned barrel, said locking means including a mushroom-shaped projection carried by said plug at the front end thereof, a plurality of arms pivoted at their front ends to the rear end of every projectile and having hooked rear ends adapted to engage behind the head of said mushroom-shaped projection, and resilient means carried by said rear end of said projectile so as to be compressed when the projectile is forced into the

barrel for yieldingly applying said hooked ends against the rear face of said mushroom projection.

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