

# UNITED STATES PATENT OFFICE.

SERGIO M. BIASON, OF STA. BARBARA, PHILIPPINE ISLANDS.

## FOUNTAIN PEN AND ATTACHMENT.

Application filed January 30, 1926. Serial No. 85,008.

The object of this invention is to provide, in connection with the barrel of a fountain pen, a tubular element constituting a barrel through which a missile may be fired.

5 A further object is to provide a device which may be readily carried by the owner, and which will not attract attention, but which shall effectively serve double purpose intended.

10 A further object is to provide a trigger and hammer which will also serve as a clip by means of which the device may be carried.

A further object is to provide a particular firing pin, and a safety lock therefor.

15 With the foregoing and other objects in view, the invention consists in the novel construction and arrangement of elements described, illustrated and claimed, it being understood that modifications may be made within the scope of the claims, without departing from the spirit of the invention.

20 In the drawings forming part of this application,

Figure 1 shows the construction in longitudinal section;

25 Figure 2 is a transverse section on line 2-2 of Figure 1.

Figure 3 is a view in elevation, a portion of the construction of Figure 1 being broken away.

30 Figure 4 is a detail view showing the cartridge shells.

In carrying out my invention, I provide a pen and holder of usual commercial type, these elements being shown conventionally, and the pen being designated 10, the barrel designed to provide a reservoir for the ink being designated 11, and a detachable cap for the pen per se being shown at 12.

40 A collar or the like 14 mounts a clip 15 which is pivotally connected with the collar at 16, and acts under the influence of spring 17, also secured to collar 14.

45 The barrel 11 of the pen includes a threaded end portion 18, and this element 18 is adapted to fit within the bore shown in Figure 1 as being formed in the end of member 20 constituting a barrel for the weapon.

The cartridge 22 of Figure 4 is shown in Figure 1 as being in position within the barrel, said cartridge having a long shell, and one end receiving the missile 24 and the charge 25 of a plate which may be exploded by the firing pin 26, for propelling the missile 24. The firing pin 26 is of U form, and may be retained in inoperative position by means of the safety device 28. The barrel is provided with a longitudinal slot 30 through which the firing pin passes, and the hammer and trigger 15, when first thrown to the position shown in full line in Figure 1 and then released and allowed to move to dotted line position, imparts a forcible blow to firing pin 26 for exploding the charge in the manner indicated.

It will be observed that the element 11 serves as a handle portion when the fingers are on the trigger, the trigger being mounted on the handle, and said portion 11 being firmly held by the hand when the trigger is released and the weapon is fired.

What is claimed is:

1. In a device of the class described, a barrel and a detachable handle therefor, a hammer mounted on the handle, and a cartridge including a firing pin for engagement by the hammer, the barrel being slotted longitudinally and the firing pin extending through the slot.

2. In a device of the class described, a barrel and a detachable handle therefor, a combined trigger and hammer on the handle, and a cartridge including a firing pin for engagement by the hammer, the barrel being slotted longitudinally and having pin extending through the slot.

3. In a device of the class described, a barrel and a detachable handle therefor, a hammer mounted on the handle, a cartridge including a firing pin for engagement by the hammer, and means for retaining the firing pin inactive.

In testimony whereof I affix my signature.

SERGIO M. BIASON.

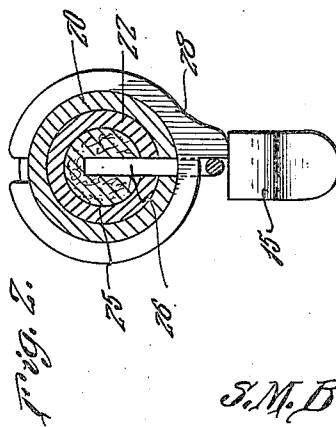
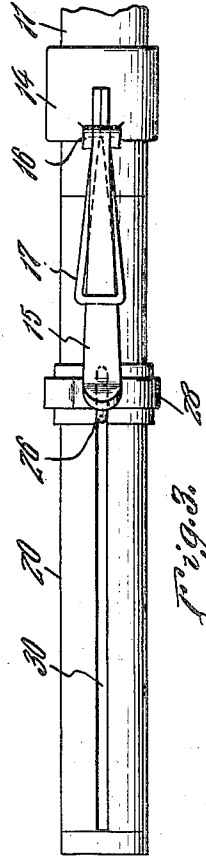
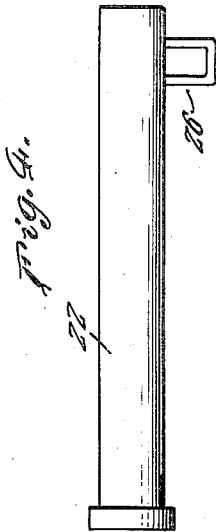
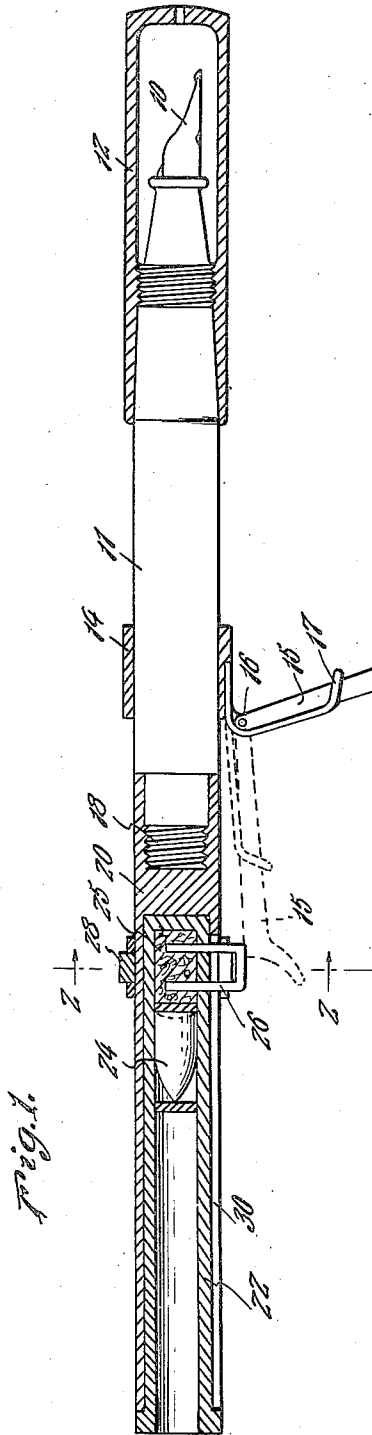
Nov. 23, 1926.

1,608,359

S. M. BIASON

FOUNTAIN PEN AND ATTACHMENT

Filed Jan. 30, 1926



*S. M. Biason*

INVENTOR

BY *Victor J. Enns*

ATTORNEY

WITNESS:

## UNITED STATES PATENT OFFICE.

BYRON C. GOSS, OF CLEVELAND, OHIO.

## FOUNTAIN-PEN-SHAPED PISTOL.

Application filed June 15, 1926. Serial No. 116,204.

This invention relates to small fire arms, of the type that may be readily carried in the pocket, and that has been given a shape that will not disclose its identity when it is seen by others.

An object of the invention is to provide a fire arm shaped like a fountain pen, and that has the size and color of a fountain pen, and that may be displayed in public in the presence of persons that it is desired to subdue and capture, without arousing suspicion.

The fountain pen fire arm is especially applicable for use with tear gas cartridges, such for example as described in my application Serial No. 98,270, filed March 29, 1926.

In the accompanying drawings,

Figure 1 illustrates a side view in elevation of the completed pen gun as carried in the pocket.

Fig. 2 is a longitudinal sectional view on the line 2—2 of Fig. 1.

Figs. 3 and 4 are views of a modification showing the barrel to be joined by a bayonet joint.

Fig. 5 illustrates face and edge views of an adjustable plug or breech block;

Fig. 6 illustrates a longitudinal section of a cylindrical trigger, recessed to receive one end of a spring;

Fig. 7 is a front end view of the trigger;

Fig. 8 is a view, partly in section, showing a cartridge in place.

In Figs. 1 and 2, the barrel 1 is shown threaded at 2, by which it is joined to the stock or handle 3 with the thread 4. Within the stock 3, is a threaded plug or breech block 5, Fig. 5, perforated at 6, and provided with a screw driver slot 7, or other means to adjust its position. An internal cylindrical trigger, 8, provided with a firing pin 9, and a cocking handle 10, which travels in the slot 11, provided with the offset 12, is recessed as at 13 to seat the spring 14, which latter sets in a recess 15 at the other end of the handle 3. After pulling back the cocking handle 10 in slot 11, until it is seated in the offset 12, which is shown as slightly inclined so as to lock the handle 10, the barrel 1 may be detached, and a tear gas cartridge 16 inserted, Fig. 8.

In the modifications shown in Figs. 3 and 4, the barrel 20 is provided with a pin 21, which engages the re-entrant slot 22, the

cooperating ends of the barrel and of the handle 24 are preferably made slightly conical as at 23, to provide a firm joint.

The pistol may be safely carried in the pocket in this condition, ready for instant use, and may be displayed in the presence of groups of people without arousing suspicion, because of its resemblance to a fountain pen. Upon releasing the handle 10, the spring 14 drives the firing pin trigger forward, and the pin passes through the hole 6 and strikes the cartridge 16, firing it, and discharging the tear gas composition. The barrel 1 may then be opened, or detached, the cartridge shell removed, and a new one inserted.

I claim:

1. A fountain pen shaped pistol, comprising a fountain pen shaped barrel, a fountain pen shaped stock, co-operating cone-shaped engaging elements on said barrel and stock with a pin on the barrel and a co-operating re-entrant slot on the stock, said stock containing a spring controlled trigger, and means to retain said trigger in a retracted position.

2. A fountain pen shaped pistol comprising a fountain pen shaped barrel, a fountain pen shaped stock, co-operating engaging elements on said barrel and stock, said stock containing an adjustable breech block, a spring controlled trigger, a firing pin on said trigger, and means on said trigger comprising a headed projecting pin extending through a co-operating re-entrant slot in the wall of the barrel to retain said trigger in a retracted position.

3. A fountain pen shaped pistol comprising a fountain pen shaped barrel, a fountain pen shaped stock, co-operating cone-shaped engaging elements on said barrel and stock with a pin on the barrel and a co-operating re-entrant slot in the stock, said stock containing an adjustable breech block, a spring-controlled trigger, a firing pin on said trigger, a re-entrant slot on said stock, a detachable headed pin in said trigger co-operating with said second re-entrant slot to retain said trigger in a retracted position, and a pocket engaging clip on the side of the barrel.

In testimony whereof I hereby affix my signature.

BYRON C. GOSS.

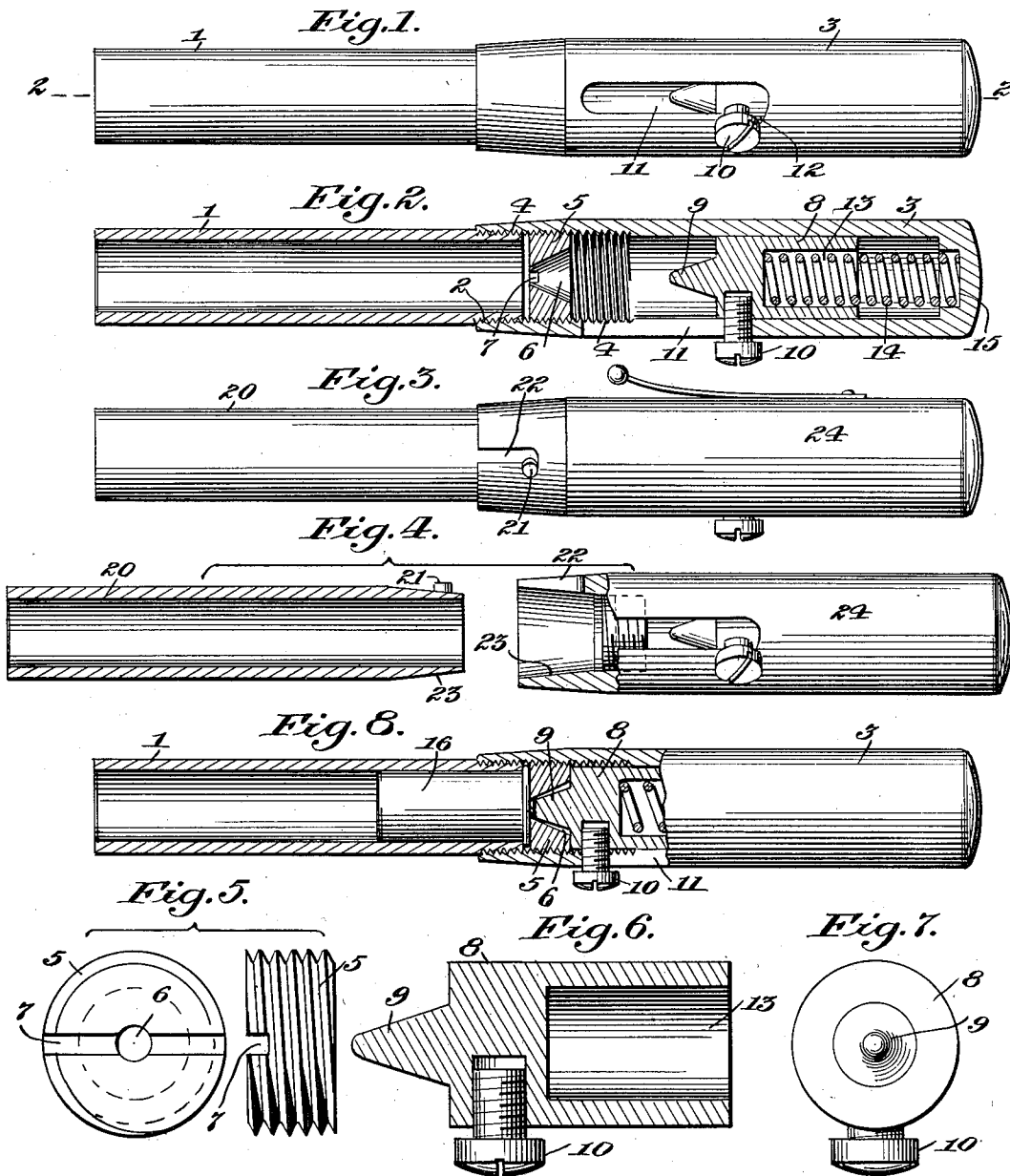
March 27, 1928.

1,663,834

B. C. GOSS

FOUNTAIN PEN SHAPED PISTOL

Filed June 15, 1926



Inventor:  
Byron C. Goss,

by Joseph W. Harris

Att'y.

## UNITED STATES PATENT OFFICE.

FREDERICK S. COCHO, OF COLUMBUS, OHIO.

## NOVELTY PISTOL.

Application filed April 5, 1928. Serial No. 287,690.

This invention relates to improvements in novelty firearms, and has for its primary object to provide a small, compact, easily carried pistol or weapon of approximately the size and appearance of an ordinary fountain pen in order that the device may be carried conveniently in the pocket of the user in a far more satisfactory manner than can be accomplished with a firearm of standard form.

In accordance with the invention there is provided a novelty firearm consisting of a cylindrical structure of substantially uniform diameter formed to comprise separable barrel, firing pins and stock sections, the barrel section being removable from the firing pin section in order to permit of the insertion or removal of a cartridge into and from the device, while the stock section is provided with a spring actuated plunger which, upon predetermined operation, is adapted to forcibly strike the firing pin, arranged in the firing pin section, so that the firing pin will be brought into contact with the cartridge in order to produce the necessary percussion to explode the latter, the arrangements and construction of the various sections of the device permitting the latter to be of uniform diameter approximately throughout its length so that the idea of compactness in the form of the device may be fully carried out.

Another object rests in the provision of a garment engaging clip which is carried by the stock section of the device by means of which the latter is held in a secured position within the pocket of the clothing of the user. This clip also serves in the additional capacity of a trigger by having a portion thereof formed to engage with the stem of the spring actuated plunger, which projects from one end of the stock section, whereby the clip operates to retain the spring plunger in a set or cocked position so that when the said clip is actuated, in the manner of an ordinary trigger, the spring plunger will be released to permit of its forcible travel into engagement with the firing pin and to thereby permit of the exploding of the cartridge situated within the barrel section.

With these further objects in view, which will be pointed out as the description proceeds, the invention consists in the novel features of construction, combinations of elements and arrangements of parts, hereinafter fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a view in side elevation of the improved novelty firing device comprising the present invention,

Figure 2 is a vertical longitudinal sectional view taken through the device,

Figure 3 is a similar view partly in section showing the plunger in retracted position,

Figure 4 is an end elevation as seen from the left of Figure 1,

Figure 5 is a transverse sectional view on the line 5—5 of Figure 2, and

Figure 6 is a transverse sectional view on the line 6—6 of Figure 2.

Referring more particularly to the drawings the number 1 designates my improved novelty pistol in its entirety. The pistol is formed to comprise a plurality of separable, longitudinally aligned sections, the numeral 2 indicating the barrel section of the pistol, the numeral 3 the firing pin section and the numeral 4 the stock section. The barrel and firing pin section 2 and 3 are of the same cross sectional diameter, while the stock section 4, in this instance, possesses a slightly greater diameter. In general, the diameter of the pistol and the complete length thereof compare closely with corresponding dimensions of an ordinary fountain pen.

The barrel section includes the usual longitudinally extending bore 5, and the inner end of this bore is adapted to receive a cartridge or bullet 6, the extreme inner end of the bore being slightly enlarged in order to constitute a seat 7 for the rim of the cartridge. Exteriorly the inner portion of the barrel section is provided with an annular shoulder 8, which terminates in a threaded extremity 9, the latter being receivable within an internally threaded socket 10 formed in the outer end of the firing pin section 3.

The reduced threaded extremity 9 of the barrel section is threadedly received within the socket 10 after a cartridge has been placed in the inner end of the bore 5. This brings the rim of the cartridge into cooperation with a slidable firing pin 11 which is movable longitudinally within a guide opening provided in the section 3. The inner end of the section 3 is exteriorly threaded as at 12 and is adapted to be received within an internally threaded pocket 13 formed in the outer end of the stock section 4.

The stock section 4 has arranged for slid-

ing movement within the pocket 13 thereof a plunger head 14, which is adapted to engage with the inner end of the pin 11 so as to project the latter violently into contact with the rim of the cartridge 6. The plunger head 14 terminates in a longitudinally extending stem 15, which is slidably received within an axial bore provided in the stock section, the inner end of said stem 15 terminating in an enlarged finger engaging portion 16 which is disposed exteriorly of the stock section. It will be seen that by grasping the portion 16 the plunger head may be withdrawn within the pocket 13 so as to be spaced from the firing pin 11. Then by releasing the stem 15 the plunger head acting under the influence of a spring 17, arranged within the stock section, is projected forwardly so as to contact with the pin 11, the latter in turn contacting with the rim of the cartridge or other location, to explode the latter and project a missile through the bore of the barrel section 2.

Arranged on the stock section 4 is a pivoted clip 18, the forward portion of which being provided with a barrel shaped enlargement 19 by means of which the clip serves to secure the device within the pocket of the user after the manner of a fountain pen clip. In addition to this function, however, the inner end of said clip is provided with an inturned lip 20 which resiliently engages with the stem 15. When the stem is retracted against the influence of the spring 17 the lip 20 engages with a groove 21 provided annularly within the stem 15, thereby serving to hold the plunger head in a retracted position against the influence of the firing spring 17. In the use of the device this permits the latter to be held readily within the hands of the user and may be pointed in a weapon like manner. Then by depressing the outer or forward end of the clip 18, the lip 20 is elevated from engagement with the groove 21. This frees the stem 15 and allows the plunger head 14 to respond to the influence of the spring 17, producing the desired impact upon the firing pin 11 to explode the cartridge 6.

In view of the foregoing it will be seen that the present invention provides a simple, compact and effective pistol which may be conveniently carried in the pocket of the user with the same degree of convenience which

accompanies the use or carrying of a fountain pen of ordinary form. It will be understood that the barrel and firing pin sections may be separated for the purpose of inserting a cartridge into or removing the same from the pistol. While I have shown these sections of the pistol secured by means of threads, it will be appreciated that other equivalent locking devices or arrangements may be provided and I therefore do not limit myself to the threaded connection specifically set forth. Similarly, other changes may be made in the specific form of the device illustrated without departing from the spirit and scope of the invention as the latter has been expressed in the following claims.

What is claimed is:

1. In a novelty pistol, a barrel, a spring actuated firing member movable longitudinally of said barrel and projecting from one end thereof, said barrel being of substantially uniform diameter throughout its length, and a movable clip arranged upon one end of said barrel for supporting the latter in connection with the garment of the user, said clip being also adapted for engagement with the firing member to control the opposite movement of the latter.

2. In a novelty pistol, separable barrel, firing pin and stock sections, a spring actuated plunger slidably carried by said stock section, an operating extremity connected with said plunger and extending exteriorly of the stock section, and a garment engaging clip carried by said stock section for retaining the pistol in an upright position within the pocket of the user, said clip being formed for engagement with the operating extremity of said plunger to retain the latter in a retracted position against the influence of a spring.

3. In a novelty pistol, a firing structure of substantially uniform diameter throughout the length thereof, a spring actuated plunger slidably mounted for axial movement in one end of said body structure, and a garment engaging clip mounted on said body structure, one end of said clip being adapted to engage with said plunger to hold the latter in a retracted position against the influence of its spring.

In testimony whereof I affix my signature.

FREDERICK S. COCHO.

Aug. 21, 1928.

1,681,172

F. S. COCHO

NOVELTY PISTOL

Filed April 5, 1928

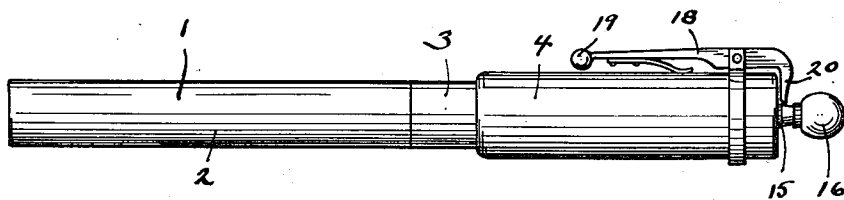


Fig. 1

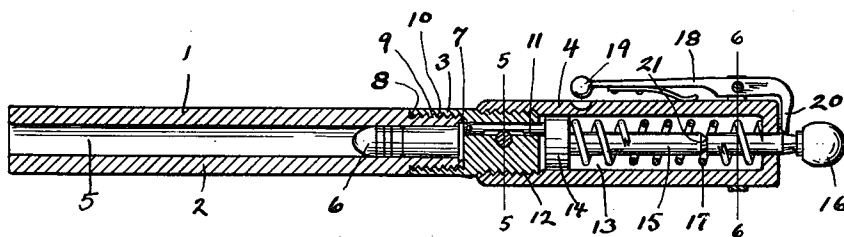


Fig. 2

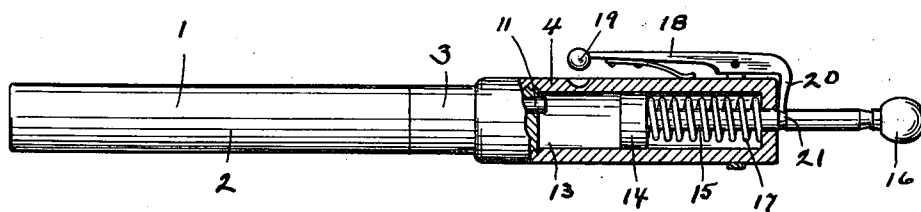


Fig. 3

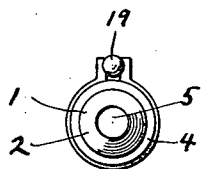


Fig. 4

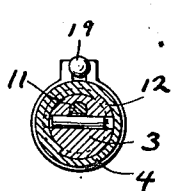


Fig. 5

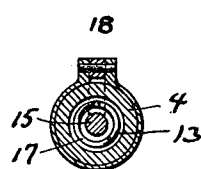


Fig. 6

Inventor

FREDERICK S. COCHO

By *W. O. McDowell*  
Attorney

# UNITED STATES PATENT OFFICE

2,042,934

## FIREARM

Merle A. Gill, Kansas City, Mo., assignor to  
Newton S. Hillyard, St. Joseph, Mo.

Application September 29, 1933, Serial No. 691,466

5 Claims. (Cl. 42-2)

My invention relates to firearms and more particularly to a device of that character to be supported in the palm of the hand and fired by closing of the fingers against a firing collar and has for its principal objects to provide a firearm of this type which is not liable to accidental discharge and that is automatically recocked after firing.

It is a further object of the invention to provide a firearm of this character for discharging tear gas shells.

In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of a firearm embodying the features of my invention and showing the method of holding the device for firing a shell.

Fig. 2 is a perspective view of the parts of the device shown in disassembled spaced relation to better illustrate their construction.

Fig. 3 is a longitudinal section through the device showing a shell in position with the device cocked and ready for firing.

Fig. 4 is a similar view showing the firing pin in retracted position and about to be released by the automatic trip for firing the shell.

Fig. 5 is a cross section on the line 5-5, Fig. 3.

Fig. 6 is a perspective view of the firing pin latch.

Referring more in detail to the drawing:

1 designates a hand stock comprising a cylindrical body portion 2 provided with a substantially semi-spherical end 3 adapted to seat in the palm of the hand. The opposite end of the stock is provided with a cylindrical bore 4 terminating in a reduced internally threaded socket 5 to mount a firing pin guide tube 6.

The firing pin tube 6 includes a sleeve having an externally threaded end 7 to engage in the threaded socket 5. The opposite end of the guide projects beyond the open end of the stock and is provided with internal threads 8 terminating in a stop shoulder 9 formed by the reduced bore 10 of the sleeve. The guide member is also provided substantially midway of its length with a rectangular slot 11 of sufficient length and width to accommodate the firing pin latch, as later described.

The firing pin is designated 12 and includes a cylindrical body portion 13 of suitable diameter to be snugly slidable in the bore 10 of the guide.

The rear end of the pin 12 is provided with a spring socket 14 to receive one end of the firing pin spring 15 which has its other end housed within the guide and engaging against the bottom of the socket 5 to urge the pin toward firing position. The forward end of the pin is reduced in diameter to form a point 16 for firing a shell 17.

The periphery of the body portion of the pin is also provided with an annular groove 18 forming a keeper or latch shoulder in which a latch 19 engages when the firing pin is cocked.

Threaded into the outer end of the firing pin guide tube and engaging against the shoulder 9 is a breech block 20 having a cup shaped recess 21 at its rear end and a flat forward face or seat 22 against which the base 23 of the shell abuts. The breech block is also provided with a central axial opening 24 to permit projection of the point of the firing pin therethrough, as shown in Fig. 3.

The firing barrel 25 of the device is of substantially the same outer diameter as the outer diameter of the firing pin guide and its inner diameter is of suitable bore to accommodate the size of shell 17 to be used therein. The breech end 26 of the barrel is reduced in diameter and externally threaded as at 27 to be mounted in the threads of the firing tube and is of sufficient length so that when the end face 28 thereof engages the rim 29 of the shell the opposite side of the rim is clamped tightly against the flat face 22 of the breech block and the shoulder 30 formed by the reduced breech is tightly engaged with the end of the firing pin tube.

In order to move the firing pin into retractive position, I provide a firing collar 31 which is slidably mounted on the guide and has its rear end slidable within the bore 4 of the stock 1, as now to be described.

The member 31 comprises a cylindrical sleeve 32 of slightly less diameter than the diameter of the bore 4 and has its ends provided with internally extending flanges 33 and 34 to slidably bear upon the rear end of the barrel 25 and firing pin guide tube 6 respectively and whereby the sleeve is spaced therefrom to form a housing for the spring latch 19. The firing collar is normally retained in projected position relatively to the stock by a coiled spring 35 sleeved over the guide and having one end engaging the bottom of the bore 4 and its opposite end the flange 34.

The latch 19 is formed of flat spring metal having a flat body portion 36 terminating in a rearwardly extending tongue 37 having a down-



wardly curved end 38 operable in the slot 11 and adapted to engage an inclined end 39 of the slot to effect release of a firing pin, as later described. Formed integrally with the body portion of the

5 latch at opposite sides of the tongue 37 are inwardly extending ears 40 and 41 adapted to engage in the groove 18 formed in the firing pin when the firing pin is in projected position.

The latch spring is retained in position within

10 the firing collar by fastening devices extending through an opening 42 in the collar and through an opening 43 in the spring and is retained in parallel relation with the axis of the guide tube by the ears 40 and 41 and the curved portion of

15 the tongue which extend into the slot for engaging with the periphery of the firing pin.

In assembling a device constructed as described, the firing pin guide tube 6 is screwed in the socket 5 of the hand stock. The firing pin

20 spring 15 and the firing pin 12 are then sleeved within the tube guide. The breech block 20 is then threaded into the open end of the tube until it seats against the shoulder 9.

The cocking spring 35 and the firing collar are

25 then sleeved over the guide tube so that the rear ends thereof enter within the open end of the hand stock, whereupon the ears 40 and 41 drop into the slotted opening 11 in the tube and enter the annular recess in the firing pin. The ears

30 then latch the firing collar against tension of the spring 35 since they engage with the end 44 of the slot 11 opposite the inclined end 39, previously described.

A shell 17 is inserted into the breech of the

35 barrel 25 so that the rim 29 thereof seats against the breech. The barrel is then screwed into the end of the firing pin guide tube until the base of the shell engages the breech block. The firing arm is then cocked, loaded and in condition for

40 firing.

To fire the shell, the device is held in the hand with the stock engaging the palm thereof and the barrel extending between the fingers, as shown in Fig. 1.

45 The fingers are then drawn back against the firing collar to move it retractively within the bore of the hand stock.

Since the ears 40 and 41 are seated in the groove 18 in the firing pin, the firing pin will also

50 be moved retractively against the tension of its spring 15 until the curved end 38 engages the inclined end 39 of the slot. Additional movement of the sleeve then causes the tongue to be cammed upwardly against the tension of the latch spring to withdraw the ears 40 and 41 from the annular

55 recess 18 of the firing pin so that the firing pin is released and driven by the stored up tension of the firing pin spring against the firing center of the shell 17 to explode the shell.

60 Upon release of the fingers from the firing collar the cocking spring 34 returns the collar to normal position and restores the ears 38 and 39 to engagement with the recess of the firing pin to again couple the collar therewith so that the device is

65 in position for firing upon retraction of the collar, as above described.

A new shell may then be inserted by removing the barrel, inserting the shell in the barrel and

70 replacing the barrel in the end of the firing pin tube, as above described.

The firearm is then loaded and ready cocked so that when the device is to be used the shell

75 may be fired simply by retracting the firing collar against tension of the spring.

It is thus apparent that since the device is automatically cocked after each firing operation, it is not necessary to cock the firing collar prior to retraction of the firing pin.

It is also apparent that due to resistance of the

5 spring 34, the firing collar cannot be accidentally moved to firing position.

While a firearm constructed and assembled as described is adapted for use in firing various types of shells, it is particularly adaptable for firing a

10 tear gas or similar shell and there is no danger of accidentally discharging the gas when the firearm is carried in the pocket of the owner.

If the device is to be used for firing tear gas shells only, it may be desirable to prevent its use

15 for firing a bullet, and in this instance, a pin 46 is inserted transversely of the bore of the barrel to preclude such use, otherwise the pin will be eliminated.

What I claim and desire to secure by Letters

20 Patent is:

1. In a device of the character described, a hand stock provided with a tubular socket and having a threaded recess forming an annular

25 shoulder with the bottom of the socket, a firing pin guide tube having a threaded end engaging in said threaded recess of the hand stock, a barrel member carried by the outer end of the guide tube, a firing pin slidable in the guide tube,

30 a spring in the guide tube for urging the firing pin to firing position, a sleeve member having an imperforate annular wall slidable over the guide tube and barrel member and having one end

slidable within the socket of the hand stock, latch means within and completely enclosed by said

35 sleeve member for engaging the firing pin to move the firing pin when the sleeve member is moved retractively on the guide tube, a spring sleeved on the guide tube and having one end engaging said annular shoulder and its other end engaging

40 the sleeve member to normally retain the latch means in engagement with the firing pin, cam means on the guide tube for releasing the latch means when the sleeve member is moved within

45 said socket against tension of the spring that is sleeved on the guide tube, and a breech block mounted in the guide tube and cooperating with the barrel for retaining a shell in firing position in the barrel.

2. In a device of the character described, a firing pin guide tube, a hand stock provided with a tubular socket of larger diameter than the guide tube, means securing the guide tube concentrically within the bottom of the socket, a firing pin

50 slidable in the guide tube, a firing sleeve having an imperforate annular wall movable over the guide tube and within said socket of the hand stock, latch means completely enclosed within the firing sleeve for normally connecting the firing

55 sleeve with the firing pin to move the firing pin when the firing sleeve is moved in one direction, means on the guide tube for releasing the latch means, a spring in the guide tube for urging the firing pin to firing position when released by

60 the latch means, and a spring sleeved on the tube for moving the firing sleeve to effect reengagement of the latch means.

3. In a device of the character described, a firing pin guide tube, a barrel cooperating with the firing pin guide tube, a hand stock supporting

70 the guide tube and provided with a tubular portion, a firing pin slidable in the guide tube, a firing pin spring in the guide tube having one end engaging the firing pin to urge the firing pin to firing position, a sleeve member having an imper-

75

forate annular wall snugly slidable within the tubular portion of the hand stock and having inwardly extending annular end flanges slidable respectively upon said guide tube and barrel, 5 latch means fixed within and completely enclosed by the sleeve member for connecting the firing pin with the sleeve member to effect compression of the firing pin spring when the sleeve member is moved toward the hand stock, means associated 10 with said guide tube to effect release of said latch means, and means for automatically returning the sleeve member for effecting reengagement of the firing pin.

4. In a device of the character described, a firing pin guide tube having a slotted opening therein, a hand stock supporting the guide tube and having a tubular portion, a firing pin slidable in the guide tube and having an annular recess therein in registry with said slotted opening, a firing pin spring in the guide tube for urging the firing pin to firing position, a sleeve member having an imperforate annular wall snugly slidable within the tubular portion of the hand stock and having inwardly extending annular 25 flanges cooperating with the imperforate wall to completely cover the slotted opening in the guide tube, a latch member fixed to and enclosed within the sleeve member and having an ear extending

through said slot for engaging the recess and having a tongue for engaging the guide tube to release said ear from the recess when the sleeve is moved in one direction over the hand stock to cause the firing pin spring to move the firing pin to firing position, and a spring sleeved on the guide tube and having its ends respectively engaging the hand stock and sleeve member for returning the sleeve member to reengage the lip member with the firing pin. 10

5. In a device of the character described, a hand stock having a tubular socket, a firing pin guide tube fixed concentrically within the socket, a barrel member connected in axial alignment with the guide tube, a firing pin slidable in the 15 guide tube, a firing pin spring housed within the guide tube for normally urging the firing pin to firing position, a firing sleeve snugly slidable within the tubular socket of the hand stock and having an annular gripping portion snugly slidable upon the barrel member, latching means completely enclosed within the sleeve member for releasably actuating the firing pin upon movement of the firing sleeve to load said firing pin spring, and a firing sleeve spring housed within 25 the socket of the hand stock for returning the firing sleeve.

MERLE A. GILL.

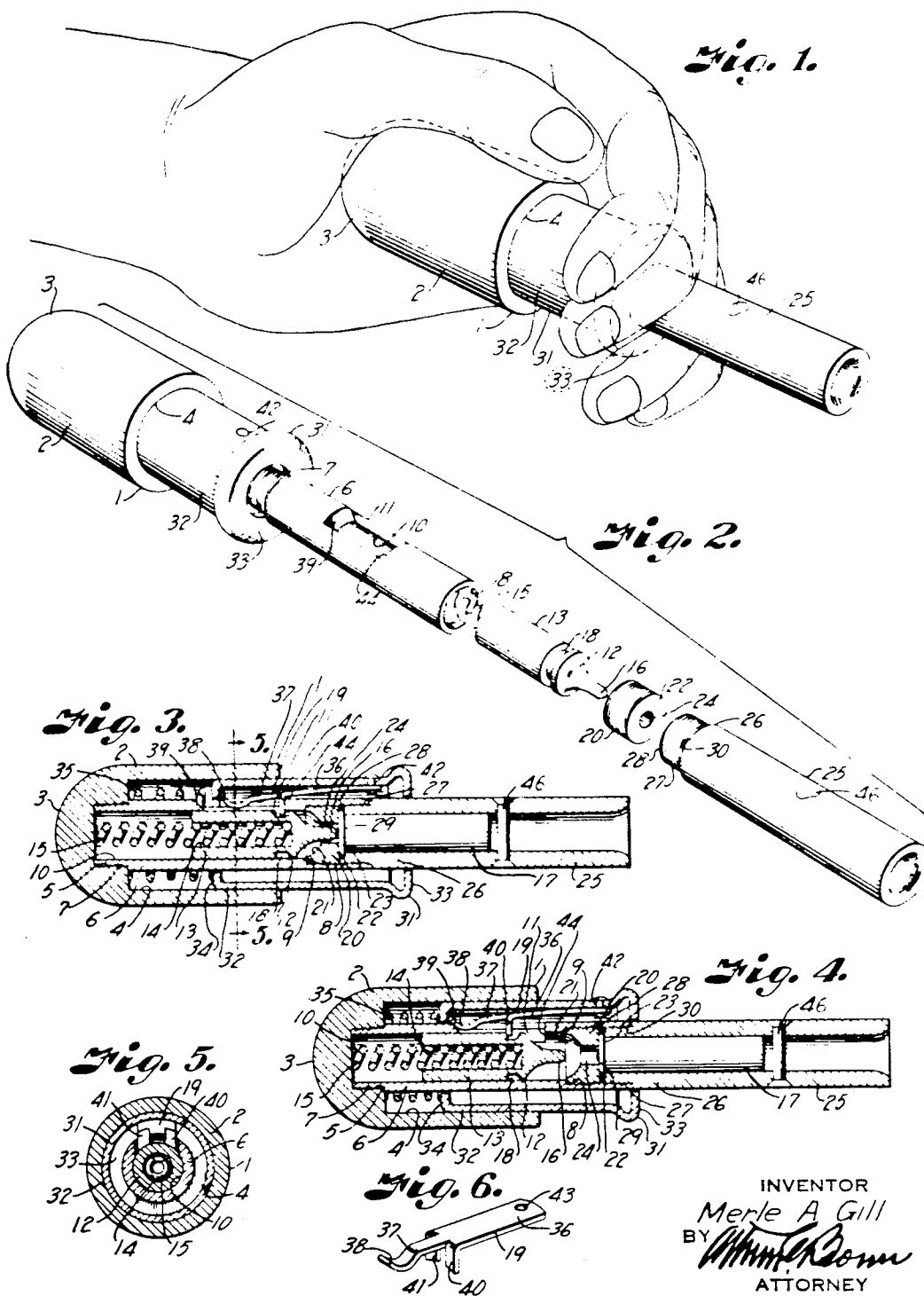
June 2, 1936.

M. A. GILL

2,042,934

Patented

Filed Sept. 29, 1933



INVENTOR  
Merle A. Gill  
BY *Wm. R. Bonn*  
ATTORNEY

1

2,880,543

PISTOL

Peter von Frantzius, Chicago, Ill., assignor to Hercules Gas-Munitions Corporation, Chicago, Ill., a corporation of Illinois

Application June 26, 1956, Serial No. 593,973

3 Claims. (Cl. 42—1)

The present invention relates to pistols, and more particularly to that type of pistol which operates to discharge an incapacitating fluid, such as tear gas. Preferably the pistol is in the shape of and simulates a fountain pen.

The gear gas is contained in a cartridge which is placed in the pistol for firing or discharging. Such cartridge has an outer shape similar to that of a firearm cartridge, or one firing a bullet, and the pistol may therefore offer a temptation to fire a cartridge having a bullet therein.

An object of the invention is to provide a pistol of the foregoing character in which it is impossible effectively to fire a firearm cartridge.

A more specific object is to provide a pistol of the character noted, in which, in an attempt to fire a firearm cartridge, the gas intended for propelling the bullet is dissipated in such a way as to be ineffective for so propelling the bullet.

A further object is to provide a pistol of the foregoing character, in which, although the propelling gas for a bullet is harmlessly dissipated, a cartridge of intended kind, e.g., of tear gas, can be utilized and discharged in a normal manner.

Other objects and advantages of the invention will appear from the following detail description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a plan view of a pistol embodying the invention;

Fig. 2 is a longitudinal sectional view through the pistol, the barrel of the pistol being shown with a tear gas cartridge therein;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a plan view showing the barrel of the pistol removed from the stock;

Fig. 6 is a view of the pistol oriented according to Fig. 1 and showing the barrel in section and with a bullet-equipped firearm cartridge therein, and

Fig. 7 is a view similar to Fig. 6, but after firing of the firearm cartridge and resultant rupture of the barrel.

The pistol shown in the accompanying drawing includes certain construction disclosed in Reissue Patent No. 17,813 granted to me on September 23, 1930, and reference may be made to that patent for additional detailed description of any of the construction of the present pistol common to the structure of that patent.

The pistol includes two main parts, namely a stock 10 and a barrel 12. These two parts are detachably secured together for insertion of a cartridge 14 (Fig. 2) of the desired type, namely for discharging an incapacitating fluid such as tear gas.

The pistol, as shown more clearly in Fig. 1, is generally in the shape of a fountain pen and is intended to simulate a fountain pen so as to appear as such when carried in an outer pocket. The stock 10 may be of any suitable material such as a metal having the desired strength, and

2

has an internally threaded front end indicated at 16 for threadedly receiving the barrel 12. A breech block 18 is threaded in the front end of the stock and positioned rearwardly or inwardly from the front end edge thereof 5 and thus inwardly of the barrel.

The cartridge is fired by means of a firing pin 20 projectable through a central aperture in the breech block and formed on the front end of a plunger 22 having a socket or recess 24 in its rear end. The recess 24 receives 10 the forward end of a compression spring 26, the rear end of which is fitted in a cooperating recess 28 in a cap 30 secured in the rear end of the stock by suitable means such as interfitting screw threads. If desired, a pocket clip 32 may be secured at the rear end of the 15 stock as by a band on the clip gripped between a shoulder on the cap and the rear end of the stock. The plunger 22 together with the firing pin 20 is actuated by manual manipulation by means of a stud 34. The latter is secured in the plunger and rides or slides in a longitudinal 20 slot 36 in the stock. The head of the stud is exposed for engagement by the thumb, and upon retraction of the stud against the action of the spring 26 and subsequent release, the plunger and firing pin are snapped forwards, whereupon the firing pin fires the cartridge.

The barrel 12 is of tubular construction and is also of a metal possessing relatively great strength so as to withstand the pressures developed upon discharge of the cartridge 14. As noted above, the cartridge 14 is of the 25 type for discharging a fluid such as tear gas, and in itself is of conventional or standard construction. It includes a tubular shell 38 and a head 40 having a flange of greater diameter than the shell. The barrel has a reduced, rear end portion 42 that is externally threaded, and screw threaded into the forward end of the stock 30 10, and upon threading therein a predetermined extent, it grips the head of the cartridge between itself and the breech block 18. If desired the rear end of the threaded rear end portion 42 may be of reduced diameter so as to form on the barrel a rearwardly facing shoulder 44 for engaging the forward end edge of the stock. The portion of 35 the stock surrounding the reduced rear end portion 42 of the barrel imparts strength to the latter for preventing breakage, as will be explained in detail below.

In order to prevent the effective firing of a firearm cartridge of the type that discharges a projectile or bullet, the barrel is provided with a weakened portion so arranged and disposed as to effect rupture of the barrel upon 40 discharge of such a firearm cartridge, if an attempt were made to fire the latter in the pistol. To this end the barrel 12 is provided with a longitudinally extending groove 46 in its outer surface. This groove is of substantial length with respect to the length of the barrel and is disposed preferably between the ends thereof. The 45 groove is also narrow, and of substantial depth relatively to the thickness of the side wall of the barrel. It will be noted that the groove does not extend through the wall of the barrel, and the side wall of the barrel therefore is continuously imperforate in its original condition before rupture. The inner surface of the barrel is of 50 uniform character circumferentially and is preferably of truly cylindrical shape. If desired, however, the forward end of the inner surface, or muzzle portion, may be flared outwardly, as disclosed in the above-mentioned reissue patent. Preferably the forward end portion or muzzle 55 portion 48 is tapered forwardly on its outer surface in order to provide a finished appearance and also to provide a relatively weakened portion of the barrel that ruptures or splits more readily than the rear or inner end portion of the barrel.

Since a pistol of the above general character has certain characteristics in common with a fire arm pistol there

may be a temptation to fire a firearm cartridge therein, and so long as such a cartridge can be fitted in the barrel of the pistol and the firing pin made to strike the cap thereof, the cartridge can be fired. The construction of the present invention renders it impossible effectively to fire such a firearm cartridge. Figs. 6 and 7 illustrate the same pistol described above but with a firearm cartridge 50 therein. It will be noted that the cartridge 50 is of external dimensions similar to those of the cartridge 14, and has a bullet or projectile 52. In the event a cartridge such as the cartridge 50 is fired, the pressure developed in the cartridge is substantially greater than the pressure developed in the cartridge 14. This pressure ruptures or splits the barrel at the weakened portion resulting from the formation of the groove 46. As a result the pressure is dissipated from its intended direction of application, namely it is expelled sideways through the ruptured barrel and the bullet, while it may be projected forwardly out of the barrel, is so projected only as extremely short distance, such as a few feet, and then falls with no lethal effect on the intended target.

The floor or bottom of the groove 46 is relatively thin, as will be noted from the sectional views, and this portion is subject to ready rupture or splitting by the pressure developed within the barrel when a regular firearm cartridge is fired in the barrel of the pistol. The portion 48 on the muzzle of the barrel is of less wall thickness than the remainder of the ungrooved portion of the barrel and while it is of greater thickness than the floor of the groove and splits after the grooved portion splits, it splits before the portion rearwardly of the groove, so that the barrel upon rupture opens up to a condition similar to that of Fig. 7. The latter figure is an exact drawing of a barrel and cartridge ruptured or split due to an attempted firing of a bullet-equipped firearm cartridge. The rear portion of the barrel is relatively strong and will rupture only after successive rupture of the central and front end portions. Because of the abrupt change in thickness of the barrel at the shoulder 44, the barrel may be sheared clean at this point, since the stock, because it surrounds the reduced portion 42 of the barrel, imparts greater strength to the latter and prevents breakage thereof and causes the shearing effect mentioned. As a result, the rear end portion 42 of the barrel is not distorted and it may be readily threaded out of the stock. A new barrel may then be threaded into the stock.

The barrel, notwithstanding the groove 46, is imperforate throughout its side wall in its original condition, and is capable of withstanding the pressure developed by the tear gas cartridge, whereby the tear gas is all discharged out of the forward end of the barrel as intended.

While I have disclosed herein a preferred embodiments of the invention, it will be understood that changes may be made therein within the spirit and scope of the appended claims.

I claim:

1. As a new article of manufacture, a pistol adapted primarily to discharge an incapacitating gas and comprising a hollow stock, an elongated one-piece cylindrical

imperforate metal barrel having one end thereof open and its other end connected removably to the stock and shaped releasably to retain either a conventional gas cartridge which when fired develops comparatively low pressure and a similarly dimensioned bullet-equipped firearm cartridge which when fired develops comparatively high pressure, and a spring-biased firing pin mounted slidably in the stock and adapted when retracted and then released while a cartridge is in the barrel to fire the cartridge, said barrel presenting a smooth unobstructed cylindrical bore, the metal of said barrel being relieved along a longitudinal region of the barrel to thus weaken the barrel circumferentially along said region so that the barrel will rupture therealong when subjected internally to the explosive force of a bullet-equipped firearm cartridge, whereby the bullet will be displaced laterally of the ruptured barrel in the radial direction of the relieved longitudinal region.

2. As a new article of manufacture, a piston adapted primarily to discharge an incapacitating gas and comprising a hollow stock, an elongated one-piece imperforate metal barrel presenting a smooth unobstructed cylindrical metal bore, said barrel having one end thereof open and its other end connected removably to the stock and shaped releasably to retain either a conventional gas cartridge which when fired develops comparatively low pressure and a similarly dimensioned bullet-equipped firearm cartridge which when fired develops comparatively high pressure, and a spring-biased firing pin mounted slidably in the stock and adapted when retracted and then released while a cartridge is in the barrel to fire the cartridge, the outer surface of said barrel being formed with a straight axially extending uninterrupted groove in the outer surface thereof substantially coextensive with the longitudinal extent of the barrel, the depth of said groove being sufficiently great as to weaken the barrel circumferentially along the linear extent of the groove on one side of the barrel, the extent to which the barrel is thus weakened being such that the barrel will withstand the low pressure explosive force of a conventional gas cartridge but will rupture in the vicinity of said groove when subjected internally to the explosive force of a bullet-equipped cartridge, whereby the bullet will be displaced laterally of the ruptured barrel in the radial direction of the axially extending groove.

3. As a new article of manufacture, a pistol as set forth in claim 2 wherein the open end of the barrel is tapered and wherein said axially extending groove is partially embodied by said tapered end.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

1,276,082	Kuhn	Aug. 20, 1918
1,608,359	Biason	Nov. 23, 1926
1,760,674	Frantzius	May 27, 1930
1,772,070	Darley	Aug. 5, 1930
2,067,408	Morris	Jan. 12, 1937
2,757,474	Williams	Aug. 7, 1956

April 7, 1959

P. VON FRANTZIUS

2,880,543

PISTOL

Filed June 26, 1956

Fig. 1

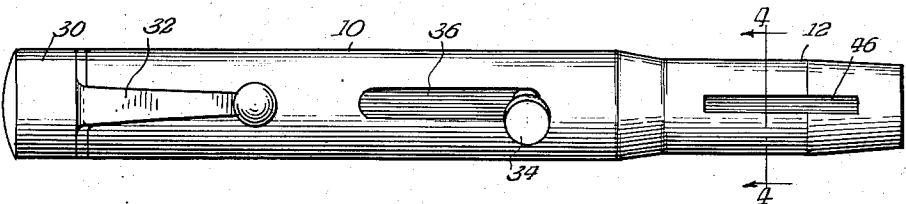


Fig. 2

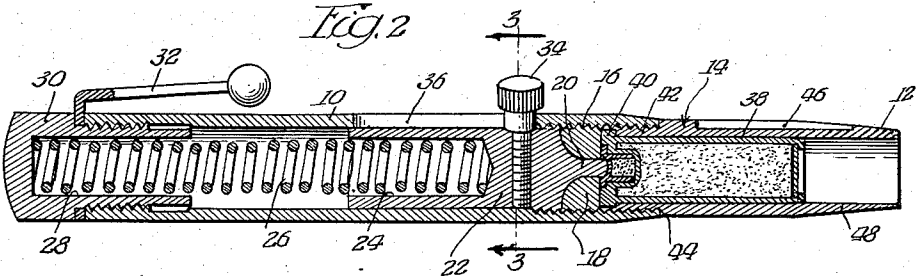


Fig. 3

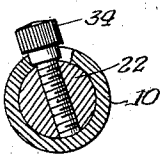


Fig. 4

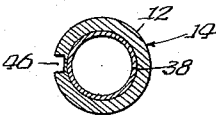


Fig. 5

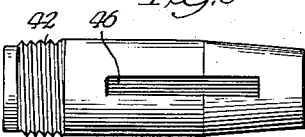


Fig. 7

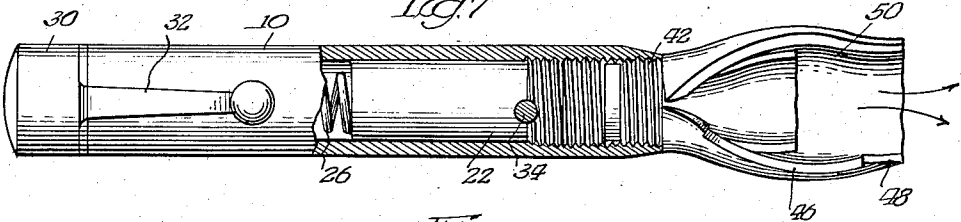
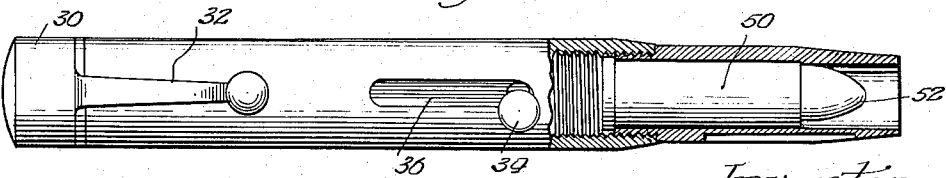


Fig. 6



Inventor  
Peter Von Frantzius  
By: Fred Hellwig  
Atty.

## UNITED STATES PATENT OFFICE

WILLIAM S. DARLEY, OF CHICAGO, ILLINOIS

## GAS GUN

Application filed February 4, 1929. Serial No. 337,405.

The invention relates to improvements in gas guns especially adapted for use by policemen and the like in capturing vicious criminals without material injury to the criminal, the primary object of the invention being to provide a simple and efficient device of this character which is highly efficient in use.

Another object of the invention is the provision of a device of the character indicated, provided with simple and effective means preventing accidental discharge of the same.

Other objects will appear hereinafter.

The invention consists in the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings forming a part of this specification and in which—

Fig. 1 is a perspective view of a gas gun embodying the invention;

Fig. 2, an enlarged longitudinal section of the same; and

Fig. 3, a partial section similar to Fig. 2 but showing the parts in firing relation.

The preferred form of construction, as illustrated in the drawings, comprises a cylindrical stock or handle member 4 made in substantial imitation of an ordinary fountain pen and provided with a retaining clip 5 for retaining the same in the pocket of the user. At one end the stock member 4 is closed by means of a removable plug 6 threaded therein, as shown, and provided with a socket 7 for the reception of one end of a firing spring 8. A plunger 9 is mounted to reciprocate in the stock 4 and is provided with a socket 10 to receive the other end of the spring 8. The plunger 9 carries a firing pin 11 adapted and arranged to project through a central opening 12 in a firing block 13 threaded in the open end of the stock 4. A firing barrel 14 is also threaded in the open end of the stock 4 for ready removal, the inner end of said barrel being adapted and arranged to receive a cartridge 15. The cartridge 15 is in the form of an ordinary blank cartridge loaded with tear gas adapted to render a vicious criminal or the like in-

capable of effective resistance by temporarily blinding him or her.

The plunger 9 is provided with a laterally projecting thumb piece 16 projecting through and operating in an elongated longitudinal slot 17 in the side of the stock 4. The slot 17 is provided in one side adjacent its firing end with a retaining or locking notch 18 adapted and arranged to receive the thumb piece 16 and hold the firing pin 11 in close proximity to, but out of firing contact with, the cartridge 15. By this arrangement, as long as the thumb piece 16 remains in the notch 18, it is impossible for the cartridge 15 to be accidentally fired.

It will be noted that it is impossible, under such circumstances, for the plunger to be accidentally retracted a sufficient distance so that, when released, there is danger of accidentally firing the cartridge 15. Likewise, the proximity of the firing pin 11 to the cartridge 15 is so close that if the thumb piece 16 should be accidentally dislodged from the notch 18, it cannot be impelled by the spring 8 with sufficient inertia to fire the cartridge. Likewise, also, in case the thumb piece 16 should be accidentally struck a longitudinal blow in the direction toward the cartridge 15, it is impossible for such a blow to fire the cartridge as long as the thumb piece 16 is retained in the notch 18. Thus it will be noted that the device is provided with simple and effective means preventing or minimizing danger of accidental firing of the same. When it is desired to fire the gun, all that is necessary is to remove the thumb piece 16 from the notch 18, retract the same a short distance, and then release it, whereupon the plunger 9 will be impelled by the spring 8 with sufficient inertia to cause firing of the cartridge 15, as will be readily understood.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of modification and variation without departing from the spirit of the invention. I therefore do not wish to be limited to the precise details disclosed but desire to avail myself of such modifications and variations as fall within the scope of the appended claims.

I claim:

1. A device of the class described comprising a shock member; a firing barrel detachably connected with said stock and adapted and arranged to receive a cartridge for firing;  
5 a spring actuated firing plunger in said stock in operative relation with a cartridge in said barrel; an actuating thumb piece on said plunger and projecting from said stock, there  
10 being an elongated longitudinal slot in said stock permitting reciprocations of said plunger, a retaining notch being provided in one side of said slot adjacent the firing end thereof adapted and arranged to lock said  
15 plunger in close proximity to, but out of firing contact with, said cartridge.

2. A device of the class described comprising a cylindrical stock member open at one end and closed at the other end by means of a  
20 removable closure member threaded therein; a firing barrel threaded in the open end of said stock and adapted and arranged to receive a cartridge in its inner end; a firing block threaded in the open end of said stock  
25 and positioned adjacent the inner end of said barrel, said block being centrally perforated for the passage of a firing plunger; a firing plunger mounted to reciprocate in said stock and project through said firing block to fire a  
30 cartridge in said barrel; a spring in said stock for actuating said plunger; an actuating thumb piece on said plunger and projecting from said stock, there being an elongated longitudinal slot in said stock permitting reciprocations of said plunger, a retaining notch being provided in one side of said slot adjacent the firing end thereof adapted and arranged to lock said plunger in close proximity to, but out of firing contact with, said  
cartridge.

3. A device of the class described, comprising a stock member; a firing barrel on said stock member and arranged to receive a cartridge for firing; a spring-actuated firing  
45 plunger in said stock in operative relation with a cartridge in said barrel; an actuating thumb-piece on said plunger and projecting from said stock, there being an elongated, longitudinal slot in said stock permitting reciprocations of said plunger, a retaining notch being provided in one side of said slot at a comparatively short distance from the firing end thereof, and adapted and arranged to receive  
50 said thumb piece and lock said plunger, said retaining notch being so located as to hold  
55 said plunger out of firing contact with said cartridge but in such close proximity thereto as to prevent accidental firing thereof upon accidental release of said plunger from said  
60 notch.

In witness that I claim the foregoing as my invention, I affix my signature this 29th day of January, 1929.

WILLIAM S. DARLEY.



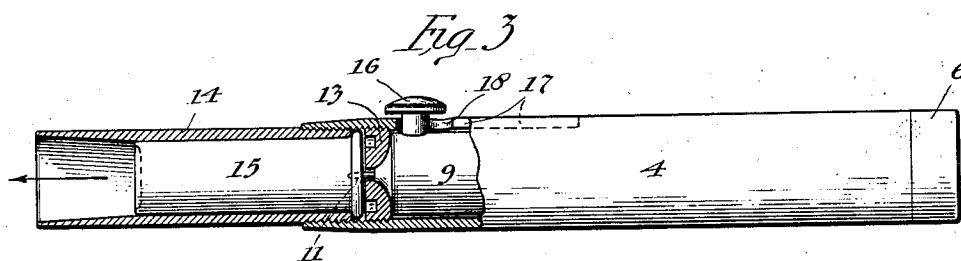
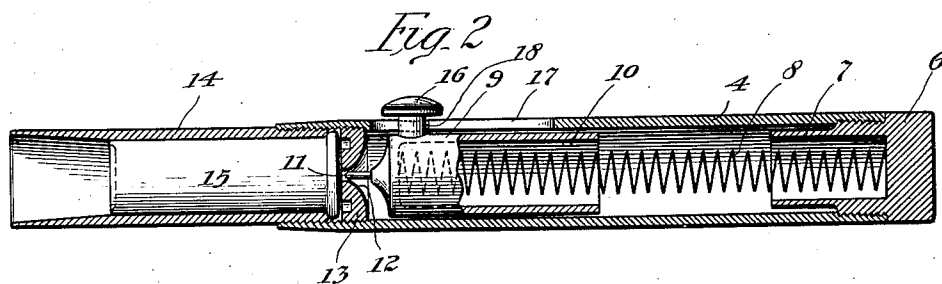
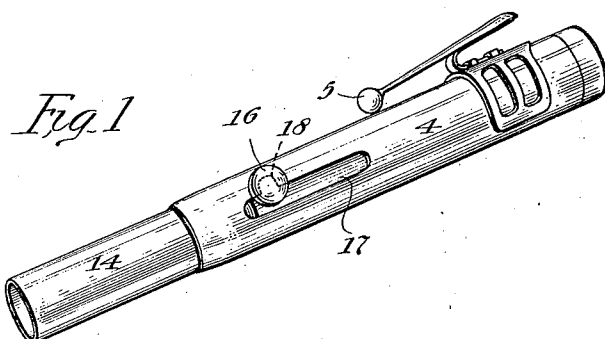
Aug. 5, 1930.

W. S. DARLEY

1,772,070

GAS GUN

Filed Feb. 4, 1929



INVENTOR.

*William S. Darley*

BY

*Brayton Richards*

ATTORNEY.

# UNITED STATES PATENT OFFICE

SCOTT M. ABBOTT, OF CHICAGO, ILLINOIS

## GAS-CARTRIDGE-FIRING DEVICE

Application filed June 23, 1928. Serial No. 287,777.

This invention relates to improvements in gas cartridge firing devices and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The primary object of the invention is to provide a small compact device for firing chemical gas cartridges such as produce tear or like gases, employed in subduing unruly persons.

Another object of the invention is to provide a device of this kind which may be carried in the vest pocket or in a hand bag in the manner of a fountain pen, ready for instant use when the occasion so demands.

Still a further object of the invention is to provide a device of this kind which may be easily loaded and carried cocked, ready for instant use without danger of accidental-firing or discharge while so carried.

Still another object of the invention is to provide a device of this kind which is simple in construction, is safe in use and comprises but a few parts which are so correlated that they will not readily get out of order.

These objects of the invention as well as others, together with the many advantages thereof will more fully appear as I proceed with my specification.

In the drawing:—

Fig. 1 is a perspective view of a chemical gas cartridge firing device, embodying the preferred form of my invention.

Fig. 2 is a longitudinal vertical sectional view through the device on an enlarged scale with the parts in the cocked position.

Fig. 3 is a view similar to Fig. 2 with the parts in the position they occupy after firing a cartridge.

Fig. 4 is a perspective view of the firing pin plunger of the device.

Fig. 5 is a perspective view of a plunger guide tube embodied in the device.

Referring now in detail to that embodiment of the invention illustrated in the accompanying drawing, 1 indicates the body or casing of the device and 2 indicates the barrel detachably connected thereto to simulate in all appearances, a modern fountain pen. The casing is tubular and is interiorly threaded at

both its top and bottom ends as best shown in Figs. 2 and 3. Threaded into the bottom end of the casing so as to be positioned at a point spaced from the extremity thereof is a breech block 3 having an axially disposed opening 4 therein. The top end of the barrel is exteriorly threaded so as to be detachably screwed into the bottom end of the casing and said end of the barrel is adapted to receive a center fire, chemical gas cartridge 5. When the cartridge is in the barrel and the barrel is screwed into the casing, the head of the cartridge is securely held in place between the breech block and barrel end as best shown in Figs. 2 and 3. By unscrewing the barrel the empty cartridge may be removed and a new one substituted therefor.

In the top end of the casing is located a guide tube 6. Said tube has a head plug 7 screwed into the top end of the casing and a body 8 which extends down into the casing a suitable distance. In one side of said tube is a longitudinal slot 9 which opens through both ends of the same and in the head plug is an axially disposed opening 10. Longitudinally slidable in said tube is a plunger indicated as a whole by the numeral 11 in Fig. 4. Said plunger includes a tubular body 12 to slide in the guide tube and on the bottom end of the body is a head 13 of a diameter snugly fitting the interior of the casing. The top end of said body 12 has an axially disposed opening 14 therein and also carries a stud or rib 15 which engages in the slot 9 in the guide tube. Thus the plunger while longitudinally movable in the casing and guide tube cannot turn therein. The bottom end of said plunger is closed by a plug 16 swaged therein and this plug carries a firing pin 17 adapted to pass through the opening 4 in the breech block to engage and explode the cartridge.

In the head 13 of the plunger and opening through that side of the plunger opposite the rib 15 is a port 18 in which a spring pressed ball or trigger 19 is disposed. Said ball in one position of the plunger engages in but projects part way through a burred over opening 20 in the casing in a manner holding the plunger cocked as will soon appear.

In the plunger body is a cocking stem 21 which has a head 22 on its bottom end that snugly fits the interior of the plunger body, said stem passing through and having a sliding bearing in the openings 10 and 14 respectively before mentioned. A spring 23 surrounds the stem 21 between the head 22 and top end of the plunger body and on the top end of said stem, without the body is a knob 24. This knob which is of a diameter approximating that of the casing is knurled so that it may be conveniently grasped in cocking the plunger.

Surrounding the body of the guide tube 6 is an expansive helical spring 25 which engages at one end against the head 7 of the guide tube 6 and engages at its other end against the head 13 of the plunger. Said spring 25 which has a greater expansive tendency than the spring 23 normally urges the plunger toward the breech block.

On the casing is provided a clip indicated as a whole as at 26 for securing the device in a vest or coat pocket, in the manner of a clip for the same purpose as used in fountain pens. This clip includes a band 27 which partially surrounds the casing and has therein a slot 28 in which a pin 29 on the casing engages in a manner limiting the turning movement of the clip on said casing. A spring finger 30 extending downwardly along the casing is carried by the band 27 and this spring finger which is adapted to engage the outer portion of a garment pocket may be turned from a position covering the opening 20 in the casing to a position exposing the same as best shown in Fig. 1.

To load the device, the barrel is unscrewed from the casing and a cartridge is positioned in the proper barrel end which is then screwed into the associated casing end. To cock the device ready for use the knob 24 is grasped and pulled outwardly. This, of course, first compresses the spring 23 and when said spring is thus compressed, a further pull on the stem will cause the plunger to be moved toward the top end of the casing, compressing the spring 25. When the spring pressed ball or trigger 19 comes into line with the burred opening 20 in the casing, said ball will snap into it. By reason of the formation of the burred opening the greater portion of said ball is disposed in said opening so that while it may not pass entirely therethrough, it passes far enough thereinto so that the plunger is held against any movement under the action of the spring 25. By reason of the rib 15 and slot 9, the ball will always be held in the proper position to enter said opening. Thus the plunger is cocked and when the knob 24 is released the stem is retracted until said knob engages the guide tube head or plug and this without releasing the plunger. The device which is now cocked as shown in Fig. 2 is ready for firing and by

turning the clip 26 in the proper direction on the casing the spring finger will cover the trigger as shown in dotted lines in Fig. 1. When cocked in this manner, the device may be carried in a vest pocket or in a hand bag without danger of accidental firing as the trigger is safely covered up by the spring finger.

Assume that the device, already cocked is carried in the vest pocket and an occasion arises which demands immediate use of the device. It is withdrawn from the pocket as one withdraws a fountain pen and the clip is turned to expose the trigger. With the barrel pointed in the proper direction, a slight thumb pressure is exerted on the exposed part of the trigger and so soon as its center has been pushed inwardly of the plane of the interior surface of the casing, the spring 25 will suddenly expand to move the plunger forcefully toward the breech block end of casing when the firing pin engages the percussion cap of the cartridge and explodes the same. This causes a discharge of gas from the muzzle end of the barrel which through its action renders those in the immediate vicinity helpless so far as violence or the like is concerned. To reload the device, the barrel is removed and a new cartridge substituted for the used one, then the barrel is replaced and the device is ready for cocking for future use.

The device is especially adapted for use by officers of the peace in quelling unruly persons and is convenient for use by persons as a protection against assaults and violences. It is small and compact and is so simple to load and operate that those of average intelligence will have no difficulty therewith.

To prevent the use of the device for the firing of a regular bullet cartridge, the muzzle end 2<sup>a</sup> of the barrel is choked or made tapered as shown and hence the device cannot be used for any other purpose than that originally intended.

While in describing my invention, I have referred in detail to the form, construction and arrangement of the parts, the same is considered as by way of illustration only except as may be specifically pointed out in the appended claims.

I claim as my invention:

1. A device of the kind described embodying therein a tubular casing, a guide tube in said casing, a spring pressed plunger longitudinally movable in said guide tube, means for cocking the plunger, means carried by a part of the plunger and engaging in an opening in the casing for locking the plunger in cocked position, said last mentioned means being manually operable to release the plunger to firing position, a firing pin carried by the plunger for engaging a chemical cartridge to release the chemical therefrom in the form of a gas and means capable of a limited turning movement on the cas-

ing and including a finger for covering and uncovering said plunger locking means.

2. A device of the kind described embodying therein a casing, a chemical cartridge receiving barrel detachably connected thereto, a spring pressed firing plunger disposed in the casing, means comprising a spring pressed stem movable in the plunger and extending through the end of the casing for cocking the plunger and means for automatically locking the plunger as it reaches cocked position, said last mentioned means being manually releasable.

3. A device of the kind described embodying therein a tubular casing, a breech block in one end of said casing, a chemical cartridge receiving barrel detachably connected to said last mentioned end of the casing, a spring pressed plunger in said casing carrying a firing pin, a plunger cocking stem disposed within the plunger and extending through the other end of the casing and manually releasable means automatically operating to lock the plunger as it reaches cocked position.

4. A device of the kind described embodying therein a tubular casing, a breech block in one end of said casing, a chemical cartridge receiving barrel detachably connected to said last mentioned end of the casing, a spring pressed plunger in said casing carrying a firing pin, a plunger cocking stem disposed within the plunger and extending through the other end of the casing and a spring pressed member disposed transversely of the plunger and acting to enter an opening in the casing as the plunger reaches cocked position to lock the same in said position, said last mentioned means being capable of actuation from outside the casing to release the plunger.

5. A device of the kind described embodying therein a tubular casing, a breech block in one end of said casing, a chemical cartridge receiving barrel detachably connected to said last mentioned end of the casing, a spring pressed plunger in said casing carrying a firing pin, a plunger cocking stem disposed in the plunger and extending through the other end of the casing, a spring surrounding a part of said stem for normally urging it in one direction in said plunger, manually releasable means automatically operating to lock the plunger as it reaches cocked position and means on the casing movable to cover and uncover said manually releasable means.

6. A device of the kind described embodying therein a tubular casing, a breech block in one end of the casing, a barrel detachably connected to said last mentioned end of the casing, a tubular guide member in the other end of said casing, a spring pressed plunger bearing at one end in said guide, a setting stem operatively connected to said plunger

and extending through a part of said guide, and a spring pressed member carried by and extending transversely of said plunger and adapted to so engage a part of the casing as to lock the plunger in cocked position, said spring pressed member being capable of being actuated from the outside of the casing for releasing the plunger.

7. In a device of the kind described, a tubular casing, a tubular guide disposed in one end thereof and having a longitudinal slot in one side thereof, a tubular plunger slidable in said guide and having a part disposed in said slot, a spring surrounding said guide and engaged at one end with said plunger, a spring pressed ball disposed in and movable laterally of said plunger and adapted in one position to so engage a part of the casing as to lock the plunger against the action of the spring when said plunger is cocked, and a spring pressed stem for cocking the plunger having a part disposed in said plunger and another part passing through the end of said guide and carrying a knob without the casing.

In testimony whereof, I have hereunto set my hand, this 20th day of June, 1928.

SCOTT M. ABBOTT.

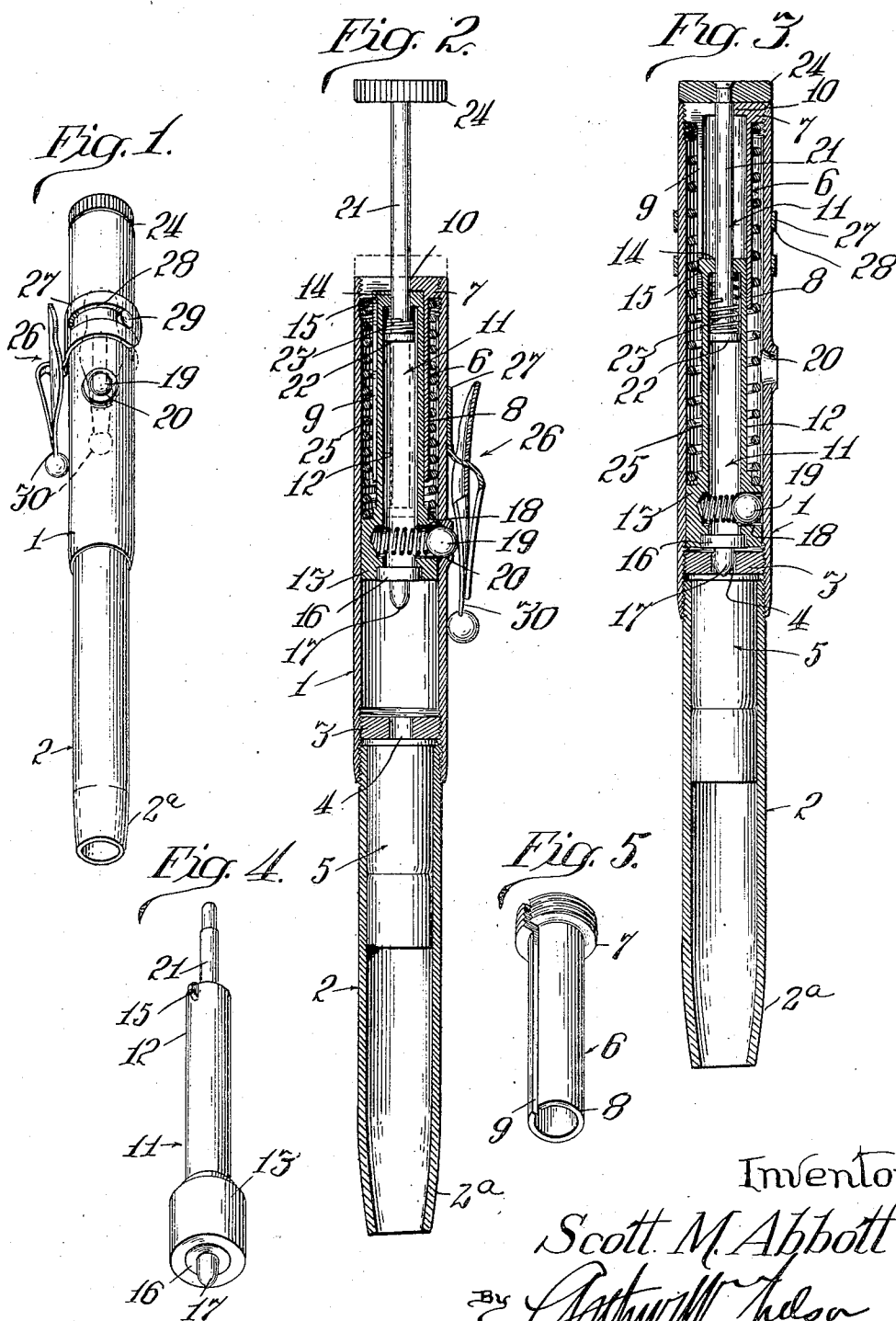
Aug. 12, 1930.

S. M. ABBOTT

1,772,656

GAS CARTRIDGE FIRING DEVICE

Filed June 23, 1928



Inventor.  
Scott M. Abbott  
By *Arthur W. Nelson*  
Attorney.

## UNITED STATES PATENT OFFICE.

GEORGE S. WEBBER, OF CHICAGO, ILLINOIS.

## FIREARM.

SPECIFICATION forming part of Letters Patent No. 788,866, dated May 2, 1905.

Application filed October 19, 1903. Serial No. 177,850.

*To all whom it may concern:*

Be it known that I, GEORGE S. WEBBER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Firearms, of which the following is a specification.

My invention relates particularly to pocket-firearms; and my primary object is to provide a simple, inexpensive, safe, and convenient pocket-piece to be carried by the owner and employed at short range for self-protection.

The invention is illustrated in its preferred embodiment in the accompanying drawings, in which—

Figure 1 is a side view of the improved weapon; Fig. 2, a sectional view taken as indicated at line 2 of Fig. 1 and illustrating the piece in the normal position of its parts; Fig. 3, a similar view illustrating the piece at the instant of releasing the firing-pin in the firing operation, and Fig. 4 a section taken as indicated at line 4 of Fig. 2.

In the preferred construction the piece comprises a barrel A, having an open rear end of reduced cross-section, the barrel being externally threaded at the reduced portion; a cylindrical frame B, having an open internally-threaded front end screwed onto the reduced rear end of the barrel; a breech-piece E, screwed into the cylindrical member B and located near the front end thereof; a plunger G, provided at the center of its front face with a firing-pin *g*; a spring H, confined between the plunger and the rear end of the hollow frame B; a handle or knob D, preferably of yielding material, such as rubber, having a socket receiving the rear end of the member B, and a ring-shaped slide C, mounted on the barrel and provided with rearwardly-extending spring-arms *c*, having curved extremities *c'* and inwardly-extending catches or projections *c''* adjacent thereto and working in slots *b* in the walls of the member B, the spring-arms *c* being connected with the ring which carries them by rivets *c''*. The breech-piece E is separated from the rear end of the barrel by a short space, which receives the flange of the cartridge F, and said breech-piece is provided centrally with a perforation for the firing-pin

and on its front surface with depressions *d* for receiving the prongs of a wrench.

From the foregoing description the manner of use will be readily understood. The barrel may be readily unscrewed from the frame to permit the insertion of a cartridge, and when the parts are again joined together the flange of the cartridge is clamped firmly between the breech-piece and the rear end of the barrel. In the firing operation the piece is held in the hand with the handle D resting upon the palm of the hand and the barrel lying between the index and middle fingers, by means of which the slide may be retracted, forcing the plunger G rearwardly against its spring. When the curved extremities of the spring-arms *c* strike against the frame at the rear ends of the slots *b*, the spring-arms are spread apart, thereby releasing the plunger, which then flies forward under the force of its spring and produces the explosion. The piece (exaggeratedly illustrated) is of small enough size to permit it to be handled readily in the manner described. Moreover, the form and small size of the piece permit it to be carried readily about the person and to be carried or drawn unnoticed in case of emergency. The piece is of course intended for use at short range where it is unnecessary to take aim.

Changes in the form of certain of the parts and in certain details of construction are contemplated. Hence no undue limitation should be understood from the foregoing detailed description.

What I regard as new, and desire to secure by Letters Patent, is—

1. A firearm comprising a tubular frame, a barrel supported thereby, a spring-held plunger in said frame, a slide-ring encircling said barrel provided with rearwardly-extending arms equipped with projections extending through slots in the walls of said frame and releasably engaging said plunger, and means for moving said arms to release the plunger, for the purpose set forth.

2. In a firearm, the combination of a barrel, a tubular frame having screw connection therewith, a breech-piece having screw connection with the interior of the front portion of said

frame and separated from the rear end of the barrel by a short space, said frame having slotted side walls, a spring-held plunger within said frame, a slide equipped with spring-held catches detachably engaging said plunger, and means for releasing the catches from the plunger.

3. In a firearm, the combination of a barrel, a tubular frame connected with said barrel and provided in its side walls with slots, a spring-held plunger within said frame, and a

slide provided with rearwardly-extending spring-arms provided near their rear extremities with catches engaging said plunger and at said extremities with cams serving to spread the arms when said slide nears the rear end of its traverse, for the purpose set forth. 15

GEORGE S. WEBBER.

In presence of—

WALTER N. WINBERG,

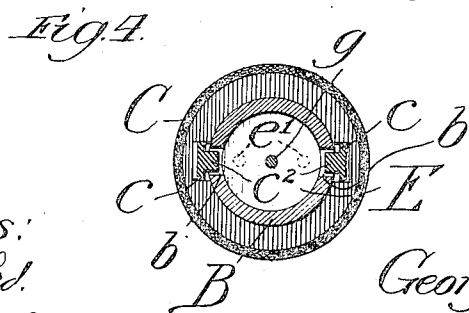
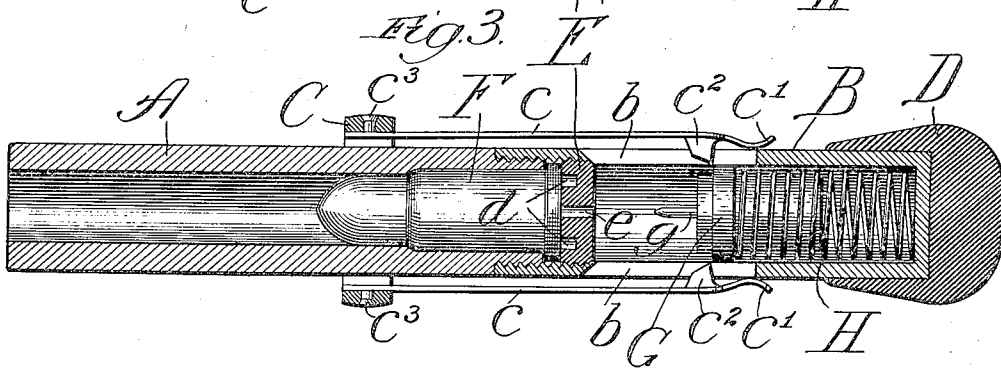
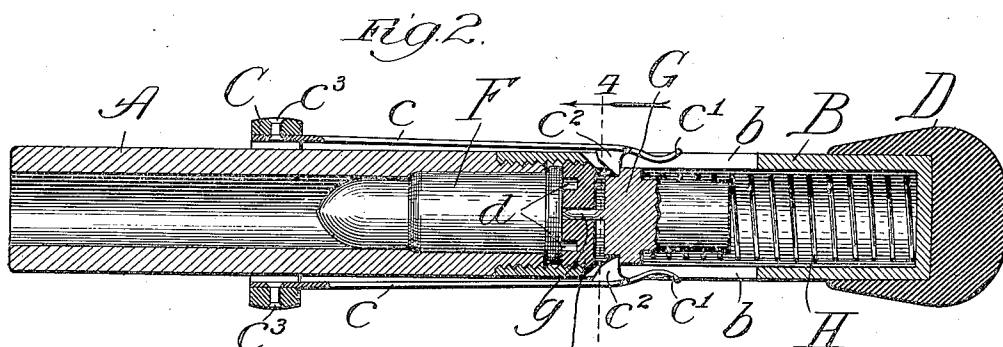
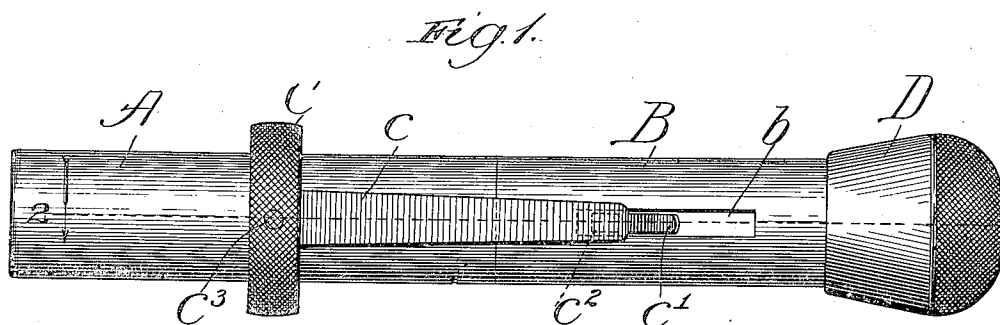
FLORA M. WIRTZ.

No. 788,866.

PATENTED MAY 2, 1905.

G. S. WEBBER.  
FIREARM.

APPLICATION FILED OCT. 19, 1903.



Witnesses:  
Edw. Chaylud.  
John Enders.

Inventor:  
George S. Webber  
By Dyrenforth, Dyrenforth & Lee.  
Att'ys.



## UNITED STATES PATENT OFFICE

PETER VON FRANTZIUS, OF CHICAGO, ILLINOIS

## PISTOL

Application filed September 11, 1929. Serial No. 391,722.

The present invention relates generally to weapons or pistols for discharging incapacitating fluid, such as tear gas. More particularly the invention relates to that type of gas discharging pistol which is in the form of a fountain pen and comprises a tubular stock, a barrel for retaining a gas cartridge, a spring pressed plunger which is slidably mounted in the stock and embodies a firing pin for engaging the percussion cap of the cartridge, and a stud which is adapted to be used to retract the plunger against the force of the spring and extends through a longitudinally extending slot in the stock.

In practice it has been found that pistols of the aforementioned type are sometimes discharged accidentally when they are inadvertently dropped or jarred by reason of the fact that the shock causes the plunger to be displaced or retracted from its inoperative position sufficiently to effect a firing of the cartridge upon its return by the spring. One object of the invention is to provide a pistol of the character under consideration, in which provision is made for releasably locking the plunger in its inoperative position in order to prevent an accidental firing of the cartridge when the pistol is dropped or jarred.

Another object of the invention is to provide a gas discharging pistol embodying means of an improved character for preventing cartridges containing bullets or projectiles from being inserted into the barrel.

A further object of the invention is to provide a pistol of the above described type, which is simple as far as construction is concerned, may be manufactured at a low and reasonable cost, and is an improvement upon that disclosed in United States Letters Patent No. 1,760,674 granted to me May 27, 1930.

Other objects of the invention and the various advantages and characteristics of the present construction will be manifest from a consideration of the following detailed description.

The invention consists in the several novel features hereinafter set forth and more par-

ticularly defined by the claims at the conclusion hereof.

In the drawing which accompanies and forms a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a side elevation of a pistol embodying the invention;

Figure 2 is a longitudinal section taken on the line 2—2 of Figure 1;

Figure 3 is a view illustrating in detail the formation and construction of the means for releasably locking the plunger in its inoperative position in order to prevent accidental displacement thereof; and

Figure 4 is a longitudinal sectional view of the outer end of the stock and discloses the manner in which the cap operates to anchor in place the clip whereby the pistol may be secured in the user's pocket.

The pistol which forms the subject matter of the present invention is in the form of a fountain pen and is designed to discharge an incapacitating fluid, such as tear gas. It comprises an elongated cylindrical stock which is adapted to be held in the hand when the pistol is used, and has formed therein a longitudinally extending bore 6. The latter is of uniform diameter throughout and extends from one end of the stock to the other. A plunger 7 is slidably mounted in the bore 6. The outer end of the stock is closed by a cap 8. This cap has a cylindrical portion 9 which extends into the bore 6 and is connected to the stock by a screw thread connection 10 so that the cap may be removed whenever desired. The inner end of the stock 5 is provided with an internal or female screw thread 11. A breech block 12 fits in the said inner end of the stock and is provided with an external or male screw thread 13 which engages the screw thread 11 and serves to hold the block in place. The female screw thread 11 is preferably of such length that the breech block, when screwed all the way into the stock, is retained in a position slightly inwardly of the extreme inner end of the stock. The block 12 has recesses 14 formed therein to receive a key or similar turning tool whereby it may be

rotated into and out of its operative position. It also has formed therein a central opening 15 through which a firing pin 16 on the inner end of the plunger 7 is adapted to pass.

In addition to the stock 5 and the plunger 7, the pistol comprises a barrel 17 which has its inner end provided with an external or male screw thread 18 for engagement with the female screw thread 11. Said barrel is shaped to receive a cartridge 19 containing material which, when fired, will produce and discharge an incapacitating fluid. The inner end of the barrel is adapted to engage the rim of the cartridge and operates, when screwed into its operative position, to hold securely the cartridge against the breech plug. To load the pistol, the barrel 17 is disconnected from the stock and the cartridge inserted into place. The barrel with the cartridge therein is then screwed into the stock until the rim of the cartridge is clamped between the breech block and the inner end of the barrel.

The plunger 7 is elongated so that it slides freely in the bore 6. It is operated to fire the cartridge by a coil spring 20. One end of this spring is retained in a cylindrical socket 21 which is formed in the outer end of the plunger 7. The other end of the spring is held in a cylindrical socket 22 which is formed in the portion 9 of the cap 8.

The plunger 7, together with the firing pin 16, is retracted against the force of the spring 20 by a stud 23. The latter comprises a shank 23<sup>a</sup>, one end of which extends transversely through and is screw threaded to the central portion of the plunger. The other end of the shank projects through a straight longitudinally extending slot 24 in the stock and is provided with a head 23<sup>b</sup>. The slot 24 operates to permit the plunger to be retracted against the force of the spring a sufficient distance to result in the firing of the cartridge when said plunger is released.

In order to prevent an accidental discharge of the cartridge when the pistol is dropped or jarred, a recess 25 is formed in the stock at one side of the slot 24. This recess is preferably circular in conformation and embodies a restricted mouth 26 which communicates with the inner end of the slot 24. When the plunger 7 is in its inoperative or unretracted position, the distal or outer end of the shank 23<sup>a</sup> may be shifted into the recess so as to lock releasably the plunger in place. The recess 25 is so positioned that when the shank of the stud is disposed therein the plunger is held a slight distance away from the breech block 12 and the firing pin is spaced from the percussion cap of the cartridge. Locking of the plunger 7 is effected by shifting the stem of the stud laterally into the recess. Said recess exemplifies simple means whereby the plunger may be releasably locked in its inoperative position.

To prevent a cartridge having a bullet or projectile therein from being inserted into the barrel and fired by the pistol, a blade 27 is provided. This blade extends across the bore of the barrel and has the ends thereof mounted in a pair of elongated longitudinally extending openings 28 which are formed in diametrically opposite parts of the barrel. In the assembly operation, the blade is inserted into place through the openings 28 and the ends thereof are beaded or riveted over as at 29 to effect an interlocking connection whereby the blade is rigidly held in place. Said blade is so positioned with respect to the inner end of the barrel that it is impossible to insert into the inner end of the bore of the barrel or fire from the barrel a cartridge containing a bullet or projectile. The inner edge of the blade is provided with a sharp edge 30 to sever the wad which is associated with the gas cartridge and operates to retain in the cartridge the material that produces the gas or incapacitating fluid. By mounting the blade in the manner set forth the cost of production is reduced to a minimum.

The outer end of the bore of the barrel is flared outwardly as at 31 to cause the gas to spread in a flared column.

The pistol is adapted to be carried in the user's pocket and is provided with a clip 32 whereby it may be securely held in place. This clip comprises an arm 33 which extends longitudinally of the stock and is provided at its inner end with a ball 34 for gripping a portion of the pocket. The other or outer end of the arm 33 extends inwardly through a transverse slot 35 in the stock and then outwardly in engagement with the bore 6. The inner end of the portion 9 of the cap is of a reduced size and fits against the part of the arm that engages the bore of the stock in order to anchor the clip in place. By anchoring the clip to the stock in this manner, the clip may be removed, whenever desired, simply by unscrewing the cap 8 and then withdrawing the bent or angled end of the arm 33 from the stock.

In loading the pistol, the barrel 17 is disconnected from the stock, as previously mentioned, so that the gas cartridge 19 may be inserted into the inner end thereof. After the cartridge has been inserted into place, the barrel is screwed into the stock 5 until the rim of the cartridge is confined between the breech plug 13 and the inner end of the barrel. To fire the pistol, the user will pull the head 23<sup>b</sup> of the stud 23 in the direction of the cap 8 for the purpose of retracting the plunger 7 against the force of the spring 20. Upon release of the head 23<sup>b</sup>, the spring operates to impel the plunger in the direction of the breech plug with sufficient force to cause the firing pin 17 to explode the percussion cap of the cartridge. To prevent the cartridge 19 from being discharged accidentally, the user

of the pistol will lock the plunger by shifting the outer end of the shank 23<sup>a</sup> into the recess 25. When the shank of the stud is confined in this recess the plunger is positively locked so that it can not be accidentally displaced.

When the user desires to fire the pistol, the head 23<sup>b</sup> is shifted laterally to withdraw the shank 23<sup>a</sup> from the recess 25. Upon withdrawal of the stem from the recess, the plunger is free so that it may be retracted into its operative or firing position. During use of the pistol, the blade 27 serves to cut the wad that is fired from the cartridge and prevents the user from inserting into the barrel a cartridge containing a projectile or bullet.

The pistol herein disclosed may be manufactured at a comparatively low cost and is an improvement upon the type of pistol disclosed in the aforementioned patent application by virtue of the fact that it embodies means for releasably locking the plunger in its inoperative or unretracted position.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

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

1. In a pistol of the character described, the combination of an elongated tubular stock provided with a closure for one end thereof and having a longitudinally extending slot formed therein, a barrel for a cartridge, removably secured to the other end of the stock, a plunger slidably mounted in the stock and provided with a firing pin, a spring between the plunger and the closure, a stud for use in retracting the plunger into an operative position against the force of the spring, said stud being secured to the plunger and extending through the slot, and means cooperating with the stud for releasably locking the plunger in its inoperative or unretracted position to prevent accidental displacement thereof.

2. In a pistol of the character described, the combination of an elongated tubular stock provided with a closure for the outer end thereof and having a longitudinally extending slot formed therein, a barrel for a cartridge, removably secured to the inner end of the stock, a plunger slidably mounted in said stock and provided with a firing pin, a spring between the plunger and the closure, and a stud projecting laterally from the plunger through the slot and adapted for use in retracting the plunger into an operative position against the force of the spring, said stock having formed therein adjacent to and communicating with the inner end of the slot a recess into which the stud may be shifted when it is desired to lock the

plunger in its inoperative or unretracted position for the purpose of preventing accidental displacement of said plunger.

3. In a pistol for discharging incapacitating gas, the combination of an elongated tubular stock, a spring pressed firing plunger slidably mounted in the stock, a barrel for a gas cartridge removably secured to one end of the stock, said barrel having formed therein a pair of diametrically opposite openings, and a member extending across the bore of the barrel and through the openings, said openings being formed in the barrel in close proximity to the outer end of the shell of the gas cartridge and adapted to hold the member in a position wherein it operates to prevent either the insertion into the barrel of a cartridge with a bullet or the firing from the barrel of such a cartridge in the barrel.

4. In a pistol for discharging incapacitating gas, the combination of an elongated tubular stock, a spring pressed firing plunger slidably mounted in the stock, a barrel for a gas cartridge removably secured to one end of the stock, said barrel having formed therein a pair of diametrically opposite openings, and a blade member extending across the bore of the barrel and through the opening and operative to prevent the firing or insertion of a cartridge with a bullet in the barrel, the ends of said blade member being beaded over so as to form interlocking connections whereby the blade member is held in place against displacement.

5. In a pistol of the character described, the combination of an elongated tubular stock provided with a closure for the outer end thereof and having a longitudinally extending slot formed therein, a barrel for a cartridge removably secured to the inner end of the stock, a plunger slidably mounted in said stock and provided with a firing pin, a spring between the plunger and the closure, and a stud projecting laterally from the plunger through the slot and adapted for use in retracting the plunger into an operative position against the force of the spring, the stock having formed therein a recess with a restricted entrance in communication with the inner end of the slot, said recess being adapted to have the stud shifted therein and operating when said stud is so shifted to lock the plunger in its inoperative or unretracted position for the purpose of preventing accidental displacement of said plunger.

Signed at Chicago, Illinois this 6th day of September, 1929.

PETER VON FRANTZIUS.

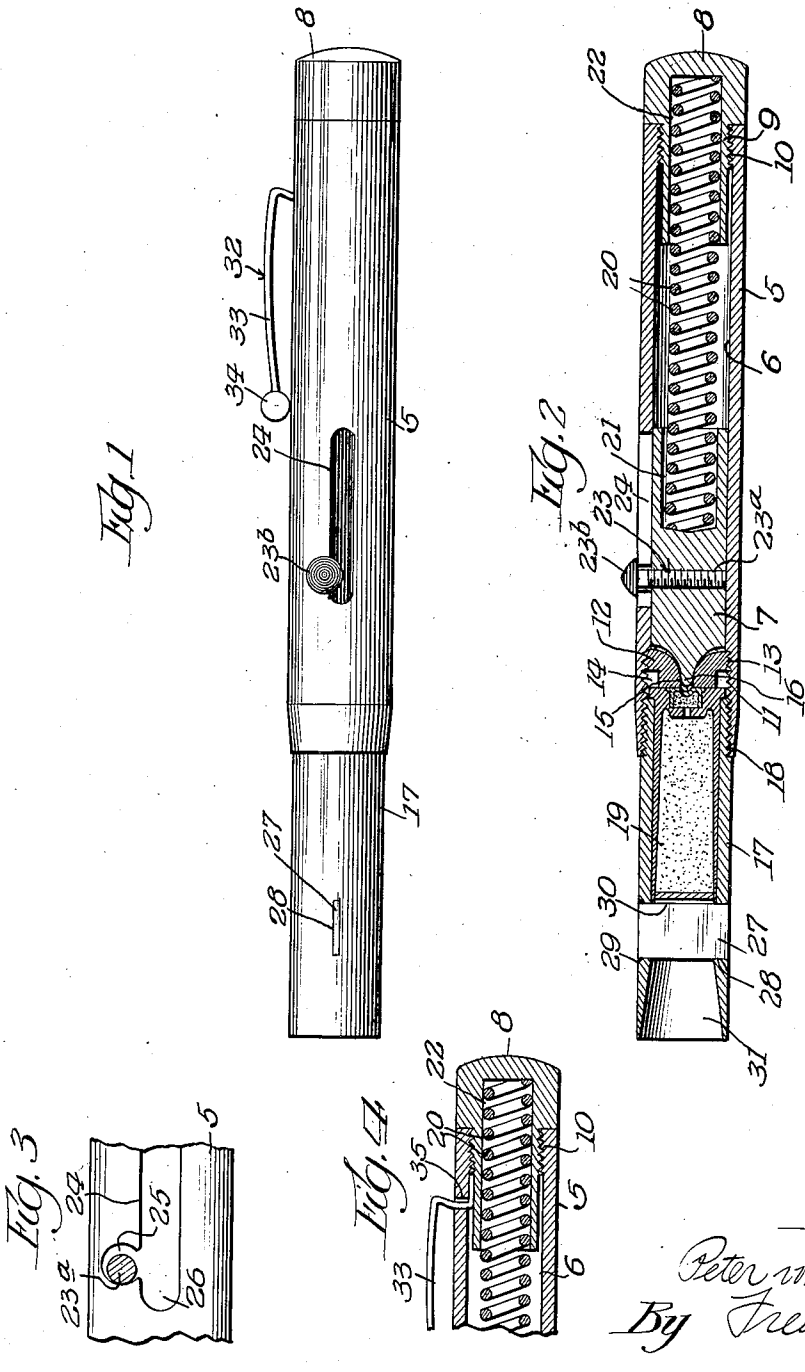
Sept. 9, 1930.

P. VON FRANTZIUS

1,775,178

PISTOL

Filed Sept. 11, 1929



## UNITED STATES PATENT OFFICE

WALLACE M. MINTO, OF JERSEY CITY, NEW JERSEY

## GAS GUN

Application filed April 23, 1931. Serial No. 532,363.

The invention has relation to fire arms or guns having for an object to provide an improved device in the form of a small inoffensive looking object, such as a fountain pen, which may be readily carried about the person or clipped to the pocket of a coat or vest, and which may be readily discharged. Other objects and advantages will hereinafter appear.

The invention consists in the novel construction and combinations of parts, as set forth in the appended claims.

In the accompanying drawings illustrating an embodiment of the invention:

Figure 1 is a side view of the invention.

Figure 2 is a central longitudinal section of the same, with the cartridge shell proper in full lines.

Figure 3 is a detail exploded side view of the inner and outer parts of the cartridge shell, and a portion of the gun barrel.

Figure 4 is a perspective view of the invention as held in the hand.

In these drawings, the numeral 1 designates the cylindrical barrel of the gun, which is in the form of a fountain pen, provided with a clip 2 for the pocket, said barrel being closed at one end by an integral wall 3, a coiled spring 4 being provided within the barrel and adapted to act upon a firing pin 5.

Closing the other end of the gun barrel is a gas cartridge 6, removably fitting within said end and having preferably screw engagement therewith at 7, the cartridge shell having an outer knurled flange 8, whereby a better finger hold may be obtained and limiting the screw movement by engaging the end of the barrel.

The cartridge shell is shown as made in two parts whereof the outer part 6 has screw engagement with the barrel and is open at both ends, and the inner part 9 containing the charge and the primer has close fitting removable engagement with said outer part. The said inner part 9 is the ordinary primed cartridge shell bought in the open market and slipped within said outer part 6, the base flange of said inner part engaging the inner end of said outer part to limit the movement

and affording a finger hold for withdrawal purposes.

The cartridge shell is filled with a suitable chemical such as chloracetophenone or its equivalent, and when the primer is struck by the firing pin, said chemical is vaporized and shot out of the gun, thereby immediately acting upon the eyes of a person at which the gun is shot to temporarily blind or disable him.

The firing pin is readily retractible and releasable by means of a lateral finger projection 10, engaging a longitudinal slot 11 of the gun barrel, said pin being within reach of the thumb or other finger of the hand.

I claim:—

1. A gas gun in the form of a fountain pen or the like, having a barrel, a spring acting firing pin within said barrel, and a gas cartridge shell fitting within and having removable engagement with the outer end portion of said barrel.

2. A gas gun in the form of a fountain pen or the like, having a barrel, a spring acting firing pin within said barrel, and a gas cartridge shell fitting within and having removable engagement with the outer end portion of said barrel and provided with an outer knurled finger hold end limiting the inward movement.

3. A gas gun in the form of a fountain pen or the like, having a barrel, a spring acting firing pin within said barrel, and a gas cartridge shell fitting within and having removable engagement with the outer end portion of said barrel and made in two parts, the outer part being open at both ends and having an outer knurled finger hold end limiting the inward movement and the inner part being the ordinary primed shell fitting closely within said outer part and the base flange of which limits the inward movement.

In testimony whereof I affix my signature.

WALLACE M. MINTO.

Oct. 6, 1931.

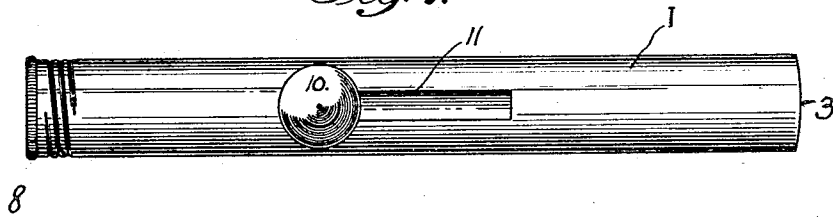
W. M. MINTO

1,826,562

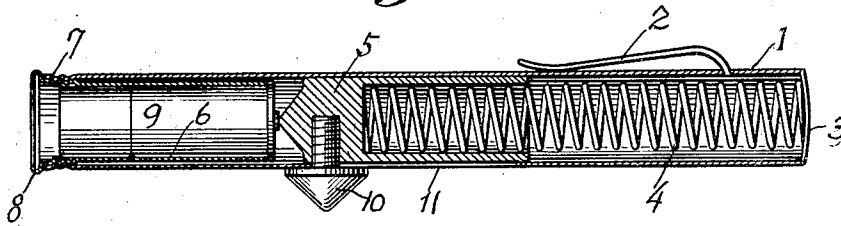
GAS GUN

Filed April 23, 1931

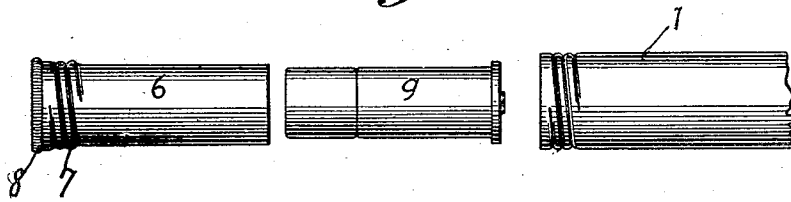
*Fig. 1.*



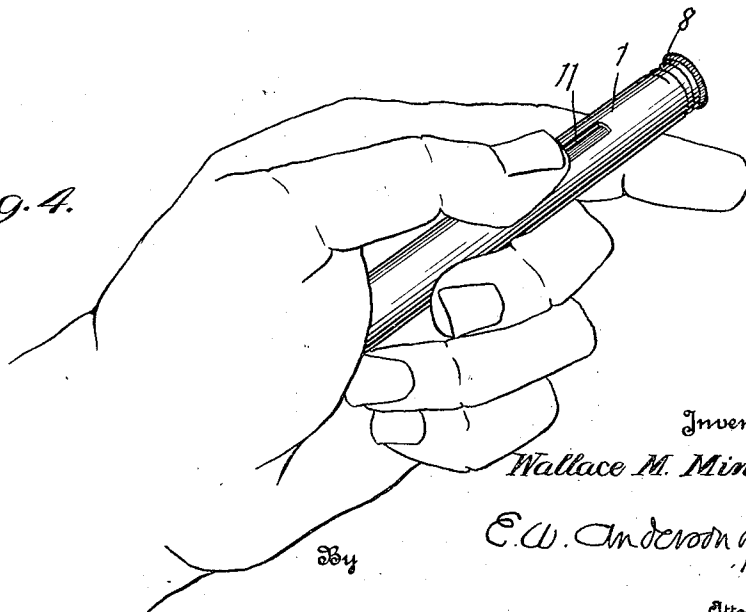
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



Inventor

Wallace M. Minto.

E. W. Anderson, Jr.

Attorney

## UNITED STATES PATENT OFFICE

ADRIAN S. AILES, OF CLEVELAND, OHIO, ASSIGNOR TO THE LAKE ERIE CHEMICAL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

## DISABLING GAS FIRING WEAPON

Application filed April 6, 1932. Serial No. 603,625.

This invention relates to improvements in safety devices for that class of weapons which fire irritating and disabling gases, for example, gases of the "tear" gas type, and more particularly to portable gas fired weapons which are carried by individuals, such as gas guns, gas pistols, gas pistol fountain pens, policemen's "billys", etc.

An object of the invention is to provide a safety device which will prevent the weapon from being discharged, should it be accidentally actuated.

A further object is to provide a gas fired weapon with a safety device which can be operated by the hand which discharges the weapon.

A further object is to provide a gas fired weapon which may be safely carried in the pocket.

Other objects of the invention will be apparent to those skilled in the art upon reading the specification.

In the accompanying drawings, Fig. 1 illustrates an enlarged view of one type of pocket gas pistol or gas gun with a preferred type of movable safety device in the "safe" position, and the firing pin knob in the retracted position recess;

Fig. 2 is the same as Fig. 1, with the firing pin knob against the safety device;

Fig. 3 is the same as Fig. 1, after the pistol or gun has been fired with the safety device turned back, and the firing pin knob in a discharge position;

Fig. 4 is a longitudinal sectional view on the line 4—4, of Fig. 2, showing a cartridge in the barrel, and the firing pin spaced therefrom and held back by the safety device;

Fig. 5 is a view partly in section on the line 5—5 of Fig. 3, showing the cartridge in the barrel with the firing pin against the end of the cartridge;

Fig. 6 is a view of a section on the line 6—6 of Fig. 1, showing the firing pin knob in the recess;

Fig. 7 is a view of a section on the line 7—7 of Fig. 2, with the firing pin against the safety device;

Fig. 8 is a view of a section on the line 8—8 of Fig. 3, with the safety device turned back, and the firing pin knob in the discharged position, and also showing a section of the spring which actuates the firing pin;

Figs. 9 and 10 are side and edge views of one type of safety device shown in Figs. 1 to 8 inclusive;

Fig. 11 is a broken view of the right hand portion of Fig. 1, with the firing pin knob pressed back in the small detent in the recess in which it is apt to be forced should the firing pin knob get caught in the clothing upon inserting the gun or pistol in one's pocket, and also showing a portion of a groove in which the safety ring is retained;

Fig. 12 is a plan view of a gas gun or pistol with another type of movable safety device, with the firing pin retracted.

Fig. 13 is a view partly in section of the gun or pistol shown in Fig. 12, showing a section of the safety device and the spring pressed steel ball which engages the safety device;

Fig. 14 is a sectional view on the line 14—14, of Fig. 13, showing a movable safety bar, which latter is provided with notches as described hereafter, and with a safety bar in the "safe" position and engaged by the spring pressed steel ball;

Fig. 15 is a sectional view on the line 14—14, of Fig. 13, with a safety bar in a discharge position, and engaged by the spring pressed steel ball, and with the large notch on the cartridge side of the safety bar in position to permit an unobstructed forward movement of the firing pin;

Fig. 16 is a broken view of still another type of safety device, which latter engages the knob of the firing pin, and showing the safety device withdrawn, in dotted lines;

Fig. 17 is a plan view of a gas pistol fountain pen, on which is placed a movable ring safety device as illustrated in Figs. 1 to 10 inclusive; and

5 Fig. 18 is a plan view of a gas firing policeman's "billy" with a movable safety ring thereon, such as illustrated in Figs. 1 to 10 inclusive.

10 In Fig. 1, a portable gas gun or gas pistol has a detachable barrel 1, and a handle portion 2. The handle 2 is provided with a slot 3 in which the firing pin moves, and an offset 4 in which the firing pin is normally retained; the knob 7 is shown in the off-set recess 4, and is secured to the firing pin 8. A movable safety device, in this modification shown as a knurled ring 9 surrounds the handle 2, and is shown as placed in a groove 10, which latter does not completely encircle the handle 2, as shown in dotted lines in Figs. 6, and 7. The ring 9 is preferably made of hard tempered steel and fits snugly in the groove 10 but which may be easily moved just before firing by the thumb or finger of the hand that holds the pistol. The ring 9 is normally moved to the safety position shown in Fig. 1, and when in this position the gun or pistol may be safely carried in the pocket without any risk of its being accidentally discharged. Upon inserting the gun or pistol in one's pocket, if the knob 7 should get caught upon the clothing it would probably first be pressed back along a straight line, and would be retained in the detent 5 as shown in Fig. 11, from which latter position it would later be released and spring back into the position shown in Fig. 1; if the knob 7 should be dislodged from its position shown in Fig. 1, and be moved into the long channel 6 of the slot 3, the knob would strike against the safety ring 9 as shown in Figs. 2, 4, and 7.

20 The handle portion 2 of the gun, or pistol, is provided with a groove 10, shown in Fig. 11, into which is sprung the hard steel incomplete ring 9, which in this modification constitutes the safety device, the ring 9 fits sufficiently tight within the space 10 so as not to be too easily moved, but which may be moved by the thumb or finger of the hand which grasps the gun or pistol; normally, the safety ring 9 is in the position shown in Figs. 1 and 2, the ends of the ring 9 being separated by a space 11 greater than the diameter of the stem 13 of the firing pin knob 7 which permits the spring tempered ring 9 to be sprung into the grooves, and so that the stem 13 of said knob will have sufficient room to pass through said space 11 freely when it is desired to fire the gun or pistol, see Fig. 9; upon turning the safety ring 9 by the thumb or finger into the position shown in Figs. 3, and 8 the gun or pistol may be readily fired, and the firing pin 8 propelled 65 by the spring 14 will strike the primer of the

cartridge 12 as shown in Fig. 5, thereby firing said cartridge.

In the modification shown in Figs. 12 to 15 inclusive, a safety bar 20 is provided with small detents 22, 23, on one side, in either of which is adapted to rest a small steel ball 21 pressed by a spring 24 and retained in position by the screw 25; the other side of the safety bar 20 is provided with a large notch 26 shown in Fig. 14, the notch 26 being sufficiently large and positioned so that when the safety bar 20 is moved to the position shown in Fig. 15 the firing pin 8 will have an unobstructed movement towards the cartridge when the gun or pistol is fired as shown in Fig. 15; the safety bar 20 may be readily moved to either position shown in Figs. 14 and 15 by the thumb or finger of the hand which holds the gun or pistol.

In the modification shown in Fig. 16, a safety pin 30 is constructed to move through the metal wall of the handle, the inner end of the safety pin 30 locking the knob stem of the firing pin in the retracted recess; the safety pin 30 may be readily moved by the thumb or finger of the hand which holds the pistol, and upon withdrawing said safety pin to the position shown at 33, the knob 7 may be actuated to discharge the gun or pistol.

In Fig. 17, a gas fired fountain pen pistol is provided with a safety ring 9 of the type illustrated in Figs. 1 to 10 inclusive, and is operated by the thumb or finger in the same manner as described above. The safety devices shown in Figs. 12 to 16 may also be applied to gas fired fountain pen weapons.

In Fig. 18, is illustrated one type of a policeman's billy provided with a safety ring 9 of the type illustrated in Figs. 1 to 10 inclusive, and is operated in the same manner as described under said figures. The safety devices shown in Figs. 12 to 16 may also be applied to gas fired policeman's billy weapons.

I claim:—

1. A disabling gas firing weapon comprising a handle portion, a barrel portion, a firing pin in said handle, a knob on said firing pin, a slot in said handle, said knob passing through said slot, an off-set safety recess to said slot, two notches in said recess, a first notch adapted to normally receive said knob when said knob is in the safety retracted position, a second notch constituting a detent opposite said first notch and adapted to receive and temporarily retain said knob when said knob is accidentally displaced from said first notch.

2. A disabling gas firing weapon, comprising a spring actuated firing pin, a slot in said weapon, a firing pin handle passing through said slot, a split ring on said weapon, said ring constituting a safety device, means to limit the movement of said ring, said ring adapted to be moved across said slot to pre-



vent said firing pin from discharging said  
weapon, and also to be moved so that the split  
in said ring will register with said slot and  
permit said weapon to be fired, an off-set  
5 safety recess to said slot, two notches in said  
recess, a first notch adapted to normally re-  
ceive said knob when said knob is in the  
safety retracted position, a second notch op-  
posite said first notch and adapted to receive  
10 and temporarily retain said knob when said  
knob is accidentally displaced from said first  
notch.

In testimony whereof I hereby affix my  
signature.

ADRIAN S. AILES.

Feb. 21, 1933.

A. S. AILES

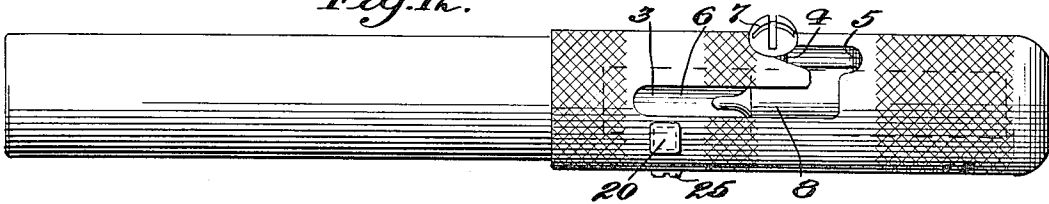
1,897,992

DISABLING GAS FIRING WEAPON

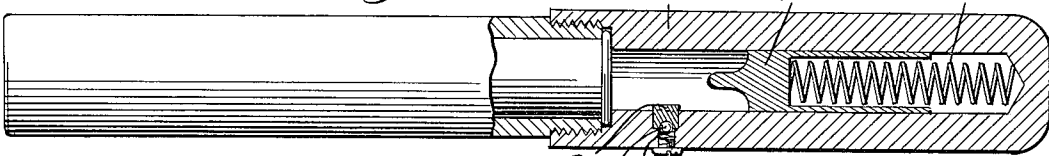
Filed April 6, 1932

2 Sheets-Sheet 2

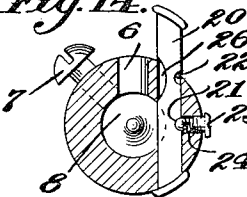
*Fig. 12.*



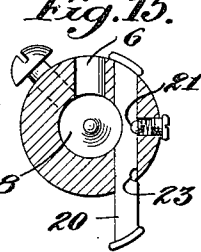
*Fig. 13.*



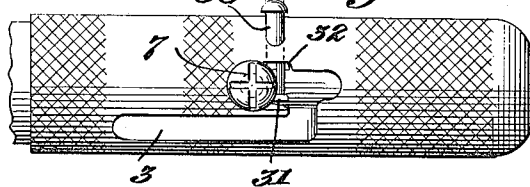
*Fig. 14.*



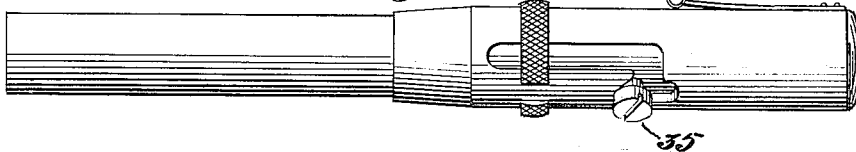
*Fig. 15.*



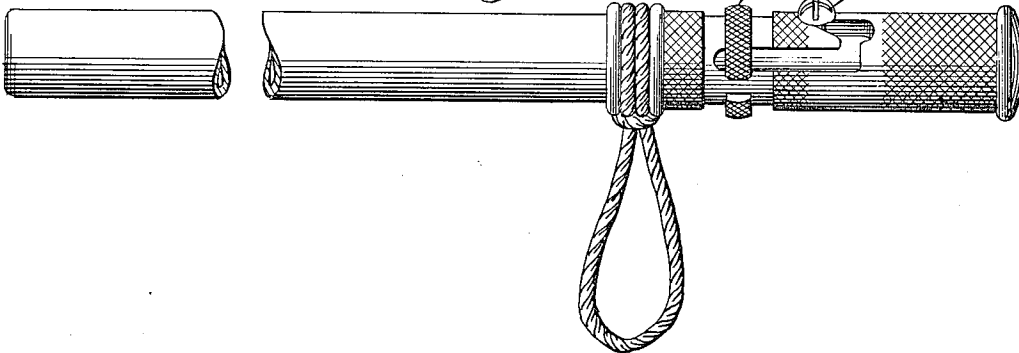
*Fig. 16.*



*Fig. 17.*



*Fig. 18.*



*Inventor:*  
*Adrian S. Ailes,*

*by Joseph W. Harris*  
*Att'y.*

Feb. 21, 1933.

A. S. AILES

1,897,992

DISABLING GAS FIRING WEAPON

Filed April 6, 1932

2 Sheets-Sheet 1

Fig. 1.

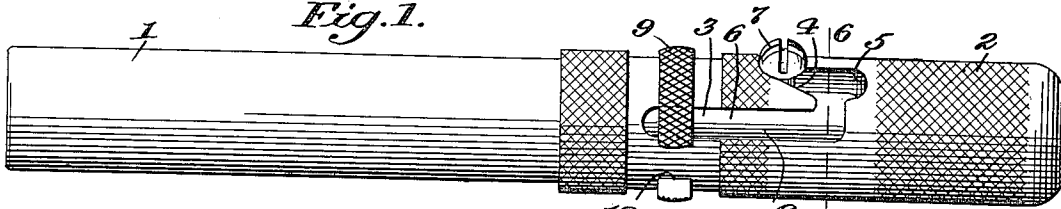


Fig. 2.

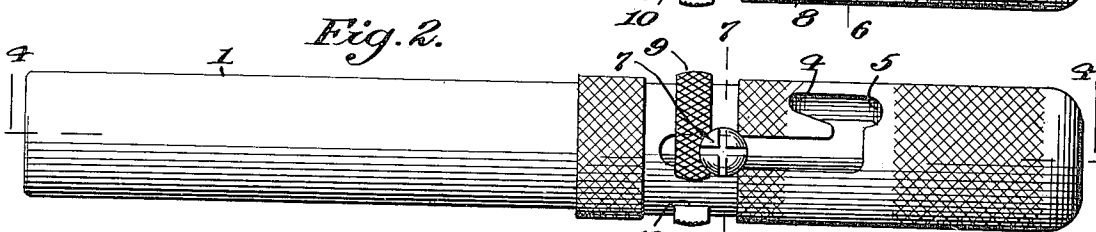


Fig. 3.

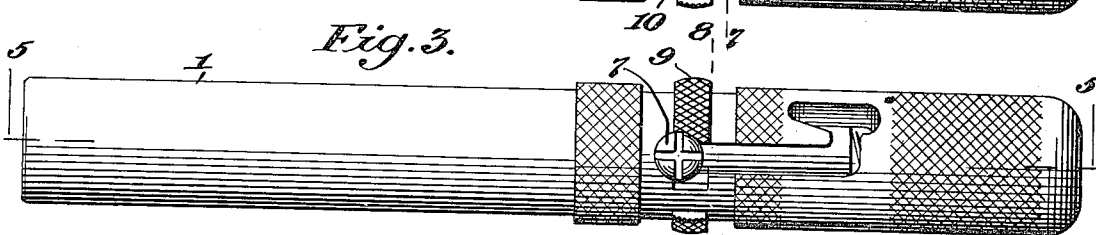


Fig. 4.

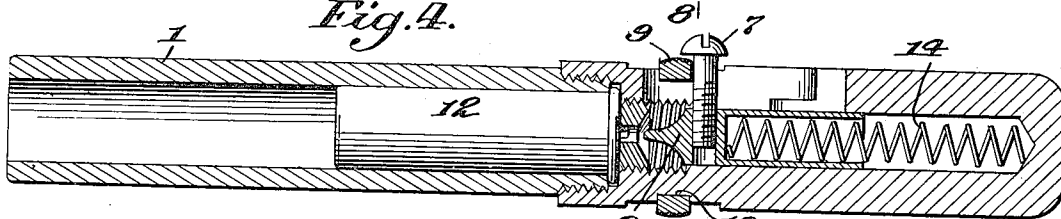


Fig. 5.

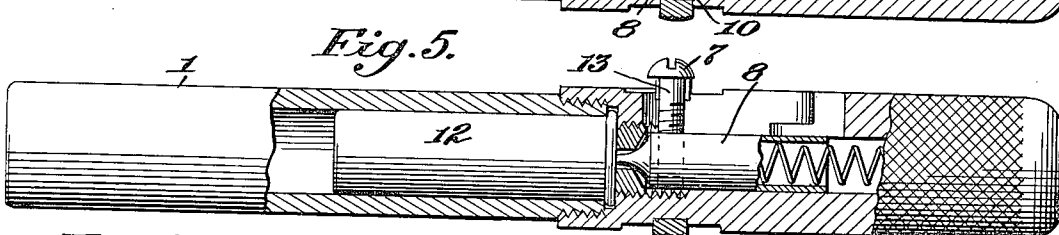


Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

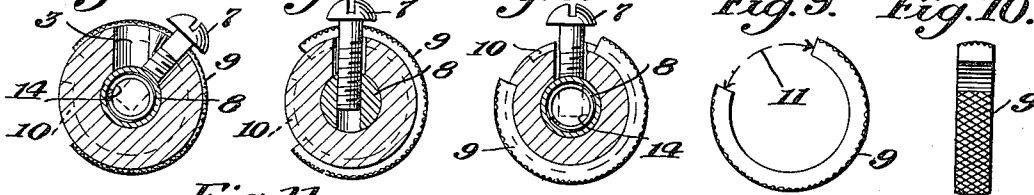
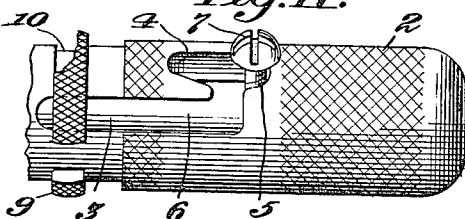


Fig. 11.



Inventor:  
Adrian S. Ailes,

by Joseph W. Harris  
Att'y.

## UNITED STATES PATENT OFFICE

1,970,719

## GAS DISCHARGING DEVICE

Peter von Frantzius, Chicago, Ill., assignor to  
Hercules Gas-Munitions Corporation, Chicago,  
Ill., a corporation of Illinois

Application November 9, 1931, Serial No. 573,777

8 Claims. (Cl. 42—2)

The present invention relates generally to devices for discharging an incapacitating fluid, such, for example, as tear gas. More particularly the invention relates to that type of gas discharging device which is designed primarily to be used as a weapon of defense against criminals, and comprises a barrel for retaining a gas cartridge, a tubular stock in alignment with the barrel, a spring-pressed plunger which is slidably mounted in the stock and embodies a firing pin for engaging the percussion cap of the cartridge and a stud which is adapted to be used to retract the plunger against the force of the spring and extends through a longitudinally extending slot in the stock.

One object of the invention is to provide a device of this type in which the barrel and stock and the other operating parts are housed within a box-like casing which consists of a bottom section and a hinged top section, and is adapted to be placed upon a desk or counter and used as a paper weight or like article.

Another object of the invention is to provide a device of the aforementioned character in which the barrel for the gas cartridge is secured to and supported by the bottom section and discharges through an opening in one end of the casing, and the stock is connected to the top section in such a manner that when the top section is in its closed position, it is aligned with the barrel, and when the top section is in its opened position, it is located at one side of the barrel so that access to the latter may be readily had in order to insert or withdraw the gas cartridge.

A further object of the invention is to provide a gas discharging device of the type and character under consideration which embodies a finger-operable lever for holding the plunger in its cocked position and for releasing the plunger, and in which the stud for retracting the plunger against the force of the spring projects downwardly through a slot in the bottom section of the casing and embodies a head at the extreme lower end which cooperates with the slot to hold the top and bottom sections in connected relation when the plunger is in discharged position and to prevent closing of the top section unless the plunger is in its cocked position.

A still further object of the invention is to provide a device for discharging gas cartridges which is generally of new and improved construction, can be manufactured at a low and reasonable cost and is efficient in operation.

Other objects of the invention and the various

advantages and characteristics of the present gas discharging device will be apparent from a consideration of the following detailed description to those who are skilled in the art.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by the claims at the conclusion hereof.

In the drawing which accompanies and forms a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a perspective of a gas discharging device embodying the invention;

Figure 2 is a vertical longitudinal section illustrating in detail the manner in which the stock is connected to the top section so that it is aligned with the barrel when the top section is in its closed position;

Figure 3 is a horizontal section;

Figure 4 is a vertical longitudinal section, similar to Figure 2, showing the spring-pressed plunger in the stock protracted to its cocked or firing position;

Figure 5 is a vertical transverse section on the line 5—5 of Figure 4; and

Figure 6 is a vertical transverse section on the line 6—6 of Figure 4.

The device which forms the subject matter of the invention consists of a cast metal, box-like casing 7 and is designed primarily to discharge a cartridge *c* containing a irritant, such as tear gas, and a propellant powder. The casing 7 consists of a bottom section 8 and a top section 9 and is so constructed that it may be used on a desk or counter as a paper weight or like article. The bottom section is rectangular in conformation and embodies in the bottom face thereof an L-shaped recess 10. The top section 9 is also rectangular in conformation and embodies a top wall 11, a pair of depending sides 12, a front 13 and a back 14. The front and back extend between and are formed integrally with the ends of the sides 12 and form with the latter and the top wall 11, a rectangular compartment 15. The top section 9 is disposed directly above the bottom section 8 and is connected to the latter by a pair of hinges 16 so that it may be swung into an open position at one side of the bottom section. The hinges 16 are located at the ends of the sides 12 and comprises hinge-members 17 which are formed integrally with and project upwardly from the bottom section 8, fit within recesses or sockets in the said side 12 and embody pivot pins 18. The top section 9 is secured in its closed posi-

tion by means of a screw 19. The latter extends through a hole in the recess portion of the bottom section 8 and extends into an internally threaded socket in the top wall 11. Upon removal of the screw 19, the top section is free so that it may be swung to one side of the bottom section in order to provide access to the compartment 15.

In addition to the casing 7, the device comprises a barrel 20 and a stock 21. The barrel 20 extends longitudinally of the casing and is formed integrally with the bottom section 8, as shown in Figure 5 of the drawing. It is positioned in the compartment 15 when the top section 9 is in its closed position, and is arranged so as to discharge through a circular opening 22 in the front 13. The gas cartridge *c* is adapted to be inserted into and withdrawn from the barrel 20 when the top section of the casing is in its opened position. A pin 23 extends diametrically across the opening 22 and serves as a stop for the wad which is usually held in the discharge end of the cartridge *c*. The stock 21 is in the form of a block of metal and is secured against the bottom face of the top wall 11 of the top section 9 by screws 24. It embodies a longitudinal bore 25 and is positioned so that it is aligned with the barrel 20 when the cover is in its closed position (see Figures 2 and 4).

The cartridge *c* is fired so as to effect a discharge of the gas through the circular opening 22 by means of a plunger 26. This plunger is mounted slidably in the bore 25 in the stock and embodies at one end thereof a firing pin 27 which is designed to extend through an aperture 28 in a cross wall 29 at one end of the stock and to strike against the percussion cap of the cartridge. A coil spring 30 is interposed between the back 14 of the top section 9 and the plunger 26 and serves to force the plunger towards the cartridge *c*. When the plunger 26 is retracted against the action of the spring and then released, it is forced forwardly and causes the firing pin 27 to pass through the aperture 28 and strike against the percussion cap of the cartridge. One end of the spring 30 is confined in a socket 31 in the back 14. The other end of the spring is confined in a cylindrical socket 32 in the other end of the plunger 26. The plunger 26 is retracted against the action of the spring 30 into its cocked or firing position by means of a stud 33. This stud is secured to and projects downwardly from the front end of the plunger and extends through a longitudinal slot 34 in the stock and a longitudinal slot 35 in the recessed portion of the bottom section 8 of the casing. The extreme outer or distal end of the pin is provided with an enlarged head 36. A circular opening 37 is formed at one end of the slot 35 and permits the head to pass through the recess portion of the bottom section 8 when the top section is swung into its closed position. This opening is so positioned with respect to the slot 35 that the cover section cannot be swung into its closed position unless the plunger is in its cocked or firing position. When the plunger is in its firing position (see Figure 2), the stud 33 is disposed in the slot 35 and the head 36 prevents opening of the top section of the casing.

The plunger 26 is retained in its cocked or firing position by means of a lever 38. This lever is located in a longitudinal groove 39 in the bottom face of the top wall 11 of the top section, and is centrally fulcrumed by means of a pin 39<sup>a</sup> which is supported between the top wall 11 and the stock 21. A finger 40 is secured to and projects downwardly from one end of the lever 38. This finger, as shown in Figures 2 and 4, extends

through an opening 41 in the top of the stock 21 and is adapted to fit within a notch 42 in the front end of the plunger so as to hold the plunger in its retracted position. When the lever 38 is swung downwardly, the finger 40 is withdrawn from the notch and the plunger is thus released so that it is actuated by the spring 30 to fire the cartridge *c*. Manipulation of the lever 38 is effected by means of a button 43. The latter is secured to one end of the lever and is positioned in a circular opening 44 in the top wall 11 of the top casing section so that it may be readily pressed downwardly for lever-actuating purposes. Withdrawal of the finger 40 from the notch 42 in the plunger 26 is opposed by a spring wire 45. The latter is secured against the top wall 11 by a screw 46 and is applied to the button 43 so that the lever 38 is urged into a position wherein the finger 40 is disposed within the notch 42. Accidental discharge of the device is prevented by means of a safety member 47. This member is disposed in the compartment 15 adjacent to the button 43 and is in the form of a lever. It is centrally fulcrumed by means of a screw 48 and is arranged so that one end thereof extends through an opening 49 in one of the sides of the top section of the casing. The other end of the safety member is adapted normally to underlie the button 43 so as to prevent the latter from being depressed so as to release the finger 40 from the notch in the plunger. When the safety member 47 is swung in one direction, the end portion which normally underlies the button is swung away from the button and permits the latter to be depressed for cartridge firing purposes. A spring wire 50 is applied to the safety member so as to hold the latter in a position wherein the button is held against downward displacement. In loading the device, the plunger 26 is first retracted against the force of the pin 30 into its cocked or firing position, by manipulation of the stud 33 which projects downwardly through the slot 34 in the stock and the slot 35 in the recess portion of the bottom section of the casing. Thereafter, the screw 19 is withdrawn and the top section 9 is swung into its open position so as to expose the barrel 20. The gas cartridge *c* is then inserted into the barrel, as shown in Figure 4. After the loading operation, the top section of the casing is swung downwardly and is locked in its closed position by means of the screw 19. When it is desired to fire the device, the safety member 47 is swung against the force of the spring wire 50 so as to release the button 43. The button is then pressed downwardly so as to shift the lever 38 to withdraw the finger 40 from the notch 42 in the plunger. Upon withdrawal of the finger from the notch, the spring 30 forces the plunger 26 towards the cross wall 29 of the stock and results in firing of the cartridge *c*. When the cartridge is fired, the gas passes outwardly from the compartment 15 through the circular opening 22 in the front 13 of the casing. The safety member and the button 43 are arranged so that in firing the device, the safety member may be manipulated by the thumb and the button by the first or fore-finger.

The herein disclosed gas discharging device consists of but a small number of parts and consequently may be manufactured at a low and reasonable cost. It is extremely efficient in operation and is so constructed that access may be readily had to the barrel 20 for the insertion and removal of the gas cartridge.

Whereas the device has been described as being primarily adapted for use in connection with the discharge of a gas cartridge, it is to be understood that other types of cartridges may be fired in the barrel. It is also to be understood that the invention is not to be restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

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

1. In a device for discharging a cartridge, the combination of a box-like casing consisting of a bottom section and a top section separable from the bottom section and embodying a continuous depending compartment-forming wall with an opening therein, a barrel for the cartridge connected to the bottom section and positioned so as to discharge through the opening in the wall when the sections are in their operative position, and manually operable firing means for the cartridge secured to the top section.

2. In a device for discharging a cartridge, the combination of a box-like casing having an opening in one end thereof and embodying a bottom section and a top section separable from the bottom section and forming therewith a compartment, a barrel for the cartridge disposed in the compartment so as to discharge through the aforesaid opening, a tubular stock connected to the top part for alignment with the barrel, a spring-actuated plunger mounted slidably in the stock and provided with a pin for firing the cartridge, means for holding the plunger in a cocked position, and means associated with the top section for manually releasing the holding means for cartridge discharging purposes.

3. In a device for discharging a cartridge, the combination of a box-like casing having an opening in one end thereof and embodying a bottom section and a top section separable from the bottom section and forming therewith a compartment, a barrel for the cartridge disposed in the compartment so as to discharge through the aforesaid opening, a tubular stock connected to the top part for alignment with the barrel, a spring-actuated plunger mounted slidably in the stock and provided with a pin for firing the cartridge, means for holding the plunger in a cocked position, and means associated with the top section for releasing the holding means for cartridge discharging purposes comprising a lever and a finger button at one end of the lever extending through the top section and operable from outside the top section.

4. In a device for discharging a cartridge, the combination of a box-like casing consisting of a bottom section and a top section separable from the bottom section and embodying a continuous depending compartment-forming wall with an opening therein, a barrel for the cartridge positioned in the compartment within the wall so that it discharges through the aforesaid opening, a tubular stock connected to the top section in alignment with the barrel, a plunger mounted slidably in the stock and provided with a pin for firing the cartridge, and a spring for actuating the plunger for cartridge firing purposes extending between the plunger and the wall

and having the ends thereof abutting directly and respectively against said plunger and wall.

5. In a device for discharging a cartridge, the combination of a box-like casing having an opening therein and comprising a pair of separable, complementary sections shaped to form a compartment therebetween, a barrel for the cartridge disposed in the compartment and positioned so as to discharge through the opening, a tubular stock secured to one of the sections so that it is aligned with the barrel, a spring-pressed plunger mounted slidably in the stock and provided with a pin for firing the cartridge, and a stud for shifting the plunger into a firing position extending through a slot in the other section.

6. In a device for discharging a cartridge, the combination of a box-like casing having an opening therein and comprising a pair of separable, complementary sections shaped to form a compartment therebetween, a barrel for the cartridge disposed in the compartment and positioned so as to discharge through the opening, a tubular stock secured to one of the sections so that it is aligned with the barrel, a spring-pressed plunger mounted slidably in the stock and provided with a pin for firing the cartridge, and a stud for shifting the plunger into a firing position extending through a slot in the other section and provided with a head whereby the two sections are held in connected relation when the plunger is in its inoperative or fired position.

7. In a device for discharging a cartridge, the combination of a box-like casing consisting of a bottom section and a top section separable from the bottom section and embodying a continuous depending compartment-forming wall with an opening therein, a barrel for the cartridge connected to the bottom member and positioned so that when the sections are in their operative position it is disposed in the compartment within the wall and discharges through the aforesaid opening, a tubular stock connected to the top section in alignment with one end of the barrel, a spring-actuated plunger mounted slidably in the stock and provided with a pin for firing the cartridge, releasable means associated with the top section for holding the plunger in a cocked position, and a stud for shifting the plunger into its cocked position, connected to the plunger and extending through a slot in the bottom section.

8. In a device of the character described for discharging a cartridge, the combination of a box-like casing having an opening therein and consisting of a pair of separable, complementary sections shaped to form a compartment therebetween, a barrel for the cartridge disposed in the compartment and positioned so that it discharges through the opening when the two sections are in their operative position, a stock also disposed in the compartment and arranged in alignment with one end of the barrel, a spring-pressed plunger mounted in one end of the stock and provided with a firing pin for the cartridge, releasable means for holding the plunger in a cocked position, and means whereby the two sections of the casing cannot be placed together into their operative position until the plunger is shifted into its cocked position wherein it is held by the aforesaid means.

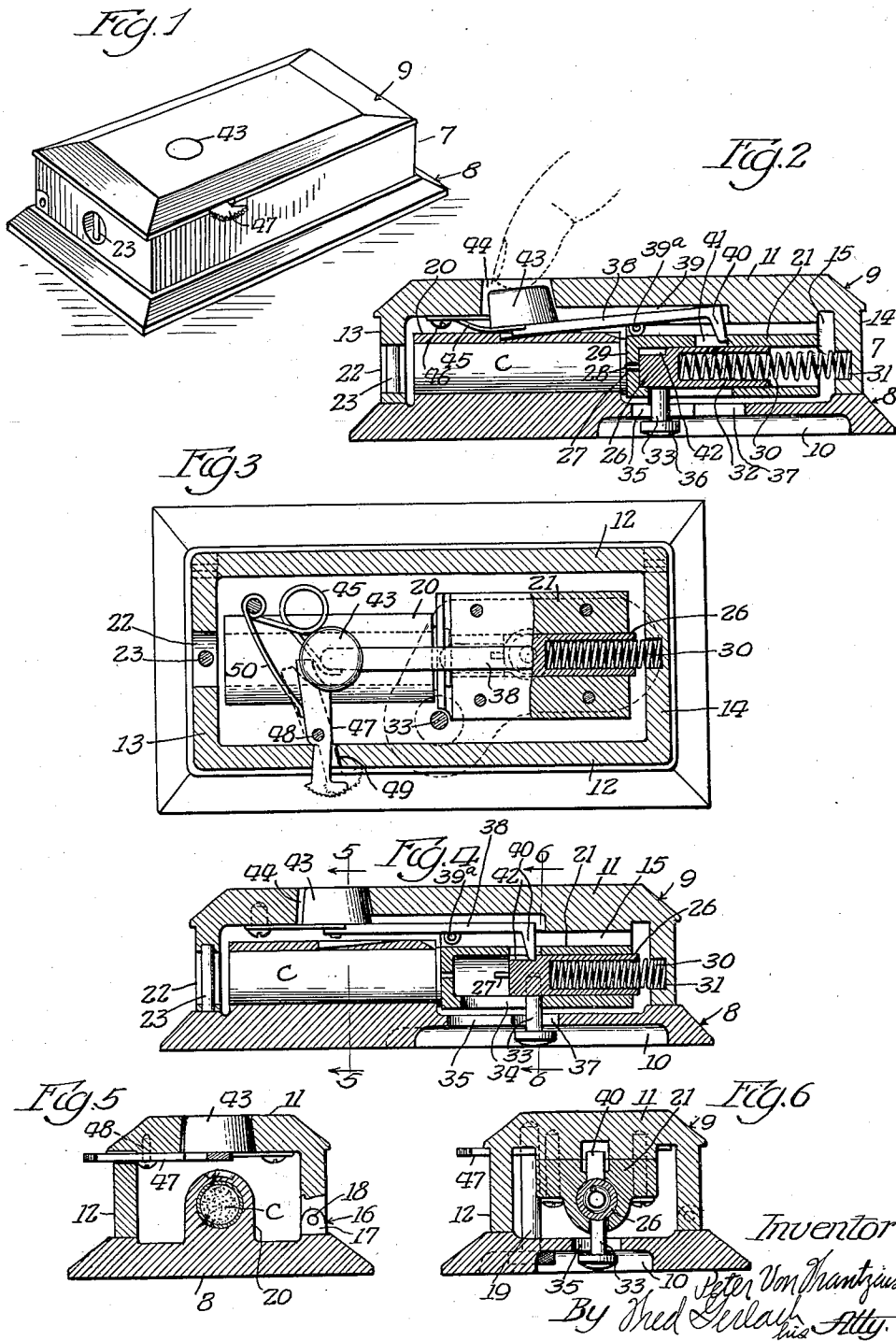
PETER VON FRANTZIUS.

Aug. 21, 1934.

P. VON FRANTZIUS  
GAS DISCHARGING DEVICE

1,970,719

Filed Nov. 9, 1931



Inventor

Peter Von Frantzius  
By Fred Seelay  
his Atty.

1

3,102,477

## ROCKET SIGNAL DEVICE

Russell O. Stefan, Downey, and Anton G. Lang, Los Angeles, Calif.; said Anton G. Lang assignor to said Russell O. Stefan

Filed Nov. 21, 1961, Ser. No. 153,953

9 Claims. (Cl. 102—37.6)

This invention relates to pyrotechnic signal producing devices and represents an improvement over the device entitled "Flare Gun" which is disclosed in our copending application for U.S. Letters Patent Serial No. 72,901, filed December 1, 1960, now Pat. No. 3,044,360. The device disclosed in said application comprised a tubular launcher embodying a spring impelled striker, the diameter of said launcher approximating that of a fountain pen, and a cheap, single-use cartridge of slightly larger diameter which screws into the launcher and provides, in one package: a firing barrel; a projectile containing a signal charge and a readily ignitable fuse charge; and a percussion cap detonatable by impact of the launcher striker therewith to both ignite said fuse charge and propel said projectile to a height of approximately 100 yards.

It is an object of the present invention to provide such a signal device in which the fuse charge is ignited in a manner to delay its burning and thus assure that a substantial portion of the mass of the fuse will remain unconsumed during a considerable portion of the upward flight of the projectile, thereby contributing to the momentum aiding in the ascent of the projectile and also deferring the ignition of the signal charge until the projectile has reached an altitude where it will be an effective signal.

Another object of the invention is to provide such a device in which the burning of the fuse charge, thus prolonged, applies a sustained rocket thrust axially to the projectile in the direction the device is pointed when fired, thereby increasing the altitude attained by the projectile.

A further object of the invention is to provide such a cartridge, the shell of which is injection cast of plastic material thereby greatly lowering the cost of such cartridges.

Prior attempts to employ cast plastic as the material for cartridge shells have encountered the tendency for percussion caps mounted in such shells misfiring more frequently than is allowable.

Still another object of the present invention is the provision of a plastic cartridge shell for a pyrotechnic signal device or the like in which misfiring of the percussion cap is practically eliminated.

It is also an object of the present invention to provide a novel signal-charge-containing projectile, adapted for use in such a cartridge, and a novel method of making said projectile which contributes substantially to the attainment of the foregoing objects.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which

FIG. 1 is an elevational view, drawn approximately to full scale, of a preferred embodiment of the invention held erect with the firing pin cocked ready for firing.

FIG. 2 is an enlarged, fragmentary, sectional view of the invention taken on line 2—2 of FIG. 1, and shows the firing pin of the invention in safety position.

FIG. 3 is a view similar to FIG. 2 illustrating the firing of said cartridge with the projectile only partly extended from the barrel of the cartridge. This view shows how the rocket fuse charge in the projectile is ignited only in a

2

centralized area of precisely limited size as the projectile is propelled from the cartridge.

FIG. 4 is a view similar to FIG. 3 and illustrates the projectile in full flight upwardly under the impulse of the momentum of its discharge from the cartridge, aided by the rocket thrust produced by the burning of the rocket fuse charge of the projectile.

FIG. 5 is an enlarged sectional view to a scale of approximately twice actual size, of the cartridge of the invention with the elements thereof separated axially so that they may be individually illustrated as they appear prior to assembly in the cartridge.

FIG. 6 is a diagrammatic illustration of the steps involved in the method of manufacture of the flare projectile of the invention.

Referring specifically to the drawings, the present invention is illustrated therein as embodied in a pyrotechnic signal producing device 10 which includes a launcher 11 and a cartridge 12.

The launcher 11 comprises a cylindrical tube 13 which is about 1/2 inch in outside diameter and is internally threaded at its opposite ends. Formed longitudinally in the tube 13 is a firing slot 14 having a safety notch 15 formed laterally therefrom near its upper end and a cocking notch 16 formed in the opposite direction laterally from said firing slot at the opposite end of the latter. Screwed into the internal threads in the upper end of the tube 13 and secured against rotation by a punched indentation 17 in the tube is a firing pin stop 18, this having an axial bore 19 with a deep conical downward counterbore 20.

Closely fitting and freely slidable within the tube 13 is a cylindrical firing pin 25, the upper end of which is tapered to fit flush within the conical counterbore 20 and terminates in a tapered striker 26 which is of a smaller diameter than the bore 19 so as to pass readily therethrough. The firing pin 25 is provided with a radial hole 27, just below the tapered upper end thereof, and a cocking pin 28 having a cylindrical knurled head 29 is driven into the hole 27 so as to be permanently assembled with the firing pin 25 and restrict movement of the latter in the tube 13 to the limits defined by the firing slot 14 and notches 15 and 16.

A coiled expansion spring 30 fits slidably into the lower end of the tube 13 and is held compressed against the lower end of the firing pin 25 by a screw plug 31 which screws into the threads in the lower end of the tube 13.

The cartridge 12 of the device 10 constitutes the ammunition which is used with the launcher 11 in each firing of the device 10, and each cartridge provides its own firing barrel so that it is unnecessary for the launcher to be provided with such a barrel.

Referring to FIG. 5 which illustrates the component parts of a cartridge 12 separated axially in the order in which they are assembled to form the cartridge, the three principal components of the cartridge are seen to be a shell 32, a projectile 33 and a percussion cap 34.

The shell 32 may be die-cast of aluminum or of the alloy known as die cast metal but, to lower the cost of the cartridge 12 this shell is preferably injection molded of a plastic of high tensile strength. The only plastics which have proved satisfactory in making the shell 32 to date are polycarbonate resin which is known in the trade as "Lexan," and acetal resin which is known in the trade as "Delrin."

The shell 32 includes a cylindrical firing barrel 35 which preferably has an inside diameter of approximately .575 inch and a wall thickness of at least .05 inch. The upper end of the barrel 35 is open and the lower end is



3

united integrally with a shell base 40 on which is provided an externally threaded nipple 41. The base 40 closes the lower end of the barrel 35 and has a deeply concave conical inner surface 42 which forms a gas expansion pocket at the lower end of the cylindrical firing chamber 43 provided by the barrel 35. The juncture of the conical surface 42 with the chamber 43 forms an annular shoulder 44.

Formed axially in the nipple 41 is a bore 45 having a counterbore 46 the latter forming an annular shoulder 47 at its juncture with said bore. The counterbore 46 is designed to tightly receive a metal reinforcing sleeve 48 which is provided with an inturned flange 49 at its inner end which is thus brought to rest against the annular shoulder 47 of the shell 32. The internal diameter of the sleeve 48 is such as to tightly receive the percussion cup 34 and the latter is pressed into said sleeve. The function of the sleeve 48 is to provide a relatively rigid base for supporting the cap 34 so as to insure detonation of the latter when the device 10 is fired. In the absence of such a reinforcement the plastic material of which the shell 32 is made was found inadequate to prevent frequent misfiring of the caps mounted therein, a circumstance which would be intolerable in the signaling device to which this invention relates. Providing shell 32 with the reinforcing sleeve 48, however, has practically eliminated failures from this source.

The percussion cap 34 is preferably a center fire primer cap of substantial power and the cap of this type identified as the No. 250 Magnum Rifle and Pistol Cap put out by Cascade Cartridge Co., Lewiston, Idaho, has proved entirely satisfactory.

Many difficulties were encountered in the development of projectile 33 to the point where this satisfactorily performs its intended function in the invention. The preferred method in the present invention of producing the projectile 33 is diagrammatically illustrated in FIG. 6. The principal element of the projectile 33 is a very thin-walled metal cup which is preferably made of aluminum but which can also be made of other relatively combustible metals such as zinc, magnesium or "die casting metal." The wall of cup 55 is preferably about .005 inch in thickness. The method of utilizing this cup in the manufacture of projectiles 33 includes the use of a steel platform 56 which is provided with a multiple of cylindrical recesses 57, each being of a size to just snugly receive one of the cups 55. Each of the recesses 57 is provided with a cup ejection hole 58. The six steps of the method of the invention for making the projectiles 33 are illustrated in adjacent recesses 57 of the platform 56. In actual practice the platform 56 is provided in multiples and where a step involves a pressing operation a different press is equipped with a bank of plungers, one for each of the recesses 57, and that step is performed on all these recesses in a single operation of that press.

The process starts with supplying each of the recesses 57 of one of the platforms 56 with a cup 55 and the filling of all the cups in the platform with a flare signal composition which constitutes the signal charge of the projectile. Where it is desired that the projectile 33 give a bright red light as a signal, this composition is made up of approximately 70% of powdered magnesium (200 mesh), 25% of potassium perchlorate, 4% of strontium oxalate (for red color), and about 1% of gum arabic for moistening the mixture. Where the gum arabic needs thinning a trace of dextrine or linseed oil is added. When this mixture has the form of a relatively dry paste it is forced into the cups 55 to fill the same, as shown in recess a in FIG. 6.

The next step of the process, illustrated in recess b, consists in placing the platform 56 in a press which is provided with a bank of plungers 59, one for each of the recesses 57 and lowering these plungers to press the composition occupying the cups 55 to greatly compact this in these cups and form this composition into a signal

4

charge 60. The lower end of each plunger 59 is semi-spherical in shape and has a rounded tit 61 formed axially thereon so as to impress this shape onto the exposed surface of each of the signal charges 60 when this step has been completed. In order to get the desired compactness of the material of the composition thus pressed into the cup 55 to form a signal charge 60, a pressure is applied on this mixture by each of the plungers 59 of from 1500 to 4000 pounds in the step just described.

The next step of the process of making the projectile 33 is illustrated in the showing of recess c in FIG. 6 and this is accomplished by placing the platform 56 in the press having a bank of plungers 62 the lower face of each of which is flat with an annular rounded channel which curls the upper edge of the cup 55 inwardly so as to form an inturned flange 63 thereon which performs the dual function of strengthening the mouth of the cup 55 during the firing of the projectile 33 while at the same time retaining the contents of the projectile therein during the upward travel of the projectile when the device 11 is fired.

The next step of the process of making projectiles 33 is to set the plate 56 aside for approximately twelve hours to let the signal charges 60 formed in the shell 55 to thoroughly dry out.

A composition is now prepared for forming a rocket-fuse charge 64 in the mouth of the projectile 33. This composition preferably comprises 75% of meal-prime ( $\frac{2}{3}$  of which is blasting powder and  $\frac{1}{3}$  charcoal) and 25% of the composition used in forming signal charge 60. This is made into a dry paste and packed into the hollow space in the mouth of each of the cups 55 and then pressed tightly therein by placing the platform 56 in a press equipped with a bank of rams 65 as illustrated in connection with recess e in FIG. 6.

The platform 56 loaded with projectiles 33 on which all of the foregoing steps have been performed so as to complete these projectiles is now set aside to permit thorough drying of the rocket-fuse charges 64, after which the projectiles 33 are ejected from their recesses 57 by a bank of ejector rods (not shown) extending through the holes 58.

The projectile 33 has an outside diameter which permits it to very loosely fit into the firing chamber 43 of the shell 32 when assembling a cartridge 12. When this assembly takes place the projectile 33 is preceded into the chamber by a cardboard disk 70 having a small hole about  $\frac{1}{16}$  of an inch in diameter. When the disk 70 comes to rest on the shoulder 44 therefore it supports the projectile 33 with the upper surface of the disk close to the adjacent surface of the rocket-fuse charge 64 with the central hole 71 of the disk exposing only a small axial portion of that surface of the charge 64, as shown in FIG. 2. To complete the assembly of the cartridge 12, a second cardboard disk 72 of the same diameter as the disk 70, but imperforate, is inserted in the mouth of firing chamber 43 so to rest against the upturned bottom of the projectile 33, the latter being inverted before insertion into the shell 32. Both of the disks 70 and 72 have an outside diameter which snugly fits the firing chamber 43. The final step in assembly of the cartridge 12 comprises painting the upwardly exposed face of the disk 72 and the exposed mouth portion of the barrel 35 above said disk with a thin coating of varnish-like sealing material 73 which will not fuse with the plastic material of the shell 32 but adheres thereto sufficiently to exclude moisture from the cartridge 12.

The threaded nipple 41 of the cartridge 12 has threads of the same pitch as the internal threads in the upper end of the tube 13 and is thus adapted to be screwed into the upper end of said tube to make a tight threaded fit with the latter, with the end of the nipple very close to or in contact with the outer end of the striker stop 18 (FIG. 2). When the cartridge 12 is thus mounted on the launcher 11 the axially mounted percussion cap 34 of the cartridge is aligned with and close to the upper end

5

of the hole 19 in the firing pin stop 18. Users of the signal device 11 are instructed to always have the firing pin 25 on safety position, that is with the cocking pin 28 in the notch 15 as shown in FIG. 2 before screwing a cartridge 12 into launcher 11 as above described and as shown in FIGS. 1 and 2, and preferably never to do this excepting immediately before and preparatory to the firing of a signal with the device 10. These precautions are of course to prevent the accidental discharge of the device resulting in injury to person or property.

#### Operation

The cartridge 12 having been screwed snugly into the launcher 11 as shown in FIG. 2, with the firing pin 25 on safety, the next step in the operation of the device 10 is to cock the firing pin as shown in FIG. 1. This is done by holding the device in the left hand, pointing the cartridge 12 away from the face and preferably upwardly, and then with the thumb of the right hand pulling the cocking pin 28 downwardly out of the notch 15 into the firing slot 14 and to the lower end of said slot and then rotating the firing pin 25 to swing the pin 28 into the cocking notch 16 where said pin is held fast by the upward pressure of the spring 30 against the striker 25 and the fact that the cocking notch 16 slants slightly upwardly from the longitudinal axis of the firing slot 14.

The device 10 is now held aloft vertically by gripping the lower portion of the launcher 11 in the right hand, with the right thumb to the right of the knurled cocking pin head 29, and the device is fired by using this thumb to shift the cocking pin 28 out of the cocking notch 16 and into the firing slot 14. This releases the firing pin 25 from restraint, coiled spring 30 thereupon rapidly impelling the firing pin upwardly to the full limit allowed by the firing slot 14 which terminates with striker 26 penetrating the percussion cap 34 of the cartridge 12.

This detonates the cap 34 which contains a sufficiently heavy charge of percussion powder to fill the pressure pocket 42 in the bottom of the firing chamber 43 with combustion gases under a pressure of approximately 2400 pounds per square inch. Flame produced in this explosion passes through the hole 71 in cardboard disk 70 and ignites the rocket-fuse powder charge in the projectile 33 in an area of the downwardly exposed surface of this charge approximately the same size as the hole 71. The precise limitation in the size and location of this area in which the charge 64 is ignited has a significant bearing on the operation of the device 10 as will be subsequently explained in detail.

Bearing upwardly against the inturned flange 63 of the projectile 33 and outwardly against the firing chamber 43 of the barrel 35, the disk 70 acts as a packer against the escape of the gases produced by the percussion cap 34 when this is detonated, except by the propulsion of the projectile 33 from the barrel 35. Although adequate for sealing purposes, the bond between the sealing film 73 and the cartridge barrel 35 is readily broken by the gas pressure tending to expel the projectile 33 from the cartridge. FIG. 3 shows the firing of the device with the projectile only partly out of the cartridge while FIG. 4 shows the projectile in free flight upwardly and indicates how this flight is aided by the rocket action of the restricted symmetrical burning of the rocket-fuse charge 64. The latter view also indicates the relative instability of the cardboard disks 70 and 72 so that the turbulence of the combustion gases propelling the projectile from the cartridge (and that of the surrounding atmosphere) deflects these disks to one side or the other of the axial path of the projectile so as not to interfere with the flight of the latter along this path.

The limitation by the disk 70 of the area in which the rocket-fuse charge 64 is ignited has two principal results of great benefit in the operation of the device 10. The regulated and symmetrical burning of the charge 64 during this period causes it to impart a substantial rocket

6

thrust upwardly against the projectile 33 throughout the initial one-third of its upward flight which considerably offsets the air resistance impeding such travel so that the projectile reaches a much higher altitude than would otherwise be the case without this assistance. Retardation in the consumption of the two charges in the projectile 33 also slows up the loss of weight in the projectile and thus renders the momentum of the unconsumed portions of the charges more effective in offsetting the air resistance to the upward travel of the projectile. Finally, the delay in igniting the signal charge 60 due to the feature being discussed, renders the light produced by the burning of this charge much more effective because the projectile 33 is at a substantially higher altitude while this charge is burning.

The inturned flange 63 of the projectile 33 serves an important function in reinforcing the mouth of the cup 55 so as to resist splitting of the edge of the cup which this shell otherwise has a tendency to do, when fired, and which results in fragmentation and loss of burning particles of the charges in the projectile which are visible in the air and detract from the strength of the signal given. The inturned flange 63 also narrows the mouth of the projectile thereby retaining charges 60 and 64 in the cup 55 at least up to the time in the flight of the projectile when the flange 63 is consumed by the flame produced by the final burning out of the charge 64 and the coincidental ignition of the signal charge 60. From this point on (which starts about midway in the upward flight of the projectile 33) the material of the cup 55 burns at the exposed edge of this along with the material of the signal charge 60. At the conclusion of the burning of the charge 60, the entire cup 55 has been consumed and there is nothing left, even in the form of an ash, to fall to earth. This mode of operation of the projectile 33 is of great importance in eliminating fire hazards in the use of the invention and the very thin combustible sheet metal of which the cup 55 is formed accelerates the rate of combustion of the cup and gives assurance that the cup is completely consumed in the air.

While the composition above described of the material used in making the signal charge 60 in the projectile 33 is for the purpose of producing a red flare signal, other colors can be produced in such a flare by substituting other color producing chemicals for the strontium oxalate component of said composition. For instance, barium chlorate when so substituted would produce a flare with a green color. It is also to be understood that the signal charge 60 may be composed of chemicals adapted to produce a dense cloud of smoke in order to manufacture a cartridge 12 adapted for giving a smoke signal during the daytime.

While a specific embodiment of the invention has been illustrated in the drawings and above described for the purpose of disclosing the invention, it is to be understood that this is for illustrative purposes only and that various changes might be made in the specific form shown without departing from the spirit of the invention or the scope of the appended claims.

The claims are:

1. A pyrotechnic signal producing cartridge comprising:  
A. a shell including:

(1) a cylindrical thin-walled barrel enclosing a firing chamber;

(a) said barrel being of adequate strength to withstand, without external support, the firing of said cartridge,

(2) a base closing one end of said barrel

(a) to form the breach of said chamber and present to said chamber a concave surface forming a gas expansion pocket at the inner end of said chamber

(b) said base providing an axial threaded nipple having an axial bore therein communicating with said pocket,

- (c) said bore having a counterbore in its outer end portion to provide a cap receptacle;
- B. a percussion cap mounted in said receptacle;
- C. a wadding disk slidably fitting within said chamber against the peripheral portion of said base,
- (1) there being a small hole formed axially in said disk;
- D. a signal projectile slidably fitting within said chamber against said disk, said projectile including:
- (1) a thin-walled cylindrical cup, inverted in said chamber to present its mouth to said disk,
- (2) a signal powder charge pressed into said cup to partially fill the same,
- (3) and a fuse powder charge pressed into the mouth of said cup over said signal charge and approximately completing the filling of said cup with said charges; and
- E. sealing means applied to the open end of said barrel and to said projectile to retain the latter in said barrel to exclude moisture from said barrel.
2. A combination as in claim 1 in which said sealing means comprises a cardboard disk slidably fitting within the open mouth of said chamber against said projectile; and a coating of plastic sealing material applied to the exposed face of said disk and the internal surface of said barrel exposed above said disk.
3. A pyrotechnic signal producing cartridge as recited in claim 1 wherein the concave surface presented by said shell base to said firing chamber is frusto-conical with an altitude approximately equal to the radius of said firing chamber.
4. A pyrotechnic signal producing cartridge as recited in claim 1 wherein
- (a) the shell thereof is jet-molded of a high tensile strength plastic,
- (b) the counterbore in the shell nipple is substantially larger in diameter and depth than said percussion cap, and
- (c) a metal reinforcing sleeve having an inturned annular flange at its inner end is provided, said sleeve being pressed into said counterbore, the latter receiving said sleeve with a pressed fit, to produce a receptacle for said percussion cap, said cap being mounted with a press fit in said sleeve, to rest against said flange.
5. A pyrotechnic signal producing cartridge as recited in claim 1 wherein said flare projectile cup is comprised of a relatively combustible metal selected from the group consisting of aluminum, magnesium, zinc, and die-casting metal.
6. A pyrotechnic signal producing cartridge as recited in claim 5 in which the flare projectile cup is provided at its mouth with an inturned flange to strengthen the mouth portion of said cup during the firing of said projectile and to confine the powder charges within said cup during the initial portion of the flight of said projectile.
7. A pyrotechnic rocket flare projectile which will be totally consumed when fired upwardly into the air, thereby practically eliminating incendiary hazards incidental to its use, said projectile comprising:
- A. a thin-walled cylindrical cup with a thickness of approximately .005 inch, said cup being made of relatively highly combustible metal,
- B. a flare powder charge pressed under high pressure into said cup to partially fill the latter and leave a deep, concave depression in said charge;
- C. a fuse powder charge pressed into said cup to overlie said flare powder charge and fill the depression formed therein; and
- D. a curled annular inturned lip on said cup for engaging said fuse charge and retaining said charge in said cup, said lip and cup being consumed upon the burning of said charges.

8. A pyrotechnic signal producing cartridge comprising:
- A. a shell including:
- (1) a cylindrical thin-walled barrel enclosing a chamber,
- (a) said barrel being of adequate strength to withstand, without external support, the firing of said cartridge,
- (2) a base closing one end of said barrel,
- (a) to form the breech of said chamber and present to said chamber a concave surface forming a gas expansion pocket at the inner end of said chamber,
- (b) said base providing an axial threaded nipple having an axial bore therein communicating with said pocket,
- (c) said bore having a counterbore in its outer end portion to provide a cap receptacle;
- B. a percussion cap mounted in said receptacle;
- C. a signal projectile slidably fitting within said chamber, said projectile including:
- (1) a thin-walled cylindrical cup made of a relatively higher combustible metal,
- (2) a flare powder charge pressed under high pressure into said cup to partially fill the latter,
- (3) and a fuse powder charge pressed into the mouth of said cup over said flare powder charge and approximately completing the filling of said cup; and
- D. sealing means applied to the open end of said barrel and to said projectile to retain the latter in said barrel to exclude moisture from said barrel.
9. A pyrotechnic rocket flare projectile which will be totally consumed when fired upwardly into the air, thereby practically eliminating incendiary hazards incidental to its use, said projectile comprising:
- A. a thin-walled cylindrical cup made of a relatively highly combustible metal,
- B. a flare powder charge comprising:
- (a) magnesium powder of approximately 200 mesh, 70% by weight,
- (b) potassium perchlorate, 20% by weight,
- (c) a color producing additive, 4% by weight, selected from the group consisting of strontium oxalate and barium chlorate, and
- (d) gum arabic, 1% by weight; and
- C. a fuse powder charge pressed into said cup to overlie said flare powder charge and fill the depression formed therein, said fuse powder charge comprising:
- (a) magnesium powder of approximately 200 mesh, 25% by weight,
- (b) blasting powder, 50% by weight,
- (c) powdered charcoal, 24% by weight, and
- (d) gum arabic, 1% by weight.

## References Cited in the file of this patent

## UNITED STATES PATENTS

1,947,834	Driggs et al. ....	Feb. 20, 1934
2,319,248	Meek .....	May 18, 1943
2,418,333	Caldwell et al. ....	Apr. 1, 1947
2,459,687	Decker .....	Jan. 18, 1949
2,791,178	Thompson .....	May 7, 1957
2,868,129	Johnson et al. ....	Jan. 13, 1959
2,986,999	Fiedler et al. ....	June 6, 1961
2,995,526	De Ment .....	Aug. 8, 1961

## FOREIGN PATENTS

560,344	Great Britain .....	Mar. 31, 1944
---------	---------------------	---------------

## OTHER REFERENCES

Military Explosives, TM 9-1910, Dept. of Army Technical Manual. April 1955, pages 284-288. (Copy in Div. 46 and Library.)



1

3,344,711

## JAVELIN STABILIZED QUIET ROUND

Robert C. Mawhinney, 4661 Heyer Ave., Castro Valley, Calif. 94546; Bert F. Gould, P.O. Box 820, Berkeley, Calif. 94701; Arthur T. Biehl, General Delivery, and Robert Mainhardt, P.O. Box 225, both of Diablo, Calif. 94528; and William D. Barton, Panama, Panama (P.O. Box 2723, Balboa, Canal Zone)

Filed Feb. 23, 1965, Ser. No. 437,345

11 Claims. (Cl. 89-14)

(Filed under Rule 47(a) and 35 U.S.C. 116)

This application is a continuation-in-part of copending application S.N. 440,046, filed Feb. 11, 1965, "Small Arms Weapon" which is a continuation-in-part of both application S.N. 141,237, filed Sept. 20, 1961, "Small Arms Weapon," now abandoned (which is a continuation-in-part of application S.N. 61,017, filed Oct. 6, 1960, "Small Arms Weapon," now abandoned), and of copending application S.N. 140,090, filed Sept. 22, 1961, "Miniature Disappearing Projectile," now abandoned.

This invention relates to firearms. More particularly it relates to a silent hand weapon.

The development of the modern rifle began approximately in 1320 when Berthold Schwartz, a monk of Freiburg, in Germany, manufactured gun powder after studying the writings of Bacon regarding explosives. Since that time the development of the rifle has continued to the present state of the art as it is known today.

It has been the intent of many inventors and experimenters to eliminate the report generated when a firearm is discharged. Recently, considerable time, expense, and the effort of a large number of people has been expended in attempts to find a silent weapon. None have been really successful. Various devices have been produced which afford some measure of success in reducing the sound of a rifle, such as silencers, but these devices are merely sound suppressors and only reduce the noise produced. The present invention effects a virtually silent hand weapon in which the movement of the mechanical parts of the weapon are louder than the report of the explosive being detonated within.

A need has grown for a rifle which will shoot a projectile which is noiseless, relatively recoilless, is accurate, at long range, and strikes the target with an impact, with little tissue damage, near or below the threshold of pain. It is often desirable to capture an animal alive without its being harmed and without alerting other animals. Thus a means is needed for propelling a small projectile which will not inflict serious injury or pain on the animal when it strikes, but yet one which will insure that the projectile enters the body sufficiently deep to deliver and transfer a drug to the animal's bloodstream. The means must also be accurate to ensure first that the proper target can be selected from a large group; second that when the animal is hit it does not react to the wound violently enough to disturb the other animals; and third that the report of the delivery means does not disturb the other animals or call attention to the shooter and reveal his position. The present invention provides a complete solution to all of these problems with a new and novel firearm and cartridge.

Briefly, the invention is a small arms hand weapon comprising in combination a smooth bore guide tube means; a cartridge having a combustion chamber and a smooth bore passage communicating therewith, said passage formed for axial alignment with the bore of the launching tube; an elongated projectile in the passage of the cartridge and having an L/D (length over diameter) ratio at least 15/1 and a center of gravity at least 70% of the length from the tail end; a silencer approximately 15 projectile calibers in internal diameter, and approximately 100 projectile calibers in internal length, communicating with the dis-

2

charge end of the guide tube means, and means for firing the cartridge.

Accordingly, it is an object of the present invention to provide a firearm capable of being fired without a report.

It is a further object of the present invention to provide a firearm capable of launching a projectile which strikes the target close to or below the threshold of pain without tissue damage.

It is another object of the invention to provide a weapon which fires a very small projectile accurately at relatively long range.

Still further objects and advantages of the present invention will become apparent from the accompanying drawings which form a part of the specification.

FIGURE 1 shows a side elevation of the cartridge of the present invention in cross section with a projectile positioned therein.

FIGURE 2 shows a side elevation of the projectile of the present invention in cross section.

FIGURE 3 shows a side elevation of the assembly of the present invention partly in section.

FIGURE 4 shows a side elevation of an alternative embodiment of the present invention partly in section showing the construction thereof.

The cartridge (FIGURE 1), as utilized in a representative and economical embodiment of the invention (effected by altering presently available small arms weapons), is made with a standard .22 caliber long rifle shell 11 case as a basic portion thereof. The standard .22 caliber igniter (not shown) is retained on the interior surface 12 of the combustion chamber. This is generally composed of lead styphanate, but any igniter which would work in a .22 caliber shell will work adequately well for the present invention.

An adapter 13 is made an integral portion of the cartridge case. Generally, the adapter resembles an elongated bullet positioned in the cartridge case, but unlike a bullet it does not separate from the case when the weapon is discharged. The adapter is formed to coaxially nest within the case with a relatively tight fit. After firing, this prevents the escape of the gaseous propellant between the contact surfaces of the case and the adapter. The close tolerances also provide frictional resistance to movement of the adapter with respect to the case. A crimped ring 14 is formed in the cartridge around the case depressing the case into an annular groove 16 in the adapter. This crimp further seals the case to the adapter and prevents the escape of the gaseous propellant or the separation of the case and adapter. Tests have shown that the crimped ring is not necessary and that the cartridge will perform adequately without it when the complete assembly of the weapon is properly designed. If the cartridge is manufactured without the crimp ring it makes the cartridge more readily adaptable for disassembly and reloading. The interiorly extending portion 17 of the adapter contacts the transversally disposed end cover 12, or flanged cap, of the case. The flanges 18 are standard on most rifle cartridges and are used for positioning the shell in a rifle chamber. The adapter is made to extend into the case to the full depth to secure proper alignment of the adapter in the case. Adapters which only extend to or just past the crimp line are not easily lined up axially with the case portion of each cartridge.

Due to the long length relative to the small diameter of the bore in the adapter portion of the cartridge, a piece of accurately made uniform diameter tubing 19 is used to line the larger bore of the adapter. This permits a larger drill to be used on the adapter with less possibility of drill wander during the bore cutting. The small internal diameter tubing provides the ultimately desired small bore with a higher degree of accuracy and uniformity than can

be achieved by drilling. Hypodermic tubing satisfactorily provides the small diameters and fine tolerances necessary for the cartridge. The tubing is flared on the internal end 21 to prevent it from being blown out of the cartridge. A small crimp 22 is also usually placed in the tube to prevent the projectile 23 from sliding or accidentally being poked back into the combustion chamber during handling. The projectile is prevented from sliding out of the cartridge by a spot of grease or other tacky lubricant. It has proven to work best when the grease is smeared in a light ring around the projectile in the middle of its length before insertion in the cartridge. Any projectile which starts to slide out can be easily pushed back in the barrel. Frangible means could be employed within, or covering the forward end of the bore in the adapter to retain the projectile therein and render this assembly more adaptable to rough handling and eliminate the need for resorting to grease.

A sabot or wad 24 is used to seal the bore of the cartridge. This keeps the propellant from deteriorating and forms a gas seal to prevent blowby when the weapon is fired. The projectiles were first fired without the sabot and performed adequately and one is not necessary. The sabot is added to prevent the possibility of the magnesium tail of the rocket igniting. The sabot is made of Teflon, because of its frictionless qualities, and helps increase the velocity of the projectile by preventing blowby. The sabot also reduces the machining accuracy required in forming the barrel. Another embodiment is effected when a heavy enough nose 26 (FIGURE 2) is used. The tail portion 27 of the projectile can then be made of Teflon and the sabot eliminated. Teflon has high strength and can withstand the axial forces that are imposed upon it. It also has high temperature resistance in addition to its frictionless qualities.

The combustion chamber portion of the cartridge of the present invention is smaller than that of the standard .22 caliber cartridge as a smaller propellant charge is employed. Approximately 7 milligrams of double-based propellant have proven adequate for use in the embodiment of the invention herein described. It would seem that as a general rule, scaling principles with respect to the propellant will hold if other sizes of the weapon are developed.

The cartridge of the present invention was derived from a modified shotgun shell cartridge which fires a  $\frac{1}{8}$  inch projectile, described in a continuation in part application S.N. 440,046, filed Feb. 11, 1965, Small Arms Weapon. It can be seen from a comparison of the two cartridges that the basic principles and component parts are very similar. Both cartridges use standard shell cases with adapters and elongated projectiles, javelin stabilized or mass stabilized, fired through smooth bore launching tubes. The projectile of the present application is also derived from the same case. It is a solid missile comprised of two materials of different specific gravity, the nose portion generally being made of a heavy metal such as steel, platinum, tungsten, etc., while the tail can be made of solid or tubular magnesium, beryllium, aluminum, a sponge metal, or a synthetic composition material. It is simply a matter of design as to which combination will work having the proper  $L/D$  ratios and a properly positioned c.g. (center of gravity). Significant compression loading is imposed on the tail of the projectile by the discharge of the weapon, therefore, the material selected must be of sufficient structural strength to withstand the loads. The material must also be able to withstand the heat generated by the propellant unless a heat shield means such as a sabot is used.

Novel and important parameters of the invention are that the projectile should have an  $L/D$  ratio at least 15/1 and the c.g. should be located at 70% of the length of the projectile from the tail and as far forward as possible. As the ratio becomes larger, increased aerodynamic stability is achieved. The best ratios have been found to be in the neighborhood of 25/1 with 20/1 being the

lower limit of acceptable stability for good accuracy, but not the lower limit for acceptable airworthiness. A ratio of 15/1 will still permit a projectile fired out of a launcher backwards to flip over and reorient itself on target providing the center of gravity is within the parameter of being at least 70% of the length of the projectile forward of the tail end. The further forward the c.g. the better the projectile flies. It appears that the limit to which the c.g. may be advanced is presently around 80% of the length when using a tungsten-magnesium projectile. At that point the c.g. is located forward of the tail end 28 of the rearwardly projecting male stud member 29. Other combinations of metal may permit moving the c.g. still further forward. Reference to the drawing (FIGURE 2) shows one way to join the tail and nose portions of a projectile as utilized for the present invention. It is a problem that some projectiles have a tendency to separate into their two portions when they emerge from the launching tube; it is believed from being blown apart. This problem is overcome by the magnesium-tungsten combination. The male-female joint between the tail section and the nose is of sufficient strength to keep the parts together when joined with a close tolerance press fit, but adding epoxy serves to help.

It is part of the invention that the two metals can be made of bonded powders. The bonding agent can be water soluble. Thus if the projectile is buried deep in the animal's body, it need not be extracted in order for the animal to recover. The projectile will dissolve and cause no further injury. In fact it becomes simply a suspension of metal particles which only appears as a slight cloud in an X-ray wound area and cannot even be identified as a foreign object in the body.

The projectile as used in this embodiment of the invention is approximately .030" in diameter while the bore of the cartridge is approximately .033" in diameter. The length of the projectile is approximately  $\frac{9}{10}$  of an inch.

The barrel 31 (FIGURE 3) of the launching tube necessarily requires a relatively long bore of very small diameter to effect the stabilization of the projectile. It has been determined that the bore must be at least six times the length of the projectile in order to obtain any range with reasonable accuracy. Barrel lengths have ranged between 6 and 18 inches with comparable results.

The bore of the launching tube was made in an ingenious manner. Since it is very difficult to form a very small bore in solid stock, tubing with the required tolerance was cut to the proper length and clamped between two pieces of solid stock. The stock had opposing mating surfaces with a groove cut therealong for accommodating and supporting the tubing in straight axial alignment. A semi-circular groove was used, but a V groove, or some other relief configuration, which is easy to form in the solid stock, would work equally well. The two halves of the solid stock are held together by clamping means such as screws or rings. The present embodiment is held together by drilled holes through one of the pieces of solid stock and tapped holes in the other. Machine screws are used therewith to clamp the two halves together. Generally any clamping means will suffice.

A silencer 32 is used with the present embodiment. The prior art of silencers teach that they should be approximately six projectile calibers in diameter and approximately ten projectile calibers in length. A representative pressure drop for such a silencer as used with a rifle is from approximately 60,000 p.s.i. in the chamber to 10,000 p.s.i. in the silencer. The present embodiment uses a silencer approximately fifteen projectile calibers in internal diameter and one hundred projectile calibers in internal length which contain the gases of combustion and drop the pressure developed in the cartridge nearly to atmosphere. A small hole 33 at the discharge end of the silencer, approximately .200" in diameter permits the projectile unrestricted passage. The silencer is large enough in internal volume to contain all the gaseous



volume at one overpressure or less which results from the burning of the propellant. In order to reduce the size of the silencer the internal cavity could be filled with metal turnings such as steel, copper or bronze wool, etc. The passage of the first projectile will clear a path and orient the fibers for subsequent projectiles. Another addition which will work to reduce the noise is lining the interior surface of the silencer with asbestos tape. These two alterations can be used singly or in combination.

The primer activating means (not shown) can utilize any typical arrangement commonly used in rifles or the firearm art wherein a standard cartridge is employed. In this embodiment a rimfire cartridge is used as previously described.

The first working embodiment of the present invention utilized a modified standard .22 caliber rifle (FIGURE 3). The hammer, trigger, and bolt mechanism 34 were retained in standard form. A new barrel was made. Since the cartridge 36 is considerably longer than a standard .22 caliber shell, the standard automatic magazine would not work. One way of manufacturing these launching tubes is to take a standard unrifled .22 caliber barrel and inserting a tubing having an outside diameter which will just fit the .22 caliber barrel and having an internal diameter of the size desired for the projectile. A standard .22 caliber rifle could thereby be modified at a minimum of expense for use with the present invention.

The mechanical operating mechanisms of the weapon portion of the primer activating means generally make more noise than the detonation of the cartridge. Therefore, certain measures can be employed to reduce these noises also, such as rubber shock pads and grommets to prevent metal to metal contact of the operating mechanism. An alternative to this problem is to use electrical ignition. This is a very effective means in that it allows remote control and a different concept of the invention can be employed. A launching tube 37 (FIGURE 4) can be attached or secured to the barrel of a rifle (not shown) with straps, or the like. Then the rifle sights and aiming system can be used to afford accurate delivery of the projectile. It also makes it possible that both a rifle and the present invention can be combined into one effective weapon with the rifle portion available for defense if necessary. This arrangement eliminates the necessity of providing and carrying two separate weapons. The remote electrical ignition can be effected by a simple push button located at any convenient location on the stock of the rifle with one of the small mercury type batteries supplying the small amount of electrical energy necessary. When this type of design is used the cartridge adapter 38 can be an integral unit adapted for mating with the barrel portion by locking means such as threads 39. The barrel can be fitted with an alignment means for seating the cartridge adapter against the barrel and insuring that proper engagement is effected between the barrel and cartridge adapter for permitting the projectile 41 to transfer from the bore 42 of the cartridge to the bore 43 of the barrel without interference due to misalignment. One such alignment means can be male 44 and female 46 portions on the cartridge and the barrel. The cartridge adapter has an end cap 47 which covers and seals the combustion chamber portion 48 of the adapter. Propellant 49 is positioned in the combustion chamber and electrical ignition means 51 project into the combustion chamber for igniting the propellant. The ignition means can include a primer 52 inside the chamber. A silencer (not shown) can be appended to the forward end of the barrel or the barrel might be tubular with perforated supporting spacers 53 and the gases of combustion re-routed back into the cavity 54 of the barrel.

The present invention possesses many advantages not common to the prior art. It effects one of the greatest advances in history of firearm improvements. By creating a virtually noiseless, painless, recoilless, accurate weapon, the present invention can be used in situations where heretofore the characteristics of a firearm have such un-

desirable effects that they could not be used and less efficient methods had to be employed.

The fact that a very small projectile is used, lowers the body tissue destruction caused by projectile impact. The projectile hits so quickly and yet is so small that it strikes below the threshold of pain. An accident in development confirmed this fact. The resulting wound is very superficial and almost unnoticeable. If the projectile is made with powdered metal and a soluble binder, it can be left in the wound and will dissolve.

Because the projectile is javelin stabilized, and does not have appreciable spin like a bullet, chemical agents can be simply sprayed on the surface, or the projectile dipped, and the agents will not be thrown off by the centrifugal action which acts on a spinning body. Thus the agents can be affixed with a soft soluble binder permitting quicker absorption into the animal's bloodstream.

Many other embodiments and advantages of the invention can be realized. Although only a couple of embodiments of the invention have been depicted, it will be apparent that various modifications and alterations can be made thereto without changing the scope of the invention and therefore the invention is not to be limited except as defined in the following claims.

We claim:

1. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube,

(b) a cartridge having a combustion chamber and a smooth bore passage communicating therewith, said bore formed for axial alignment with the bore of said launching tube,

(c) an elongated projectile in said passage and having an  $L/D$  ratio at least 15 to 1 and a c.g. at least 70% of the length from the tail end,

(d) a silencer having an internal volume equal to a cylinder approximately 15 projectile calibers in diameter and approximately 100 calibers in length communicating with the discharge end of said guide tube means, and

(e) means for firing said cartridge.

2. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least 6 times the length of the projectile to be launched therethrough,

(b) a cartridge having a combustion chamber and a smooth bore passage communicating therewith, said bore formed for axial alignment with the bore of said launching tube,

(c) an elongated projectile in the passage of said cartridge having an  $L/D$  ratio at least 20 to 1 and a c.g. at least 70% of the length from the tail end, said projectile having a nose portion formed of a high density metal and a tail portion of a relatively low density material,

(d) a silencer having an internal volume equal to a cylinder approximately 15 projectile calibers in diameter and approximately 100 calibers in length communicating with the discharge end of said guide tube means, and

(e) means for firing said cartridge.

3. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least 6 times the length of the projectile to be launched therethrough,

(b) a cartridge case defining a combustion chamber and having a smooth bore passage communicating with said combustion chamber formed for axial alignment with the bore of said launching tube,

(c) a propellant charge in said combustion chamber,

(d) primer means associated with said cartridge case,

(e) an elongated projectile in said passage and having an  $L/D$  ratio at least 15 to 1 and a c.g. at least 70% of the length from the tail end,

(f) a silencer having an internal volume equal to a

cylinder approximately 15 projectile calibers in diameter and approximately 100 calibers in length communicating with the discharge end of said guide tube means, and

(g) means for initiating said primer.

4. A small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least 6 times the length of the projectile to be launched therethrough,

(b) a cartridge case defining a combustion chamber and having a smooth bore passage communicating with said combustion chamber formed for axial alignment with the bore of said launching tube,

(c) a propellant charge in said combustion chamber,

(d) primer means associated with said cartridge case,

(e) an elongated projectile in the passage of said cartridge having an  $L/D$  ratio at least 20 to 1 and a c.g. at least 70% of the length from the tail end, said projectile having a nose portion formed of a high density metal and a tail portion of a relatively low density material,

(f) a silencer approximately 15 projectile calibers in internal diameter and approximately 100 calibers in internal length affixed to the discharge end of said guide tube means, and

(g) means for initiating said primer.

5. A silent small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least six times the length of the projectile to be launched therethrough,

(b) a relatively small caliber rimfire cartridge case having a flanged rear wall portion and a cylindrical bore,

(c) a projectile container having a cylindrical rear end portion coaxially inserted within the bore of and engaged with said case, said container having a re-entrant portion at the rear end thereof forming a combustion chamber with said cartridge case rear wall, a smooth bore passage in said container communicating with said re-entrant portion at one end and formed for axial alignment with the bore of said launching tube at the other end,

(d) a propellant charge in the combustion chamber formed by said container and said case,

(e) an elongated projectile less than 30 mils in diameter positioned in the passage of said container, said projectile having an  $L/D$  ratio approximately 25 to 1 and a c.g. at least 75% of the length from the rear end thereof, said projectile having a streamlined nose section and a cylindrical body section, said nose section formed of a high density metal and said tail section of a lesser density material, and

(f) a silencer attached to the discharge end of said launching tube, said silencer approximately 15 calibers in internal hollow diameter and approximately 100 calibers in internal hollow length, said silencer having a transversely disposed wall at the discharge end thereof and a bore approximately .200 of an inch in diameter therein in the path of flight of said projectile.

6. The small arms weapon of claim 5 wherein a Teflon sabot is placed in the passage of said container at the rear end of said projectile between said propellant charge and said projectile.

7. The method of forming a small arms hand weapon the steps comprising

(a) inserting a snugly fitting small internal diameter launching tube having a uniform bore into a standard smooth bore .22 caliber rifle,

(b) removing the bullet and powder charge from a standard .22 caliber long rifle cartridge while retaining the standard rimfire percussion primer material therein,

(c) inserting a predetermined accurately measured load of propellant into said emptied cartridge,

(d) inserting coaxially into said cartridge a projectile

container having a cylindrical rear end portion formed for mating with said cartridge, said container having a re-entrant portion at the rear end thereof forming a combustion chamber with said cartridge case rear wall, a smooth bore in said container communicating with said re-entrant portion at one end and formed for axial alignment with the bore of said launching tube at the other end,

(e) inserting an elongated projectile less than 30 mils in diameter and smaller than the bore of said launching tube in said bore of said container, said projectile having an  $L/D$  ratio approximately 25 to 1 and a c.g. at least 75% of the length from the rear end thereof, said projectile having a streamlined nose section and a cylindrical body section, said nose section formed of a high density metal and said tail section of a lesser density metal,

(f) attaching a silencer to the discharge end of said launching tube, said silencer approximately 15 calibers in internal hollow diameter and approximately 100 calibers in internal hollow length, said silencer having a transversely disposed wall at the discharge end thereof and a bore approximately .200 of an inch in diameter therein in the path of flight of said projectile,

(g) forming alignment means on the forward end of said container and the rearward end of the tube inserted in said rifle, and

(h) inserting said modified .22 cartridge into said modified .22 rifle.

8. The small arms hand weapon of claim 4 wherein said means for igniting said primer is effected by electrical energy.

9. A silent small arms hand weapon comprising in combination

(a) a smooth bore launching tube at least six times the length of the projectile to be launched therethrough,

(b) a cup shaped end case having engagement means integral thereto,

(c) a projectile container having a cylindrical rear end portion coaxially inserted within the bore of and engaged with said case, said container having a re-entrant portion at the rear end thereof forming a combustion chamber with said case rear wall, a smooth bore passage in said container communicating with said re-entrant portion at one end and formed for axial alignment with the bore of said launching tube at the other end,

(d) a propellant charge in the combustion chamber formed by said container and said case,

(e) an elongated projectile less than 30 mils in diameter positioned in the passage of said container, said projectile having an  $L/D$  ratio approximately 25 to 1 and a c.g. at least 75% of the length from the rear end thereof, said projectile having a streamlined nose section and a cylindrical body section, said nose section formed of a high density metal and said tail section of a lesser density material, and

(f) a silencer approximately 15 projectile calibers in internal diameter and approximately 100 calibers in internal length affixed to the discharge end of said guide tube means, and

(g) electrical means for igniting said propellant.

10. The small arms weapon of claim 9 wherein a Teflon sabot is placed in the passage of said container at the rear end of said projectile between said propellant charge and said projectile.

11. The small arms weapon of claim 1 wherein said projectile is made of powdered metals bonded by a soluble binding agent.

No references cited.

BENJAMIN A. BORCHELT, *Primary Examiner*.

S. W. ENGLE, *Assistant Examiner*.



Oct. 3, 1967

R. C. MAWHINNEY ET AL

3,344,711

JAVELIN STABILIZED QUIET ROUND

Filed Feb. 23, 1965

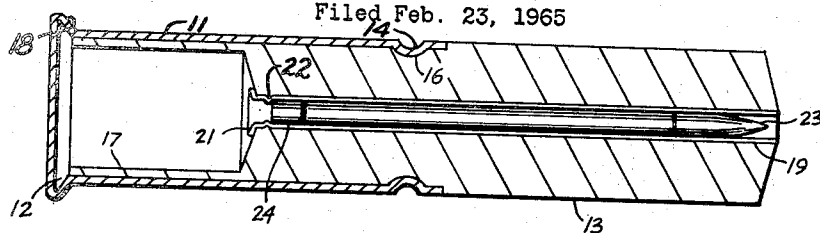


FIG. 1

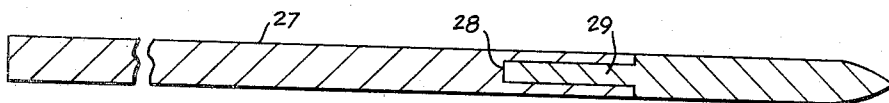


FIG. 2

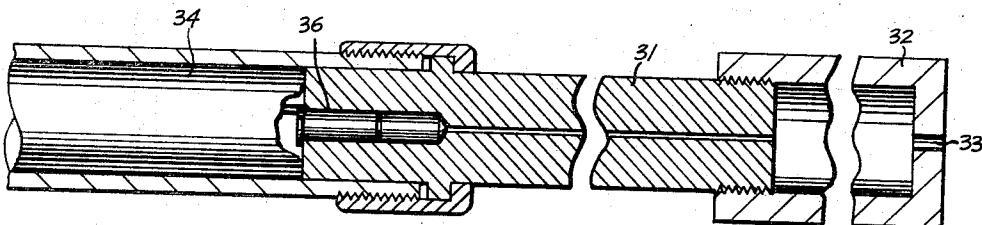


FIG. 3

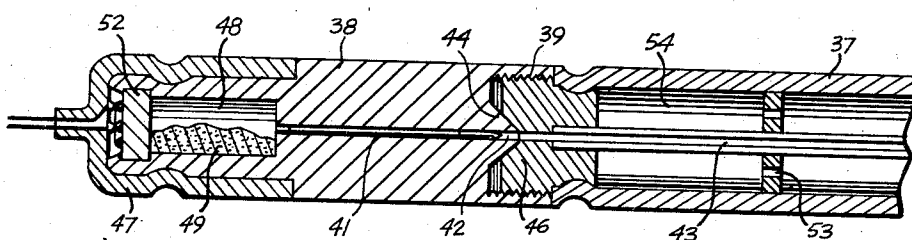


FIG. 4

ROBERT C. MAWHINNEY  
BERT F. GOULD  
ARTHUR T. BIEHL  
ROBERT MAINHARDT  
WILLIAM D. BARTON  
INVENTORS

BY *John L. Greig*  
ATTORNEY

1

2,757,474

## PEN TYPE TEAR GAS GUN

Don C. Williams, Huntington Park, Calif.

Application February 26, 1954, Serial No. 412,882

5 Claims. (Cl. 42—1)

This invention relates to discharging devices for tear gas cartridges, bombs, and the like, and in particular a tubular casing having a handle with a button controlled firing pin therein and with a cartridge retaining barrel removably mounted on one end whereby the gun is adapted to be held in one hand and fired by drawing the button or trigger rearwardly with the thumb of the hand.

The purpose of this invention is to facilitate carrying tear gas bombs and to provide means whereby a tear gas cartridge may be carried in a pocket, such as a pocket for a fountain pen and wherein the device may readily be removed and fired.

With the conventional method of throwing tear gas bombs through doors, windows, and the like, it is difficult to carry the bombs and because of the inconvenience of carrying bombs of this type tear gas bombs are usually not available when desired. With this thought in mind this invention contemplates a tear gas gun having a tubular housing with button actuated firing instrumentalities therein and with a cartridge retaining barrel removably mounted on one end of the housing whereby the device may be carried like a fountain pen and may readily be removed and fired as desired.

The object of this invention is, therefore, to provide means for forming a tear gas gun whereby the gun may readily be carried in a pocket of a police officer or other person.

Another object of the invention is to provide an improved tear gas gun that is adapted to be held and operated with one hand.

A further object of the invention is to provide an improved tear gas gun that is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a tubular housing having a plug threaded in one end and a barrel threaded in the opposite end, a tubular trigger carrier slidably mounted in the housing and having a button extended through a slot in one side of the housing, a hammer slidably mounted in the trigger carrier, a firing pin slidably mounted in the hammer, springs positioned to actuate the trigger carrier, hammer, and firing pin, and a spring actuated sear providing a key for locking the hammer to the trigger.

Other features and advantages of the invention will appear from the following description taken in connection with the drawing, wherein:

Figure 1 is a plan view illustrating the improved pen-type tear gas gun.

Figure 2 is a longitudinal section through the gun illustrating the positions of the parts with the firing pin in position to fire the cartridge.

Figure 3 is a longitudinal section through the gun, taken on line 3—3 of Fig. 1 with the parts shown in released positions after firing and with part of the barrel and cartridge broken away.

Figure 4 is a cross section through the gun taken on

2

line 4—4 of Fig. 3 showing the sear operating and mounting instrumentalities.

Referring now to the drawings wherein like reference characters denote corresponding parts the improved tear gas gun of this invention includes a tubular housing 10 having a plug or base 11 threaded in one end, a barrel 12 threaded in the opposite end, a cylindrical trigger carrier 13 slidably mounted in the intermediate part of the housing, a hammer 14 having a cylindrical stem 15 positioned with the stem slidably mounted in the trigger carrier, a rod 16 slidably mounted in the hammer and having a firing pin 17 extended from the forward end, a button 18 providing a trigger extended through a slot 19 in one side of the housing and connected to the trigger carrier 13 with a screw 20, a spring 21 for returning the firing pin, a spring 22 for actuating the trigger carrier, a spring 23 for actuating the hammer, and a spring 24 for urging a sear 25 into locking positions for retaining the hammer in the trigger carrier.

The housing 10 is formed with internal threads 26 in one end into which a section 27 of the base 11 is threaded and the opposite end is also provided with internal threads 28 into which the end of the cartridge barrel 12 is threaded. The housing is also provided with a head or partition 29 having an opening 30 therethrough in which the firing pin 17 is positioned and the slot 19 in one side of the housing is formed with a ramp or inclined surface 31 at the inner end whereby upon moving the trigger 18 rearwardly an inclined surface 32 of a projection 33 of the sear rides upwardly on the surface 31 moving the sear from the position shown in Fig. 3 to that shown in Fig. 2 whereby the hammer 14 is released from the trigger carrier. At this time the spring 23 drives the hammer forwardly with the hammer engaging a collar 34 at the intersection of the rod 16 with the firing pin 17 whereby the firing pin is driven into a head 35 of a cartridge as indicated by the numeral 36. The hammer 14 is provided with a recess 37 that is adapted to receive the collar 34 whereby the collar is engaged by the end surface 38 at the base of the recess.

The stem 15 of the hammer is provided with an annular recess 39 into which the sear is adapted to extend, as shown in Fig. 3 and, also as shown in Fig. 3 the sear is slidably mounted in a slot 40 that is positioned to register with the recess 39.

The sear 25 is provided with a pin 41 that extends into an opening 42 in the trigger or button 18 and the spring 24, which is positioned around the stem 41 is positioned in an enlarged recess 43 in the lower part of the button.

The head 44 of the screw 20 is positioned in a recess 45 in the outer end of the button and the intermediate part of the screw extends through an opening 46 which is aligned with the recess 45. The inner end of the screw is threaded into an opening 47 in the trigger carrier 13 whereby the button or trigger is substantially integral with the trigger carrier.

The end of the rod 16, opposite to the end on which the firing pin is positioned, extends into an opening 48 in the base 11. The base 11 is also provided with a knurled surface 49 and a similar knurled surface 50 is provided around the inner end of the barrel 12. A clip 51 may also be provided on the housing for retaining the gun in position in a pocket or the like.

With the parts assembled in this manner the device will be carried with the parts as shown in Fig. 3 wherein the firing pin is freely resting against the end of the cartridge and, with the parts as shown, it will be understood that it will be impossible to accidentally fire the cartridge as it is first necessary to withdraw the firing pin. However, when it is desired to fire the cartridge the button or trigger 18 is drawn rearwardly until the surface 32 of the sear rides

upwardly on the surface 31 whereby the hammer is released and the spring 23 drives the hammer and firing pin against the cartridge. The barrel 12 may then be removed and a new cartridge placed therein.

It will be understood that modifications, within the scope of the appended claims, may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. A tear gas gun comprising a tubular housing, a cartridge retaining barrel removably mounted on one end of the housing, a hammer having a recess in one end thereof and a tubular stem thereon slidably mounted in the housing, a firing pin slidably mounted in the hammer and tubular stem thereof, a collar on one end of said firing pin adapted to enter the recess in said hammer when said hammer is released and said firing pin is positioned in said housing to engage a cartridge in the barrel thereof, means for manually cocking the hammer, and resilient means for driving the hammer against the firing pin to drive the firing pin against the cartridge.

2. A tear gas gun comprising a tubular housing, a cartridge retaining barrel removably mounted on one end of the housing, a hammer having a recess in one end thereof and a tubular stem thereon slidably mounted in the housing, a firing pin slidably mounted in the hammer and tubular stem thereof, a collar on one end of said firing pin adapted to enter the recess in said hammer when said hammer is released and said firing pin is positioned in said housing to engage a cartridge in the barrel thereof, means for manually cocking the hammer, resilient means for driving the hammer against the firing pin to drive the firing pin against the cartridge, and means for resiliently returning the firing pin.

3. A tear gas gun comprising a tubular housing, a cartridge retaining barrel removably mounted on one end of the housing, a trigger extended through a slot on one side of the housing, a trigger carrier slidably mounted in the housing and connected to the trigger, a hammer slidably mounted in the trigger carrier, said hammer having a recess in one end and a tubular stem on the other end, a firing pin slidably mounted in the hammer and the tubular stem thereof and positioned to engage a cartridge positioned in the barrel, a collar on said firing pin receivable in the recess in said hammer, a sear for latching the hammer to the trigger carrier, means for actuating the sear to release the hammer upon movement of the trigger to a firing position, resilient means for actuating the hammer to engage the collar on said firing pin to drive the firing

pin toward the cartridge, and resilient means for actuating the trigger carrier.

4. A tear gas gun comprising a tubular housing, a cartridge retaining barrel removably mounted on one end of the housing, a trigger extended through a slot in one side of the housing, a trigger carrier slidably mounted in the housing and connected to the trigger, a hammer slidably mounted in the trigger carrier, said hammer having a recess in one end and a tubular stem on the other end, a firing pin slidably mounted in the hammer and the tubular stem thereof and positioned to engage a cartridge positioned in the barrel, a collar on said firing pin receivable in the recess in said hammer, a sear for latching the hammer to the trigger carrier, means for actuating the sear to release the hammer upon movement of the trigger to a firing position, resilient means for actuating the hammer to engage the collar on said firing pin to drive the firing pin toward the cartridge, resilient means for actuating the trigger carrier, resilient means for returning the firing pin and resilient means for urging the sear into engagement with the hammer.

5. A tear gas gun comprising a tubular housing, a cartridge retaining barrel removably mounted on one end of the housing, a trigger extended through a slot in one side of the housing, a trigger carrier slidably mounted in the housing and connected to the trigger, a hammer slidably mounted in the trigger carrier, said hammer having a recess in one end and a tubular stem on the other end, a firing pin slidably mounted in the hammer and the tubular stem thereof and positioned to engage a cartridge positioned in the barrel, a collar on said firing pin receivable in the recess in said hammer, a sear for latching the hammer to the trigger carrier, means for actuating the sear to release the hammer upon movement of the trigger to a firing position, resilient means for actuating the hammer to engage the collar on said firing pin to drive the firing pin toward the cartridge, resilient means for actuating the trigger carrier, resilient means for returning the firing pin, resilient means for urging the sear into engagement with the hammer, and a clip on the outer surface of the housing.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

1,681,172	Cocho	Aug. 21, 1928
1,858,601	Sedgley	May 17, 1932
2,042,934	Gill	June 2, 1936
2,195,711	Hutchison	Apr. 2, 1940

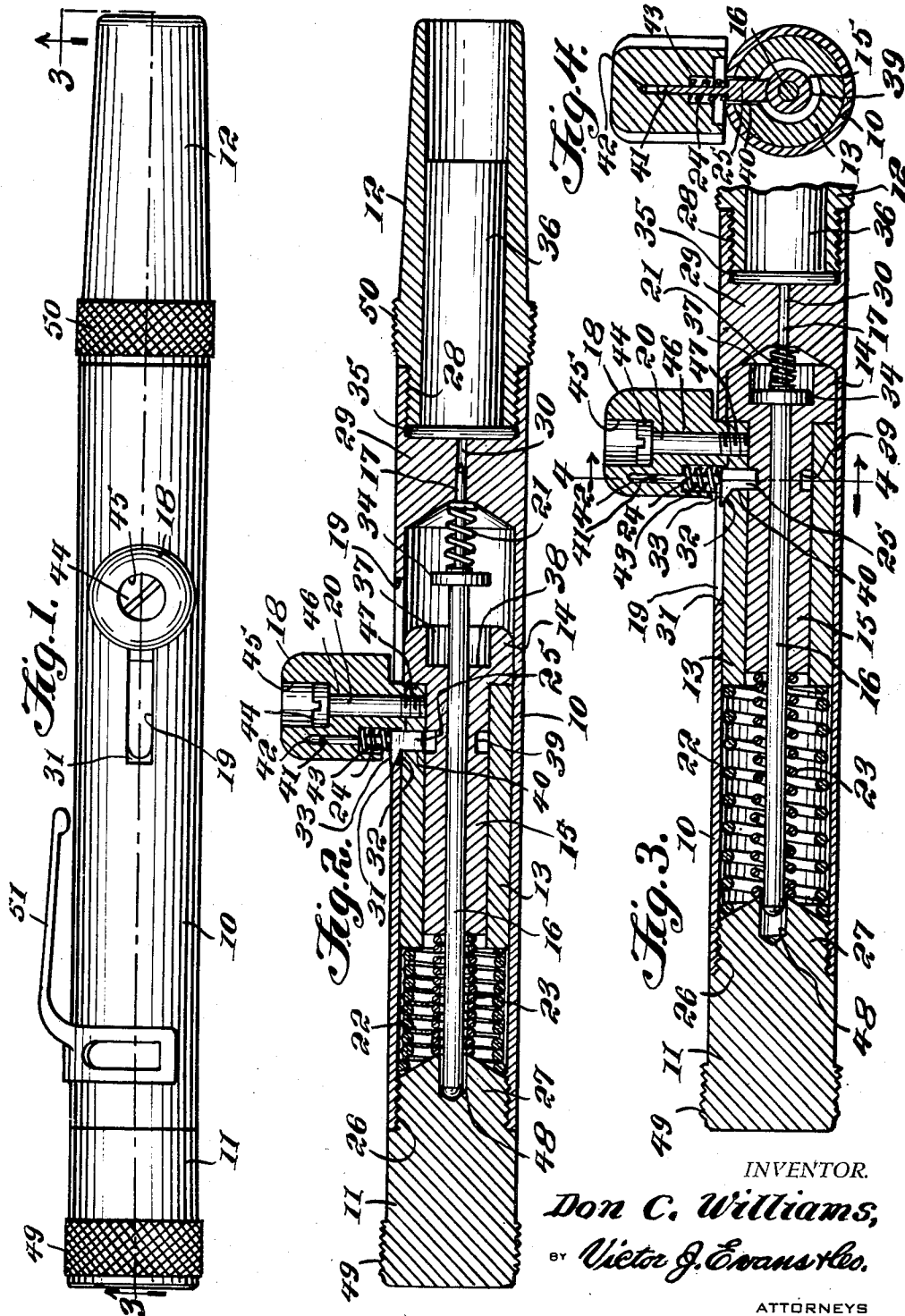
**Aug. 7, 1956**

D. C. WILLIAMS

**2,757,474**

PEN TYPE TEAR GAS GUN

Filed Feb. 26, 1954



1

3,044,360

## FLARE GUN

Russell O. Stefan, 10950 Vulcan St., Downey, Calif., and  
Anton G. Lang, 5219 Lunsford Drive, Los Angeles,  
Calif.

Filed Dec. 1, 1960, Ser. No. 72,901

1 Claim. (Cl. 89—1)

This invention relates to flare guns and it has as a particular object, the provision of a flare gun about the size of a pencil.

It is an object to provide such a flare gun which has a clip and may be carried in a pocket of the clothing just like a pen or pencil and with equal convenience and yet be available any time for instant use as a flare gun when the need for this arises.

Heretofore flare guns available on the market and used on ships, airplanes and by the military, have been sizeable and handled a cartridge as large or larger than a 12-gauge shotgun cartridge. The flare charge was propelled from these guns several hundred yards into the air. In the wide open spaces where the visibility of the flare at very great distances is highly desirable, this range of the flare charge required the use of flare equipment too large for convenient use in many situations where a much less flare range would produce a signal quite adequate for the communication desired to accomplish thereby.

It is accordingly an object of the invention to provide a simple, relatively light, compact and inexpensive flare gun suitable for use by a sportsman in the air, or at sea, or in the mountains, or by military and naval personnel generally or by airline crews, which will fire a flare charge approximately one hundred yards into the air.

Another object of the invention is to provide such a flare gun equipped with flare cartridges which may be inexpensively produced and sold.

Still another object is to provide such a flare gun with cartridges for firing flares of different colors, which cartridges may be readily distinguished as to color by the sense of touch, thus facilitating the sending of a prescribed color signal while in complete darkness.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which

FIG. 1 is an elevational view drawn to full scale of a preferred embodiment of the invention with the cocking piece of the gun positioned in the safety notch thereof and with a cartridge applied to said gun.

FIG. 2 is an enlarged sectional view taken on the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary enlarged elevational view of the barrel of the invention showing the cocking piece guide slot as well as the safety notch formed in one edge and the cocking notch as formed in opposite edges thereof.

FIG. 4 is a cross-sectional view taken on the line 4—4 of FIG. 2.

FIG. 5 is a cross-sectional view taken on the line 5—5 of FIG. 2 with the cocking piece and firing pin rotated in the barrel to bring the cocking piece into its longitudinal guide slot.

FIG. 6 is a perspective view at a reduced scale of one of the series of flare cartridges of the invention, this cartridge being preferably of the style used for producing a white flare.

FIG. 7 is a view similar to FIG. 6 of a slightly different cartridge of said series preferably used for producing a green flare.

FIG. 8 is a view similar to FIG. 7 of another different

2

style of cartridge of said series, preferably used for producing a red flare.

FIG. 9 is a perspective view of a plastic cap used to cover the primer cap of any of the flare cartridges used with the invention until the time when this is applied to the gun.

FIG. 10 is a fragmentary longitudinal sectional view of a modified form of the flare gun of the invention with the cocking piece thereof disposed in the longitudinal guide slot as when the gun is being fired.

Referring specifically to the drawings, the invention is there disclosed as embodied in a flare gun 10 which, when armed, embraces a flare cartridge 11.

The flare gun 10 includes a firing pin guide tube 12 which may be manufactured of a section of cylindrical metal tubing about  $3\frac{1}{2}$  inches long,  $\frac{7}{16}$  inch in outside diameter and with a wall thickness of  $\frac{3}{32}$  of an inch. The tube 12 thus has a quarter-inch bore. The tube 12 is tapped at its upper and lower ends for a reason to be made clear hereinafter. The upper end of tube 12 is also counterbored at 13 and a notch 14 is provided in the wall of the tube at its lower end. The wall of tube 12 also has a pair of diametrically opposed aligned holes 15 just below the threads provided in the upper end of the tube in which a cylindrical stop pin 16 is permanently installed as by a drive fit between the pin and the holes 15. Extending downward from a point a slight distance below the pin 16 is a longitudinal cocking piece guide slot 17. Shaped from the left edge of slot 17 a short distance below its upper end is a cocking piece safety notch 18 having an upwardly extending recess 19 the purpose of which will be made clear hereinafter. Formed in the right and left edges of slot 17 at the lower end of the latter are cocking notches 20 the purpose of which will be explained hereinafter.

The lower end of tube 12 is closed by a closure 25 of the same external diameter and having a threaded plug 26 which screws into the lower end of the tube there being an annular radial shoulder 27 formed on the closure between said plugs and the external portion of the closure. The plug 26 has a spring guide stem 28 disposed coaxially therewith.

Compressed between the lower end of tube 12 and the annular shoulder 27 is the flat mounting ring 29 of a pocket clip 30, the ring 29 having a tit 31 die-formed therein which extends into the notch 14 in the lower end of tube 12 and thus prevents rotation of the ring 29 when the closure 25 is screwed into place in the tube 12.

Slidably confined within the bore 32 of the tube 12 is a cylindrical firing pin 33. This pin has a tubular skirt 34 into which an expansive coil spring 35 extends so that opposite ends of this spring bear against the plug 26 and the firing pin 33. Formed transversely in the firing pin 33 is a tapped hole 40 into which is screwed the threaded stem 41 of a cocking piece 42. The hole 40 has a restricted terminal portion 43 against which the inner end of screw 41 is forced in order to permanently install the cocking piece 42 in the firing pin 33 with the flat head 44 of the cocking piece disposed in a plane perpendicular to the tube 12.

Provided on the upper end of the firing pin 33 is a striker 45 which comprises a short pin about  $\frac{1}{16}$  of an inch in diameter. This is mounted in a vertical plane which includes the axis of the firing pin 33 and is perpendicular to the axis of the stem 41 of the cocking piece 42. The length of the striker 45 is such that when the cocking piece 42 is positioned as shown in FIG. 5 and the firing pin 33 allowed to respond to the expansive energy of the spring 35 to move upwardly into contact with the stop pin 16, the striker 45 will extend to one side of and above said stop pin as shown in broken lines 46 in FIG. 2.

3

The flare cartridge 11 has a die-formed metal body 47 which includes a thin cylindrical gun barrel 48 which is open at its upper end and has at its lower end a thin head 49 from which an externally threaded nipple 50 extends downwardly, this nipple having a bore 55 with a counter-bore 56 at its lower end.

The bore 55 is of a diameter which snugly receives a copper-cased primer cap 57 having an external flange 58 which fits into the counterbore 56 thereby limiting the movement of the cap into the bore 55 to that which leaves the lower end of the cap 57 flush with the lower end of the nipple 50. The flare cartridge 11 also includes a flare projectile 59 which includes a thin cylindrical metal casing 60 which is closed at its upper end by a wall 61 and is open at its bottom end, said casing being of an external diameter which loosely fits into the shell 48. Before the projectile 59 is inserted into the shell 48, the casing 60 is turned open-end up and a solid flare charge 62 and solid powder charge 63 are successfully pressed into the casing so as to produce a concave lower surface 64 on the powder charge as shown in FIG. 2.

After the projectile 59 is inserted into the flare gun barrel 48, a cardboard disk 65, which snugly fits the barrel, is forced into the upper end of the latter against the projectile 59 and a sealing coat of 70 of liquid plastic material is applied to the disk 65 and mouth portion of the shell 48 to hermetically seal the projectile 59 in the shell 48, when this hardens.

The flare charge 62 is selected from chemicals which will produce different colors when ignited and burn with a bright, hot flame. Thus a set of cartridges 11 are made to produce a series of flares which for instance may include the colors green, red, and white. Each flare cartridge 11 is coated on the outside with a dye of a color corresponding with the color of the flare which will be produced by the flare projectile 59 contained therein. To facilitate selecting in the dark among the flare cartridges 11 one might have in his pocket, a cartridge which will produce a flare of a given color, the gun barrel 48 of each cartridge 11 which is packed to produce a flare of a given color will be exteriorly formed so that it can distinguished by the sense of touch from cartridges packed to produce flares of other colors. Thus, for convenience, the flare 11 which is packed to produce a white flare is completely cylindrical as shown in FIG. 6; while the flare cartridge packed to produce a green flare has a single rib 71 formed along the shell 48 of the cartridge as shown in FIG. 7; while a flare cartridge 11 packed to produce a red flare is provided with two flanges 71 as shown in FIG. 8, with these in diametrically opposed relation. For still other colors, the flare cartridges 11 may be distinguished by still different arrangements of flanges 71 which can be readily identified in the dark by the sense of touch.

To prevent accidental detonation and perfect the sealing of the cartridge 11, each of the flare cartridges 11 are marketed with the nipple 50 thereof covered by a plastic cap 72 as shown in FIG. 9. It is thus necessary before applying any of the flare cartridges 11 to the flare gun 10 to unscrew the cap 72 from the nipple 50 of that cartridge.

#### Operation

The flare gun 10 is shown in FIG. 1 with the cocking piece 42 confined in the safety notch 18 and impelled upwardly into the recess 19 of that notch so as to secure the gun 10 against accidental firing resulting from rotation of the firing pin 33 which would bring the stem 41 of the cocking piece into the longitudinal slot 17. When a flare cartridge 11 has been applied to the gun 10 as above disclosed, the cocking piece 42 may be rotated out of the notch 18 into the slot 17 and then pulled downwardly to the lower end of the latter slot, and then, if it is desired to fire the gun 10 at once, the cocking piece 42 is simply released allowing the spring 35 to propel the firing pin 33 upwardly to its upward limit where it bangs against and is halted by the stop pin 16. This extends the strike 45

4

upwardly into its broken line position 46 causing it to penetrate the primer cap 57 and fire the gun. The flame from the primer cap 57 ignites the powder charge 63 at the lower end of the flare projectile 59 and the gas produced by the sudden burning of this charge propels the flare projectile 59 from the flare gun barrel 48 of the flare cartridge 11. The force of this is of course confined until adequate to rupture the plastic seal 70.

The heat generated by the explosion of the powder charge 63 in the firing of the flare gun 10 ignites the flare charge 62 so that this burns throughout the ascent of the projectile 59 and through a major portion of its descent but is timed to burn out about a hundred feet before it reaches the ground.

The cocking notches 20 are provided to retain the cocking piece 42 at the lower end of slot 17 with the spring 35 fully tensioned for a short time only before firing the flare gun. With the cocking piece positioned in one of these notches, the gun 10 is said to be cocked, and when it is desired to fire the gun the cocking piece 42 is merely engaged so as to shift this out of the notch 20 occupied by it so as to be released from restraint by the latter which occurs of course as soon as the cocking piece stem 41 moves opposite the lower end of the slot 17. Thus free from restraint, the firing pin 33 is impelled by the spring 35 to its upward extreme position where it strikes the pin 16 and is halted thereby with the striker 45 detonating the cap 57.

It is to be noted that the stop pin 16 not only forms a breech for the primer cap 57, preventing its being forced out of the bore 55 by the internal gas pressure thereagainst when the gun is fired, but this pin also serves as a limitstop for absorbing the full impact of the kinetic energy accumulated by the firing pin 33 during its upward travel under the impulse of spring 35. The pin 16 not only serves this dual function but permits the guide tube 12 to be made of standard tubular stock.

It is to be noted that the flare gun 10 represents an extreme simplification of what is ordinarily considered necessary in a flare gun. For instance the handle of an ordinary flare gun is omitted and the flare gun 10 is held by the firing pin guide tube 12. The permanent gun barrel, which is ordinarily considered essential, is omitted and a flare cartridge is provided which contains within itself an external cylindrical barrel 48 which serves as a gun barrel for the flare gun 10. Strangely enough, the cartridge 11 which thus incorporates within itself the flare gun barrel can be made more cheaply and sold at a lower price than conventional flare gun cartridges.

Referring now to FIG. 10, a flare gun 100 is shown therein which is identical with the flare gun 10 excepting that it incorporates a modified means for assembling the cocking piece with the firing pin of the gun. The gun 100 has a firing pin 101 having a smooth transverse bore 102 and an axial bore 103 which connects at its upper end with bore 102 and at its lower end with an axial counterbore 104 formed within the skirt 105 of the firing pin 101. The firing pin 101 has a striker 106 and a cocking piece 107 the step 108 of which extends into the bore 102 and has a hole 109 which receives a locking pin 110 having a head 111 and which extends through hole 103 into the hole 109. The head 111 is engaged by spring 35 thereby holding the pin 10 in the hole 109 and locking the cocking piece 107 to the firing pin 101. Also embodied with the pin 110 and head 111 is a spring guide stem 112 which, in the flare gun 100, performs the function of keeping the spring 35 straight during the operation of the gun and renders the guide stem 28 unnecessary so that the latter is omitted in the gun 100.

Apart from the differences noted, the flare gun 100 is constructed in identically the same manner as the flare gun 10 and its mode of operation is identical with that of the preferred embodiment of the invention.

We claim:

1. A pyrotechnic signal launching gun adapted to be held

5

upright for firing an expendable signal cartridge having a percussion cap and mounted axially on the upper end of said gun, the gun comprising: a cylindrical tube having an outside diameter within the order of approximately one-half inch; a cylindrical firing pin slidable within said tube; a striker on the upper end of said firing pin; means provided on the upper end of said tube for inter-engaging with a cartridge to secure said cartridge temporarily on said end of said tube in coaxial relation therewith and with said percussion cap exposed to detonation by said striker; a plug closing the lower end of said tube; a coiled expansion spring compressed in said tube between said plug and said striker, there being a firing slot formed longitudinally in a portion of said tube, said slot having a safety notch formed laterally therefrom adjacent to but spaced a short distance from the upper end of said slot, said slot also having a cocking notch formed laterally therefrom at its lower end; a cocking piece extending radially from an upper end portion of said firing pin and outwardly through said slot, said cocking piece being manipulable into said safety notch where it holds said

6

striker out of contact with the percussion cap of a cartridge applied to said gun, said cocking piece also being manipulable along said slot to increase the compression of said spring and then into said cocking notch to restrain said spring under a high degree of compression, the upper end of said slot allowing said cocking piece to travel freely along said slot under the impulse of said spring, after said cocking piece has been dislodged manually from said cocking notch, until said striker engages and detonates said percussion cap.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

2,120,580	Sherman	June 14, 1938
2,436,751	Hammell et al.	Feb. 24, 1948
2,444,920	Davis et al.	July 13, 1948
2,459,687	Decker	Jan. 18, 1949
2,880,543	Von Frantzius	Apr. 7, 1959

##### FOREIGN PATENTS

161,334	Switzerland	July 1, 1933
---------	-------------	--------------

July 17, 1962

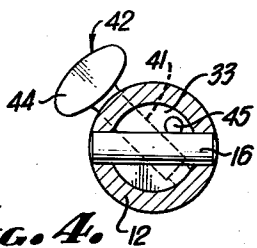
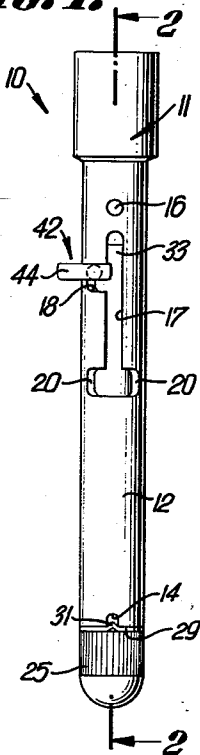
R. O. STEFAN ETAL

3,044,360

FLARE GUN

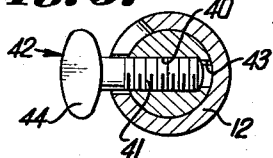
Filed Dec. 1, 1960

**FIG. 1.**

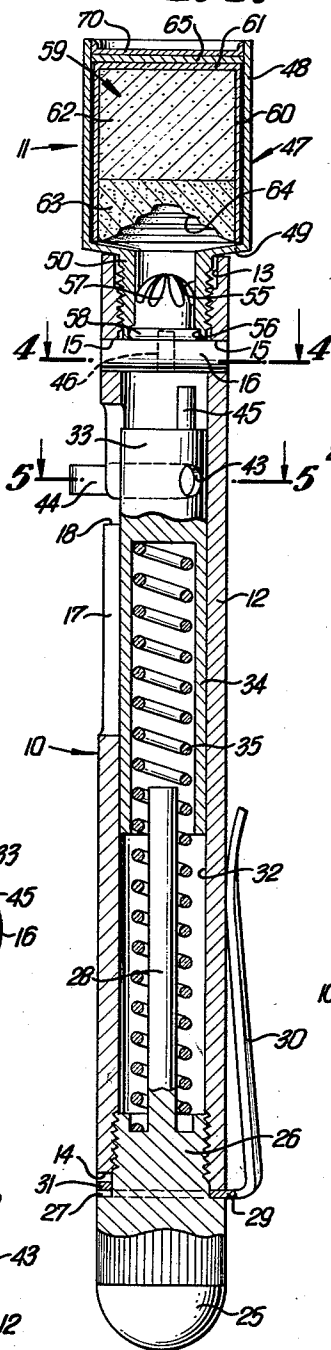


**FIG. 4.**

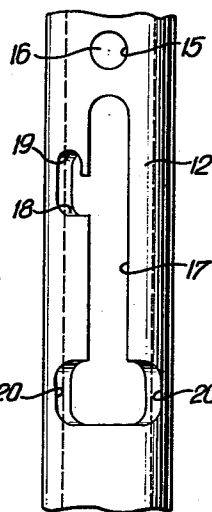
**FIG. 5.**



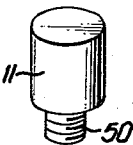
**FIG. 2.**



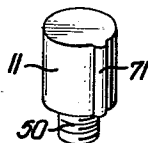
**FIG. 3.**



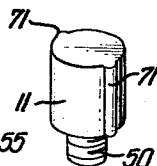
**FIG. 6.**



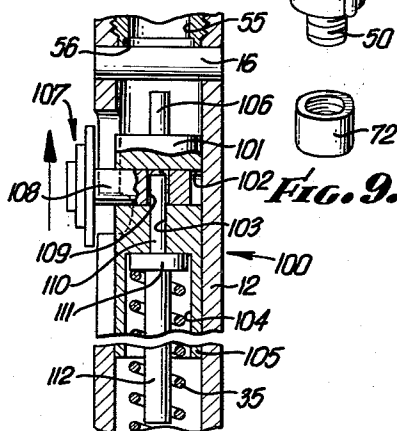
**FIG. 7.**



**FIG. 8.**



**FIG. 10.**



**FIG. 9.**

**RUSSELL O. STEFAN  
ANTON G. LANG  
INVENTORS.**

BY

*[Signature]*

ATTORNEY.



1

3,202,099

## FLARE CARTRIDGE

Austin M. Wortley, Jr., Devon, and Barry Rothman, West Chester, Pa., assignors to Penguin Associates, Inc., Malvern, Pa., a corporation of Pennsylvania

Filed Oct. 16, 1963, Ser. No. 316,580

2 Claims. (Cl. 102—37.6)

This invention relates to aerial flare devices, and more particularly concerns a flare cartridge which is adapted for use with a pen-type flare launching device.

It is an object of this invention to provide a flare cartridge which is of improved construction and which gives superior results in use.

Other objects and advantages of this invention, including its simplicity and economy, as well as the ease with which it may be adapted to existing equipment, will further become apparent hereinafter and in the drawings, in which:

FIG. 1 is a view in top plan of flare launching device and a flare cartridge constructed in accordance with this invention;

FIG. 2 is a view in section taken as indicated by the lines and arrows 2—2 which appear in FIG. 1; and

FIG. 3 is a view in longitudinal section, and on an enlarged scale, of the flare cartridge.

Although specific terms are used in the following description for clarity, these terms are intended to refer only to the structure shown in the drawings and are not intended to define or limit the scope of the invention.

Turning now to the specific embodiment of the invention selected for illustration in the drawings, there is shown a flare cartridge 11 which comprises an elongated cartridge casing 12 with a primer 13 mounted at one end. Primer 13 is preferably a shotgun shell primer cap, known in the art as a battery-cup primer.

A cup-shaped pellet casing 14 is positioned in cartridge casing 12 with its open end 15 facing primer 13.

A flare pellet 16 is contained in pellet casing 14, and resilient ignition means are pressed on top of pellet 16 for cushioning the shock of the exploding primer 13 and for igniting the flare pellet material. The resilient ignition means includes a layer of ignition mix 17 pressed on top of flare pellet 16, and a cord 18 covered with black gunpowder pressed into ignition mix layer 17.

Open end 15 of pellet casing 14 is crimped over to lock in place all the material within pellet casing 14, and thereby prevent the ignition means from separating from flare pellet 16 in order to insure reliable ignition of the pellet. A roll crimp of end 15 is illustrated in the drawings, but a star crimp may be used if desired.

A flash-hole expansion chamber 21 is formed in cartridge casing 12 between primer 13 and crimped open end 15 of the pellet casing. At the other end of the flare, a rubber shock-absorbing plug 22 is mounted with one end adjacent the bottom of the pellet casing, and the other end facing the open end of cartridge casing 12. A sealing layer 23 is applied to the outer end of plug 22. Another sealing layer 24 is applied to the primer end of cartridge casing 12 to seal the primer 13 in the cartridge casing.

On the outside of casing 12, near the primer end of the casing but spaced therefrom, are formed a series of engagement threads 25 which are adapted for quick engagement with a body tube 26 of a flare launching device 27. In previous devices, engagement threads extended all the way to the primer end of cartridge casing 12, but these have been stripped away, thereby eliminating a number of turns previously required to thread flare cartridge 11 into body tube 26, and reducing the time required for performing this operation. In addition, the stripped

2

portion acts as a guide to thread engagement, thereby facilitating loading of the device under adverse conditions, e.g., at night or in inclement weather.

The flare launching device 27 illustrated in FIGS. 1 and 2 includes body tube 26, and a knurled cap 28 that acts as a base for compression spring 31 which is positioned within body tube 26. Spring 31 acts against the bottom of a firing pin 32 that includes a striking end which is adapted to enter the recess in retainer nut 34 to strike the primer 13 and thereby launch the flare. Body tube 26 is provided with a firing slot 35 which extends longitudinally, and a slanting cocking and safety slot 36 which extends from the rear of firing slot 35 at an acute angle thereto. Slot 36 terminates in a cocking and safety notch 37, and a short safety detent slot 38 extends therefrom in a longitudinal direction and ends in a safety detent notch 41.

A trigger screw 42 is screwed into a recess in firing pin 32 and extends through the slots in body tube 26.

An eye bolt 43 is swivelly mounted in cap 28, and a lanyard may be threaded through it and attached to the clothing of the person carrying the flares launching device. The lower end of body tube 26 is knurled so that the device may more easily be handled, even when wearing gloves.

In operation, trigger screw 42 is positioned in cocking and safety notch 37 and flare cartridge 11 is screwed onto the end of tube 26. If device 27 should be accidentally dropped so as to compress spring 31, trigger screw 42 moves directly rearward in safety slot 38 toward safety detent notch 41, and does not move into cocking and safety notch 37.

To fire the flare device 27, trigger screw 42 is moved into and along cocking and safety slot 36 to the rear of firing slot 35. A wiping motion of the thumb is used, not a push of the thumb. Then trigger screw 42 is released, and spring 31 urges firing pin 32 forwardly so that its striking end enters the recess in retainer nut 34 and strikes primer 13 to detonate it. The explosive gases from primer 13 enter flash-hole expansion chamber 21 and ignite the ignition mix layer 17, which in turn ignites the pellet 16. The gas also propels the flare to expel it from cartridge casing 12 into the air where pellet 16 burns with a bright flame, the color of which may be varied by means well known in the pyrotechnic art.

The crimp on pellet casing end 15 locks the ignition mixture in place and prevents it from fracturing and falling apart, and provides additional expansion chamber space.

The flare is assisted in attaining greater height by a rocket effect as the gases from the fast burning ignition mix are expelled rearwardly during the ascent of the flare. Eventually, the flare loses its ballistic stability, and starts to lob end over end.

The length of the cartridge casing 12 is important and is to be noted. It is about twice as long as conventional devices. This greater length provides a pistol and rifle barrel effect that projects the flare to greater height. The seal 24 also aids in preventing the explosive gases from escaping rearwardly instead of exerting full force against the flare.

Also assisting the flare in attaining greater height is the close tolerance between the inside of cartridge casing 12 and the outside of pellet casing 14. In practice, cartridge casing 12 is 1 7/8 inches long, and the tolerance between cartridge casing 12 and pellet casing 14 is two-thousandths of an inch on a side.

Primer 13 is a shotgun or battery-cup primer cap which is larger than the pistol shell caps conventionally used and is self-contained, containing anvil, primer mixture, and cup. It gives greater reliability than the pistol primer used in conventional devices.

Seals 23 and 24 may be of any suitable epoxy resin, and pellet casing 14 is preferably made of aluminum, although it may be made of other materials such as paper. When casing 14 is made of aluminum, it is consumed in the flame and makes the flare burn more brilliantly. Cord 18 may be made of any suitable fuse igniter cord.

It is to be understood that the form of the invention herewith shown and described is to be taken as a presently preferred embodiment. Various changes may be made in the shape, size and arrangement of parts. For example, equivalent elements may be substituted for those illustrated and described herein, parts may be reversed, and certain features of the invention may be utilized independently of the use of other features, all without departing from the spirit or scope of the invention as defined in the subjoined claims.

The claimed invention is:

1. A flare cartridge comprising an elongated cartridge casing having an inside diameter with a primer mounted at one end, an annular sealing layer sealing the primer in said cartridge casing, a cup-shaped pellet casing having an outside diameter and positioned in said cartridge casing with an open end facing said primer, said inside diameter being no more than four-thousandths of an inch larger than said outside diameter, a flare pellet contained in the pellet casing, a layer of resilient ignition material mounted on top of the flare pellet, a flash-hole expansion chamber formed in said cartridge casing between said primer and said pellet, an elongated rubber shock-absorbing plug mounted in said cartridge casing with one end adjacent the bottom of said pellet casing, a sealing layer sealing the other end of said plug in said cartridge casing, and engagement threads formed on the outside of said

cartridge casing and spaced longitudinally away from its primer end for quick engagement and prealignment of the threads with a body tube of a flare gun.

2. A flare cartridge comprising an elongated cartridge casing having an inside diameter with a primer mounted at one end, a sealing layer sealing the primer in said casing against moisture, a cup-shaped pellet casing having an outside diameter and positioned in said cartridge casing with an open end facing said primer, said inside diameter being no more than four-thousandths of an inch larger than said outside diameter, a flare pellet contained in the pellet casing, a flash-hole expansion chamber formed in said cartridge casing between said primer and said pellet, a sealing layer sealing the other end of the cartridge casing, engagement threads formed on the outside of said cartridge casing, and means positioned between the threads and the primer end of the cartridge casing adapted to prealign the threads with the body tube of a flare gun, whereby to facilitate the loading of the flare gun under adverse conditions.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

25	3,044,360	7/62	Stefan et al. ....	102—37.6
	3,086,894	4/63	Bagett .....	102—86.5
	3,102,477	9/63	Stefan et al. ....	102—37.6

##### FOREIGN PATENTS

30	652,542	4/51	Great Britain.
----	---------	------	----------------

BENJAMIN A. BORCHELT, *Primary Examiner.*

SAMUEL FEINBERG, SAMUEL W. ENGLE,  
*Examiners.*

Aug. 24, 1965

A. M. WORTLEY, JR., ETAL

3,202,099

FLARE CARTRIDGE

Filed Oct. 16, 1963

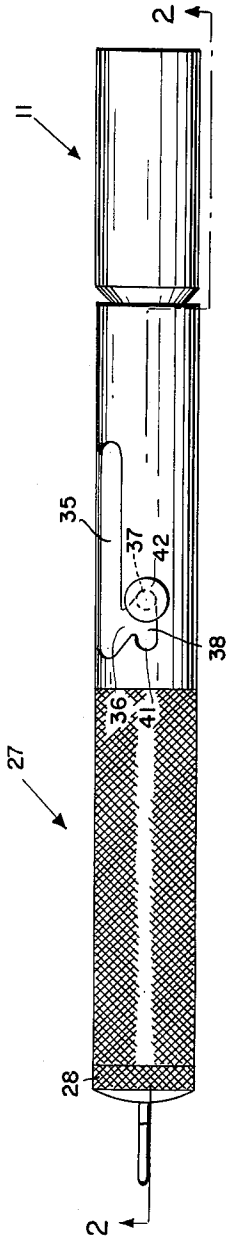


FIG. 1.

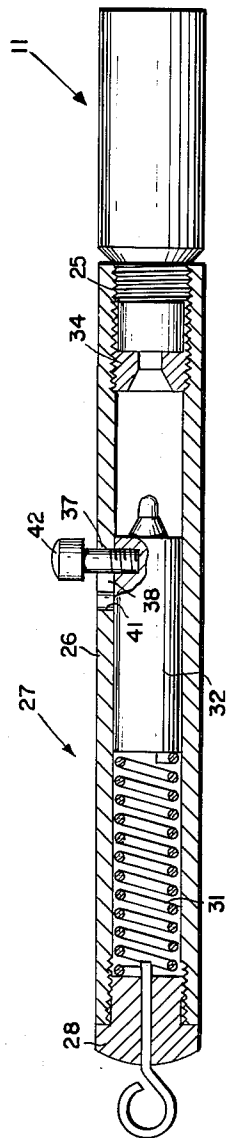


FIG. 2.

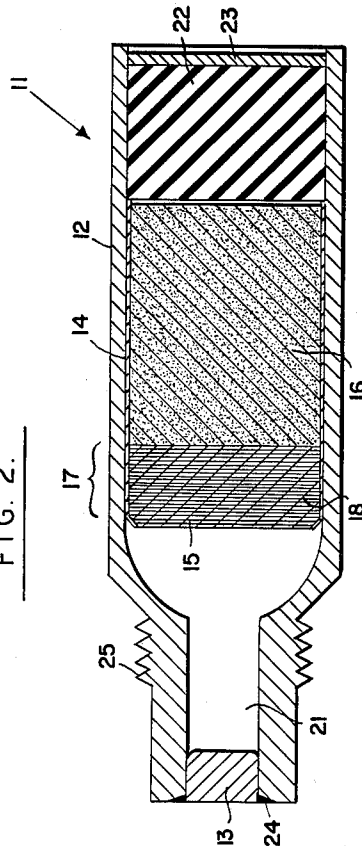


FIG. 3.

INVENTORS  
AUSTIN M. WORTLEY, JR.  
& BARRY ROTHMAN  
BY  
*John F. A. Earley*  
ATTORNEY