June 13, 1944. C. G. FORMHALS 2,351,257

MULTIPLE BARREL GUN

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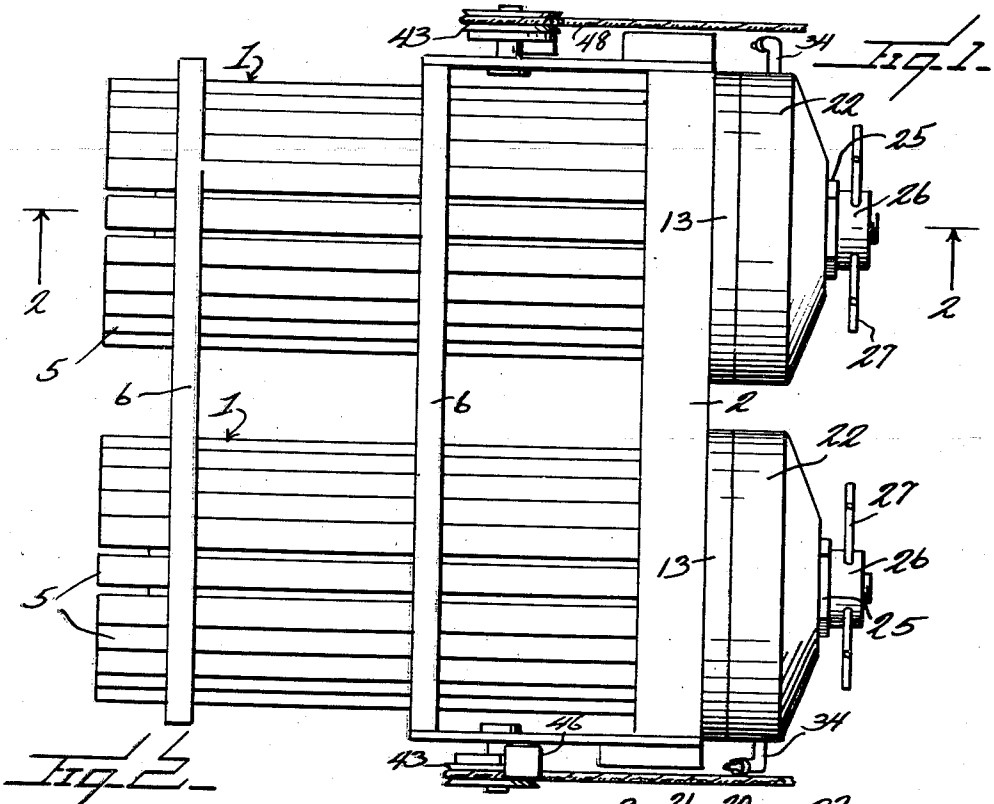


Fig. 1

Fig. 2

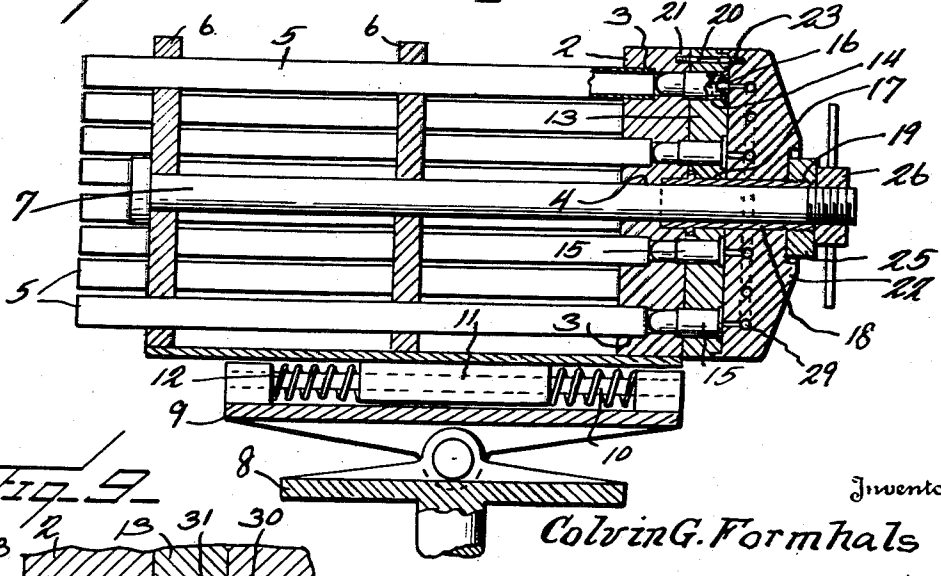
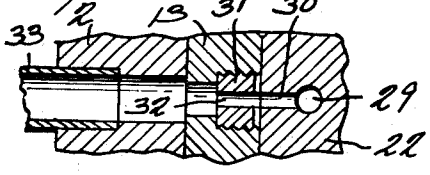


Fig. 3



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Fig. 3

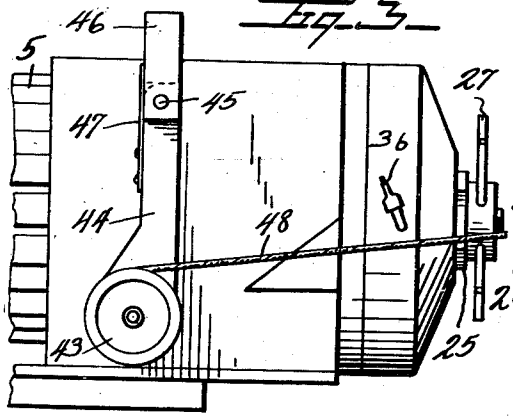


Fig. 4

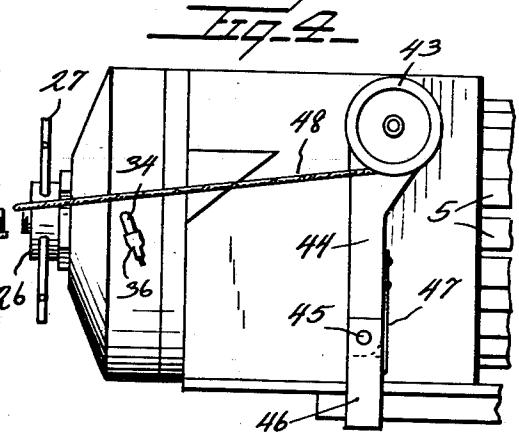


Fig. 5

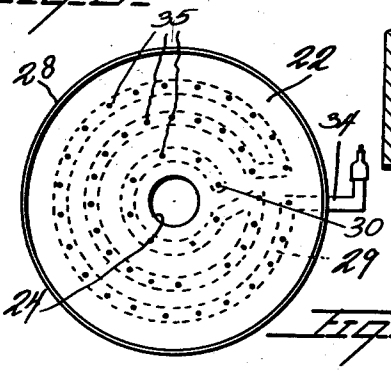


Fig. 8

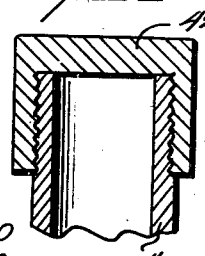


Fig. 6

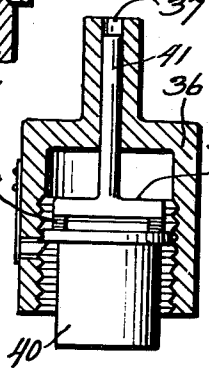


Fig. 7

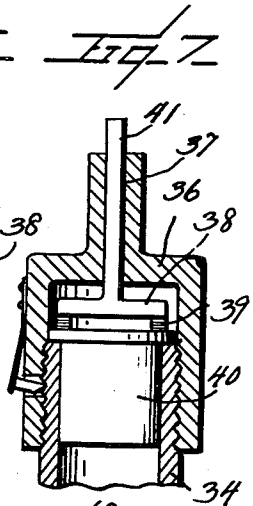


Fig. 10

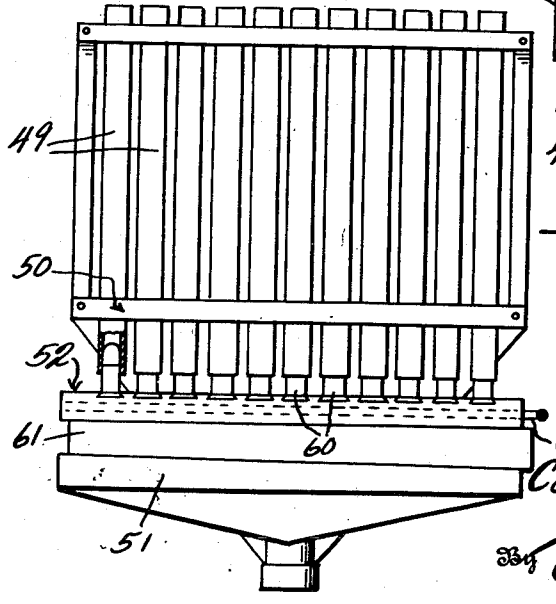
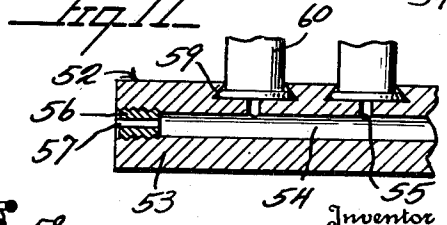


Fig. 11



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MULTIPLE BARREL GUN

Calvin G. Formhals, Smithfield, Ill.

Application May 13, 1941, Serial No. 393,251

3 Claims. (Cl. 89—1)

This invention relates generally to the class of ordnance and pertains particularly to improvements in rapid fire guns.

A primary object of the present invention is to provide an improved multi-barrel gun designed for rapid fire in which a novel method of successively firing the several barrels of the gun is provided.

Another object of the invention is to provide a multi-barrel rapid fire gun wherein a single firing charge is employed to ignite a multiplicity of powder charges, each of which is contained in a projectile shell, the said projectile shells being provided only with the powder charge and not having the customary primer employed where a firing pin is made use of.

A further and more specific object of the invention is to provide in a multi-barrel gun a rapid fire means comprising a cartridge carrier having a fire chamber formed therein which is in communication with the primer openings of the shells for the several barrels, the said fire chamber having connected with one end thereof a blank cartridge which, when fired, causes a flame to pass through the fire chamber to successively ignite the charges of the several cartridges in communication with such chamber.

Another object is to provide a multi-cylinder gun having a removable magazine carrying a plurality of cartridges and adapted to be placed in position with respect to the barrels or cylinders of the gun so that each cartridge will be directed toward a barrel and having a unit adapted to be secured over the magazine unit and provided with a single fire chamber through which an ignition flame is caused to pass and with means for leading such flame from the chamber to the cartridges whereby such cartridges may be fired successively as the flame passes through the chamber.

Still another object is to provide a multi-barrel gun having a removable magazine carrying a plurality of cartridges, each of which is introduced into a barrel when the magazine is set in operative position, with novel means for forcing the magazine into operative position and holding it in such position during the firing of the cartridges.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings, it being understood, however, that the invention is not to be considered as limited by the specific illustration or description but that such illustration and description constitutes a preferred embodiment of the invention.

In the drawings:

Fig. 1 is a view in top plan of a two-unit multi-barrel gun constructed in accordance with the present invention.

Fig. 2 is a sectional view taken substantially on the line 2—2 of Fig. 1 through one of the units showing only the outer annular series of barrels.

Fig. 3 is a view in side elevation of the gun structure shown in Fig. 1, illustrating the operation of the firing device.

Fig. 4 is a view in elevation of the opposite side of the gun shown in Fig. 1, showing the reverse operation of the firing device.

Fig. 5 is a view looking into the face of the firing block which forms a unit of the magazine structure.

Fig. 6 is a detailed sectional view on an enlarged scale of the firing pin and firing cartridge carrier showing the manner in which the cartridge is secured in the carrier.

Fig. 7 is a view similar to Fig. 6 of the firing pin and firing cartridge carrier or unit showing the carrier applied to its supporting tube on the firing block.

Fig. 8 is a view on an enlarged scale and in section of the closing means for the firing tube.

Fig. 9 is a detailed sectional view taken on the line 9—9 of Fig. 5, and illustrating the control valve for the fire passage of the firing block.

Fig. 10 is a view in plan of another form of the multi-barrel gun structure in which all of the barrels are disposed in one plane.

Fig. 11 is a detailed sectional view of the magazine for the gun as shown in Fig. 10, illustrating a manner of securing the cartridges to the body of the magazine.

Referring now more particularly to the drawings, there is illustrated in Figs. 1, 2, 3 and 4, an embodiment of the present invention wherein rifle or gun barrels are maintained in a cylindrical group, thus forming a gun unit which is indicated as a whole by the numeral 1, in which the barrels have a spiral arrangement. Any number of barrels may be used to make up a unit and any number of units may be mounted in side by side relation or one above the other, upon a suitable support or carriage, not shown, which may be desired. In Fig. 1, two multiple barrel units are shown disposed in spaced parallel relation and these units are of the same construction or design, therefore, a description of one will suffice for both.

In accordance with the present invention, a unit 1 comprises a breech 2 which is here shown as being in the form of a circular body of material. This breech is provided with a plurality of passages or bores 3 extending axially therethrough and with a central bore 4, each of the bores 3 having secured therein an end of a barrel 5. The bores 3 are in spiral arrangement around the central aperture 4 and any number of such bores may be employed, it being preferred that each breech 2 carry approximately fifty barrels. These barrels extend forwardly from the breech through brace plates 6 which maintain the barrels in the proper spaced relation and through the center of each of the plates there is passed a tie bolt or rod 7, the rear end of which extends through the passage 4 in the center of the breech and a substantial distance rearwardly of the breech, as shown in Fig. 2. The several barrels may be arranged in parallel relation or certain of the central ones may be parallel and the others may be given a very slight outward divergence so that bullets fired through the barrels will spread to cover a wide area after they have traveled a substantial distance from the gun.

Any suitable type of support may be provided for the gun units which will provide for the shifting of the gun to fire in a desired direction, such a support being here conventionally illustrated and indicated generally by the numeral 8 and having pivotally mounted thereon a platform 9 supporting a suitable number of horizontal rods 10. Guides 11 carried by the gun units are supported upon the rods 10 and the forward and rearward movements of the gun are controlled by springs 12, as shown in Fig. 2, so that recoil will be properly taken care of. As previously stated, the means for mounting the gun and the recoil mechanism may be of any desirable or suitable character, such mechanism forming no part of the present invention.

The passages 3 of the breech body constitute not only means for receiving the rear ends of the barrels but cartridge chambers carried by a magazine block 13. This block is of the same overall dimensions as the breech 2 against the rear face of which it is positioned and it is provided with cartridge chambers 14 of the same number as the chambers 3, in each of which is fitted a cartridge 15 having a powder charge but no primer. The primer opening in the base of each cartridge is indicated by the numeral 16 and provides a means for the introduction of the powder charge igniting flame into the cartridge casing.

The central part of the magazine block or cartridge block has an axial opening 17 through which extends a sleeve 18, the rear end of the sleeve being screw threaded as indicated at 19. This sleeve receives the rear end of the tie rod 7 and has its forward end fitted into the rear part of the central passage 4 of the breech 2.

The magazine block 13 is provided with a centering bore or centering bores 20 which opens through each face and the breech 2 of each gun unit carries a centering pin 21 for engagement in the bore 20. The magazine block 13 with the sleeve 18 is slipped onto the rear end of the tie rod 7 and when the centering bore 20 receives the pin 21 of the adjacent breech, the cartridges will be alined for introduction into the cartridge chambers 3 of the breech block, as shown in Fig. 2.

After the magazine block has been placed in position against the rear face of the breech, there is then applied against the rear side of the magazine block the firing block, which is indicated generally by the numeral 22. This firing block also carries a centering pin 23 which engages in the rear end of the centering bore 20 of the magazine block and the firing block has a central passage 24 for the reception of the sleeve 18 and tie rod 7. There is then applied to the threaded end of the sleeve 18 a securing nut 25 which draws the magazine block and firing block together and a nut 26 is then applied to the threaded rear end of the tie rod 7 which, when tightened up on the rod, forces the breech, magazine and firing blocks tightly into cooperative relation. This nut 26 may be provided with a wheel or with spokes 27 to facilitate its rotation so that it may be turned tightly into position.

Integral with the firing block 22 there is formed the peripheral flange 28 which encircles a portion of the magazine block, as shown in Fig. 2, and functions to seal the opposing faces of the magazine and firing blocks to prevent the escape of the burning gases from between these bodies.

Formed in the firing block 22 around the central aperture 24 thereof is a spiral flame chamber or tube 29, the inner end of which is adjacent the passage or opening 24 and in communication with a forwardly directed gas exhaust opening 30 shown particularly in Figs. 5 and 9. This exhaust opening has threaded thereinto a valve plug 31 which is provided with a central passage 32. The size of the passage of the valve plug 31 is governed by the caliber of the shells or cartridges used in the gun and the degree of rapidity with which the firing flame passes through the spiral chamber 29 to the exhaust is controlled by the size of the passage through the valve plug. This valve plug opens toward a dummy barrel 33 which functions merely to carry off the exhaust gases while the other barrels, indicated by the numeral 5, of course, function to guide the passage of the projectiles which are discharged from the cartridges.

The outer end of the spiral flame chamber 29 is directed radially outwardly through the side of the firing blank and has connected therewith an angled blank cartridge receiving tubular holder 34, the free outer end of which extends substantially tangentially to the surface of the circular firing block and may be directed upwardly and forwardly, as shown in Fig. 3, or downwardly and forwardly, as shown in Fig. 4, according to which of the two units the magazine block and firing block is applied.

Extending axially through the forward face of the firing block from the flame chamber 29 are small passages 35, each of which is directed into the primer opening 16 of a cartridge. By means of these axial passages 35, flame from the flame chamber 29, generated in the manner hereinafter described, ignites the powder charges of the cartridges.

The holder 34 is designed to have attached to its free outer end a firing pin unit, comprising a cap 36 having at its outer end a guide 37. This firing pin unit has disposed within the cap portion 36, a two-pronged head 38, each of the firing prongs being indicated by the numeral 39 and arranged so that the rim of a firing blank cartridge 40 will be struck at two points so as to positively insure the firing of the firing cartridge. The firing pin head 38 is provided with the firing pin 41 which slides through the pin guide 37 and

projects from this guide when the unit is threaded onto the end of a holder **34** in the manner shown in Fig. 7.

The blank cartridge **40** is held in any suitable manner within the cap portion **36** of the firing pin unit so that these units can be supplied separately from the firing blocks which would have the ends of the holders **34** closed by caps **42** until the gun is ready to be fired. The caps **42** are then removed and each holder has a firing pin unit threadably applied thereto and in this operation the blank cartridge **40** is pushed back against the head, as shown in Fig. 7, so as to extend the rear end of the firing pin from its guide and into a position where it can be struck by a suitable hammer.

At one side of each unit **1**, there is pivotally supported a pulley **43** with which is integrally connected the hammer arm **44** having pivoted to its outer end, as at **45**, a firing hammer **46**. In the two-unit structure shown in Fig. 1, one of these hammer arms is arranged to swing upwardly while the other one is arranged so that the hammer will swing from a raised position downwardly, as shown in Figs. 3 and 4. Since the magazine blocks and firing blocks may be used upon any gun unit, it will be readily seen that it is necessary that when the blocks are applied to a unit upon one side of the group shown in Fig. 1, for the firing pin unit to extend upwardly and when applied to the other side or gun unit, for the firing pin to extend downwardly since it is necessary that the blocks be inverted in order to prevent the firing pins from being located between the gun units instead of upon the outer sides as is necessary to enable the hammer to be used thereon. It is for this reason that the centering pins **21** and **23** are employed and in a two-unit gun structure, as shown in Fig. 1, the pins **21** of the breech block would be at the top of the block for one unit and at the bottom of the block for the other unit, thus making it necessary for the attendant of the gun to turn the magazine and firing blocks to the proper positions to bring the firing pins upon the outer sides thereof before the blocks can be placed in position for firing.

Each hammer arm carries a spring **47** which engages the adjacent hammer **46** upon the side opposite from the firing pin unit and each pulley connected with a hammer arm has attached thereto and partly wrapped therearound, a lanyard **48** whereby the gunner may swing the hammer arm so as to bring the hammer into contact with the firing pin **41** to effect the firing of the blank cartridge.

By the provision of the hammer spring **47**, it will be seen that the arm can be made to swing with considerable force so as to insure the application of the necessary impact to the firing pin, without danger of damaging the firing pin unit holder **34**, since the spring will permit the hammer **46** to yield.

It will be readily apparent from the foregoing that after a magazine block carrying a number of cartridges has been placed in firing position and a firing block has been secured against the back of the magazine block, when the hammer is brought into forcible contact with the firing pin **41**, the blank cartridge **40** will be fired and the flame and hot gases thus produced will travel through the spiral flame chamber to the exhaust port **32**. By providing the necessary resistance to the rapid escape of the flame of the burning gases from the flame chamber **29** through the selection of a valve **31** having a passage therethrough of suitable size, the burning gases will find their way through the axially directed passages **35** to the primer openings of the cartridges and will thus ignite the charges to produce a successive firing of the shells starting from the outer end of the spiral chamber and working toward the inner end where the exhaust valve **31** is located. In this manner there is produced an effective rapid fire gun which is made to operate by the operation of but a single firing hammer. After the gun has been fired, the magazine block can be removed and a new block substituted for a second round of firing.

Fig. 10 illustrates a slight modification of the structure shown in Figs. 1 and 2, although the principle employed for firing successively a number of cartridges is the same. In this arrangement, a plurality of barrels **49** are secured in a suitable manner in spaced substantially parallel relation in a common plane, the supporting frame being here generally indicated by the numeral **50**. Extending in spaced relation with the rear or breech ends of the barrels **49** is a breech block **51**. The numeral **52** designates a magazine unit comprising a bar **53** through which is formed longitudinally a straight flame chamber **54** having at spaced intervals, corresponding with the number of barrels **49**, the flame escape passages **55** which correspond to the passages **35** of the firing block **22**. At one end of the bar **53**, an exhaust controlling valve **56** is secured in the passage **54**, this valve having the reduced bore **57** therethrough and functioning in the same manner as the valve **31**, while at the opposite end of the bar **53** is a firing pin unit holder **58** of the same form as the holder **34** and adapted to receive a firing pin unit, such as is shown in Figs. 6 and 7.

The bar **53** is provided with the transversely extending dove-tail channels **59** and in these channels are fitted the bases of cartridge casings **60**, which are without primers so that each casing has an opening leading thereinto from the adjacent passage **55**, whereby an igniting flame can enter the casing to set off the firing charge therein.

This elongated magazine unit **52** from the bar portion **53** of which the cartridges project in spaced parallel relation and all in the same direction, is adapted to be placed across the breech ends of the barrels **49** with each cartridge extended partway into a barrel, as shown in Fig. 10. There is then inserted between the magazine and the breech block **51**, a wedge bar **61** which forces the shells home in the breeches of the barrels. Thus it will be seen that when the firing blank cartridge carried by the carrier **58** is set off, the burning gases therefrom will rush through the flame chamber **54** and being restricted in their escape by the valve **56**, will pass laterally through the passages **55**, so as to ignite the charges of the cartridges, thus setting off the cartridges successively from one end of the magazine to the other.

While an illustration has been made of means for holding a blank cartridge to be employed for igniting the charges in the various shells carried by the magazines of the two forms of the gun here illustrated and described, it is to be understood that the invention is not to be considered as limited to this specific means of firing the shells, as it will be readily obvious to those versed in the art that the charges may be fired or ig-

nited by electricity, gas or chemicals as well as by the use of powder.

What is claimed is:

1. A multi-barrel gun, comprising a plurality of barrels, cartridges for said barrels each including a casing carrying an explosive charge and a primer opening in its rear end, a body disposed against the rear ends of the cartridges and having a flame chamber formed therethrough and extending across the ends of the cartridges and further having lateral passages leading from the flame chamber each toward a cartridge primer opening, means for supporting a blank cartridge at one end of said chamber, means forming an exhaust port at the opposite end of the chamber, and means for firing said blank cartridge whereby the burning gases therefrom will pass through the chamber and through said passages to ignite the charges of the cartridges, said exhaust port comprising a removable plug having a restricted exhaust opening therethrough, the diameter of which controls the degree of rapidity with which the burning gases passed through the flame chamber.

2. A gun of the character described, comprising a breech block, a plurality of rifle barrels secured in said breech block and opening at one end therethrough, a removable magazine block disposed against the breech block and carrying a plurality of cartridges each including a casing having an explosive charge therein and having a primer opening, a firing block positioned against said magazine block and covering the rear ends of said casings, said firing block having a flame chamber extending therethrough and across the ends of the cartridges, a plurality of lateral passages leading from the flame chamber each into a cartridge primer opening, a tubular firing pin unit carrier connected with one end of said flame chamber, means forming an exhaust gas escape control at the other end of the chamber, a firing pin unit secured to said carrier and carrying a blank cartridge directed into the tubular carrier, a firing pin disposed against the base of the cartridge, and means for firing said blank cartridge.

3. A multi-barrel gun, comprising a plurality of barrels supported in one plane and each having a breech end, a breech block extending across and in fixed spaced relation with the breech ends of the barrels, a bar member adapted to extend across the breech ends of the barrels and having a flame passage formed longitudinally therethrough, said flame passage having a plurality of lateral passages corresponding in number with said barrels and adapted to be alined therewith, cartridges corresponding in number to the barrels secured to said bar and each including a casing carrying an explosive charge and having a primer opening alined with one of said lateral passages, said cartridges being spaced for introduction into the breeches of said barrels, a longitudinally tapered wedge bar adapted to be longitudinally inserted between said first bar and said breech block to force said cartridges into the fixed breech ends of the barrels, means at one end of said flame passage for supporting a blank cartridge in position to have its firing charge discharged into the flame passage, means for setting off said blank cartridge, and means at the opposite end of the flame passage controlling the movement of the burning gases from the blank cartridge through the flame passage.

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