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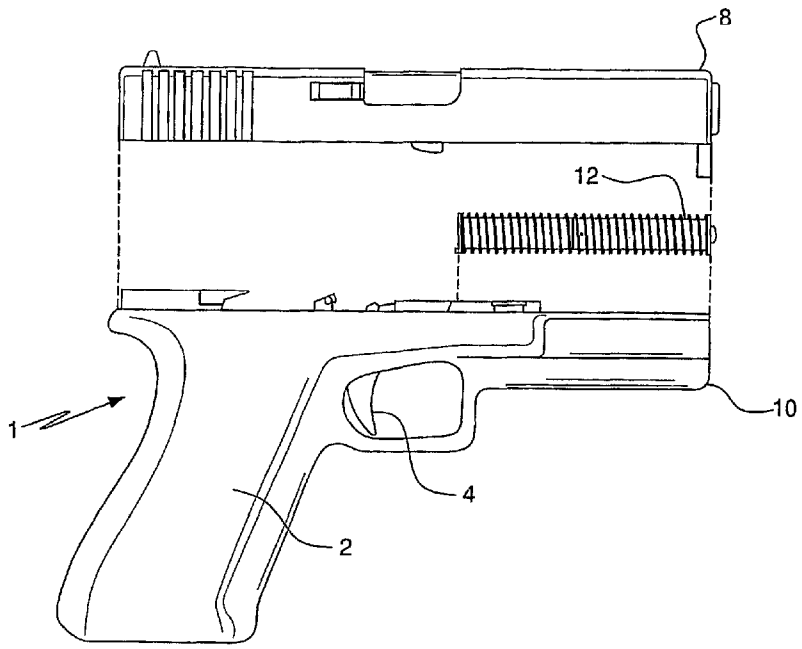
(54) **Title:** CAMERA INTEGRATED FIREARM SYSTEM AND METHOD



(57) **Abstract:** A camera integrated firearm system replaces the original recoil spring and guide assembly of a firearm with a casing which includes a camera, a gunshot impact sensing and switching module, an image memory module, and output data ports. When the weapon is discharged, the sensing and switching module senses this discharge and immediately turns on the camera. The camera, utilizing ambient light plus the light generated by muzzle flash, i.e. the jet of fire exiting the barrel at the instant the bullet exits the weapon, takes and saves, in memory, a closely spaced sequential stream of digital photographs or, alternatively, video recordings. Using the data outputs, the images can then be downloaded for viewing.

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CAMERA INTEGRATED FIREARM SYSTEM AND METHOD

RELATED APPLICATION

Provisional application No. 60/844,934, filed on September 5, 2006.

BACKGROUND OF THE INVENTION

The use of firearms by local, state, and federal law enforcement personnel, as well as the military and private security sectors, presents a variety of situations in which the very circumstances surrounding this usage becomes an issue. For instance, oftentimes there are questions as to whether the discharge of a weapon was necessary, what events dictated the firing of a weapon, or who was actually present on the scene and what those individuals may have been doing at the time a weapon was fired. Recounts and recreations of circumstances surrounding the use of firearms is critical to subsequent investigations. However, witness observations, after the fact, are often conflicting and unreliable. Inquiries would be well served if images of the actual incidents which are the subjects of investigation could be viewed by the finder of fact. As a result, the contemporaneous memorialization or recording of the events would be of great value.

SUMMARY OF THE INVENTION

It is thus the object of the present invention to provide a camera integrated firearm system which addresses these law enforcement and investigatory issues.

It is an object of the present invention to provide a camera integrated firearm system and method which generates and stores, in memory, a series of high speed photographs or videoclips of the person, object or scene at which a firearm is pointed, at the very instant the weapon is fired and the bullet hits its target.

It is another object of the present invention to provide a camera integrated firearm system and method which employs a miniature camera mounted in the recoil spring guide assembly of a firearm to record images, contemporaneously with the firing of the weapon.

It is still another object of the present invention to provide a camera integrated firearm system and method which does not alter the outward configuration or operation of the firearm in any manner.

It is further object of the present invention to provide a camera integrated firearm system and method which maintains the weapon's accuracy, safety, and reliability.

It is still a further object of the present invention to provide a camera integrated firearm system and method which allows the use of existing technology to modify existing handguns and other firearms by replacing the original recoil spring guide assembly of the weapon with the system of the present invention.

These and other objects are accomplished by the present invention, a camera integrated firearm system which mounts within the barrel of a handgun or other weapon. More specifically, the original recoil spring and guide assembly of the firearm is replaced with a casing which includes a camera, a gunshot impact sensing and switching module, an image memory module, and output data ports. When the weapon is discharged, the sensing and switching module senses this discharge and immediately turns on the camera. The camera, utilizing ambient light plus the light generated by muzzle flash, i.e. the jet of fire exiting the barrel at the instant the bullet exits the weapon, takes and saves, in memory, a closely spaced sequential stream of digital photographs or, alternatively, video recordings. Using the data outputs, the images can then be downloaded for viewing.

Novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The invention, itself, however, both as to its design,

construction and use, together with additional features and advantages thereof, are best understood upon review of the following detailed description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of a handgun incorporating the present invention.

FIG. 2 is a side view of a handgun showing the present invention installed.

FIG. 3 is a front view of a handgun with the present invention installed.

FIG. 4 is an elevation view of the recoil spring guide camera assembly of the present invention.

FIG. 5 is a cross-sectional view of the recoil spring guide camera assembly of the present invention.

FIG. 6 is a front view of the recoil spring guide camera assembly of the present invention.

FIG. 7 is a rear view of the recoil spring guide camera assembly of the present invention.

FIG. 8 is an end view of the computer interface/battery connection, mounted within the casing of the present invention, looking forward toward the front of the recoil spring guide camera assembly of the present invention.

FIG. 9 is a front view of the power adapter employed in the present invention.

FIG. 10 is a schematic representation of the operation of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Handgun **1** comprises gun body **2** having trigger **4** and gun barrel or muzzle **6**, with upper half **8** and lower half **10**. Recoil spring guide camera assembly **12** is configured to replace the standard recoil spring guide in lower half **10** of muzzle **6** of the gun. Assembly **12** comprises outer casing or housing **14**. Casing **14** is optimally made of corrosion resistant steel or similar metal. Recoil spring **20** circumscribes housing **14**. Recoil spring retention walls **16** and **18** of

assembly **12** are located at the ends of casing **14**. Raised notch **19** is provided on the back of rear wall **18**. The notch indexes the slot in the receiver (not shown) in lower portion **10** of gun **1**, in order to maintain orientation of assembly **12**.

Casing **14** is comprised of front section **22** and rear section **24**. Sections **22** and **24** are threadably connected at **26** and secured with barrel locking screws **28**. An O-ring spacer **29**, provides a secure seal between sections **22** and **24**.

Rear section **24** comprises open space **30** in which battery **32**, compelled against battery contact spring **34**, is positioned.

Located within and forwardmost of front section **22** of casing **14** is high speed camera **36** with lens **38** extending through retention wall **16**. Also positioned within section **22** are gunshot impact and switching module **40**, camera control and memory module **42**, and computer interface/battery powered connector **44**. Power/data adapter **46**, positioned between battery **32** and connector **44**, provides connectivity of electrical power from the battery to the components located within front section **22**.

The electronic interconnections between components, i.e. impact and switching module **40**, camera control and memory module **42**, and high speed camera **36**, are well known in the electronic arts, as are the individual components themselves. The present invention is not directed to the individual, commercially available components which make up the system and method of the invention or to the manner of interconnection of these components.

Computer interface/battery powered connector **44** comprises power/data outport port **48** with center contact **45** and side contact **43**, providing ports for external connection with electronic components. Rectangular plug-in connector **41** of connector **44** is configured to extend into power/data adaptor **46**. Alignment holes **54** are located within front wall of plug-in connection **41**.

Adapter **46** is configured with plug-in opening **50** configured to receive rectangular plug-in connection **41** from connector **44**. Power data output port **51** with center contact **55** and side contact **53** are provided as ports for external connection with electronic components. Alignment pins **52** extending from adapter **46** are configured to be positioned within alignment holes **54** in connector **44**.

Power/data adapter **46** is configured to rotate freely within rear section **24** of casing **14** and is held in place by front battery contact **35**, which in turn is pressed against the adapter by compressive tension from battery spring **34**.

The sequence of operation of the invention is readily appreciated by reference to FIG. 10. Pulling or actuating trigger **4**, **A** causes explosion **E** within gun **1**, causing discharge and firing of bullet **B**. Explosion **E** is sensed by explosion/impact sensor switch **S** which actuates camera **C**. Visual images **I** are then contemporaneously taken of target **T** and these images are stored in camera memory **M**.

Images **I** can be downloaded via power/data output port **48** at the end of connector **44**, to a computer, PDA, micro SD cards, internet connection, or other receiving device. Output port **48** can be configured for a USB connection or similar plug-in jack for retrieving images **I** from memory **M/42**.

Should the firing of handgun **1** be deemed an event requiring a permanent video recording, assembly **12** is simply removed from the gun by field stripping, the standard gun maintenance procedure, and unassembled and reassembled as follows:

1. Barrel locking screws **28** are removed.
2. Rear section **24** is unscrewed from front section **22**.
3. Recoil spring **20** is removed by sliding it off casing **14**.
4. Battery **32** and power/data adapter **46** are removed.

5. A video out cable, supplied as part of the invention support package (not shown) is plugged into output port **48**.
6. Contents from camera memory **42** are downloaded.
7. Fresh battery **32** is installed, if warranted.
8. Components are reassembled in reverse order.
9. Assembly **12** is reinstalled into gun by field stripping.

Camera **36** can be a high digital camera capable of taking a series of high speed photographs, in rapid succession, preserving them in memory, or it can be a video camera which takes a video clip of events at time of firearm discharge.

The firearm using recoil spring guide camera assembly **12** is thus fully self-contained. The assembly is installed without any modifications to the firearm receiving the assembly. Installation is achieved by field stripping the weapon and replacing its recoil guide and recoil spring with assembly **12**. Experienced weapon's handlers can perform the installation in less than two minutes.

The invention, itself, is designed to be incorporated into a firearm in such a manner that a handgun, for instance, will fit into its existing holster, will have the same weight and balance, will have no additional controls or on/off switches, and will operate with no degradation in reliability, safety, or accuracy. The invention operates without any indication to the operator or anyone else that each time the gun is fired, a series of photographs will be automatically taken and stored.

The operation of the camera is completely automatic, silent, and does not require focus or other adjustments by the operator. The invention is oriented in such a manner as to view the object at which the gun is aimed. By designing the invention to replace the recoil spring and recoil spring guide and having the impact of the exploding gun powder within the bullet

cartridge at the instant the gun is fired activate the camera's operation, images are taken at the precise time of discharge. The invention has also been designed to maintain upright camera orientation within a 15 degree arc, thereby making video generated by the camera easy to view. It also can be readily converted to television format for media newscasts.

Assembly **12** disclosed herein is designed to operate inside a Glock Model 21, a widely issued handgun carried by federal, state, and municipal law enforcement. The invention installs into this model of handgun without any modifications to the gun. However, the present invention is not restricted to this weapon, but can be adapted for use in most firearms. Each specific firearm will require a version of the invention engineered for that specific model. The basic design, spirit, and function however are based upon the drawings provided and the intent of the drawings is to cover all firearms which employ a recoil spring guide and recoil spring, i.e. nearly every modern semi-automatic and fully automatic weapon in production today.

Certain novel features and components of this invention are disclosed in detail in order to make the invention clear in at least one form thereof. However, it is to be clearly understood that the invention as disclosed is not necessarily limited to the exact form and details as disclosed, since it is apparent that various modifications and changes may be made without departing from the spirit of the invention.

CLAIMS:

1. A firearm with a barrel and trigger, said firearm comprising:

a highspeed camera;

means for sensing discharge of the firearm upon pulling the trigger and, upon sensing discharge of the firearm, actuating the camera for recording highspeed visual images;

means for storing the visual images;

means for retrieving said visual images;

casing means for enclosing the camera, the sensing and actuating means, and the image retrieving means; and

a recoil spring externally circumscribing the casing means, the casing means and recoil spring being located within the barrel of the firearm.

2. The firearm as in claim 1 further comprising means located within the casing means for powering the camera.

3. The firearm as in claim 2 wherein the means for powering comprises a battery.

4. The firearm as in claim 2 further comprising means located within the casing means to transfer power from the powering means to the sensing and actuating means, the camera, the means for storing the visual images, and the means for retrieving the visual images.

5. The firearm as in claim 4 wherein the means to transfer power comprises a power/data adapter.

6. The firearm as in claim 1 wherein the camera comprises a lens extending from the casing means.

7. The firearm as in claim 1 wherein the means for retrieving visual images comprises means for outputting data.

8. A firearm recoil spring camera assembly for a firearm having a barrel and a trigger, said assembly comprising:

a highspeed camera;

means for sensing the discharge of a firearm upon pulling its trigger and, upon sensing discharge, actuating the camera for recording highspeed visual images;

means for storing the visual images;

means for retrieving said visual images;

casing means for enclosing the camera, the sensing and actuating means, and the image retrieving means; and

a recoil spring externally circumscribing the casing means, the casing means and spring being configured to be positioned within the barrel of the firearm.

9. The firearm assembly as in claim 8 further comprising means for powering the camera located within the casing means.

10. The firearm assembly as in claim 9 wherein the means for powering comprises a battery.

11. The firearm assembly as in claim 9 further comprising means located within the casing means to transfer power from the powering means to the sensing and actuating means, the camera, the means for storing the visual images, and the means for retrieving the visual images.

12. The firearm assembly as in claim 11 wherein the means to transfer power comprises a power/data adapter.

13. The firearm assembly as in claim 8 wherein the camera comprises a lens extending from the casing means.

14. The firearm assembly as in claim 8 wherein the means for retrieving visual images comprises means for outputting data.

15. A firearm with a barrel and trigger, said firearm comprising:

a casing located in the barrel of the firearm;

a highspeed camera located within the casing;

a gunshot impact and switching module located within the casing, said module comprising means for sensing gunshots and means for switching on the camera;

memory means for storing visual images taken by the camera, said memory means being located within the casing; and

a recoil spring externally circumscribing the casing.

16. The firearm as in claim 15 further comprising means for powering the camera located within the casing.

17. The firearm as in claim 16 wherein the means for powering comprises a battery.

18. The firearm as in claim 16 further comprising means located within the casing to transfer power from the powering means to the module sensing and actuating means, the camera, the means for storing the visual images, and the means for retrieving the visual images.

19. The firearm as in claim 18 wherein the means to transfer power comprises a power/data adapter.

20. The firearm as in claim 15 wherein the camera comprises a lens extending from the casing.

21. The firearm as in claim 15 wherein the means for retrieving visual images comprises means for outputting data.

22. A method for recording visual images simultaneously with the discharge of a firearm comprising the steps of:

providing a firearm with a barrel and a trigger;

providing a casing having a highspeed camera;

positioning the casing within the barrel of the firearm;

pulling the trigger of the firearm to discharge said firearm;

sensing the discharge of the firearm from within the casing;

actuating the camera for recording highspeed visual images from within the casing;

storing the visual images recorded by the camera within the casing; and

retrieving said stored visual images from the casing.

23. The method as in claim 22 wherein a gunshot impact and switching module positioned within the casing senses the discharge of the firearm and actuates the camera.

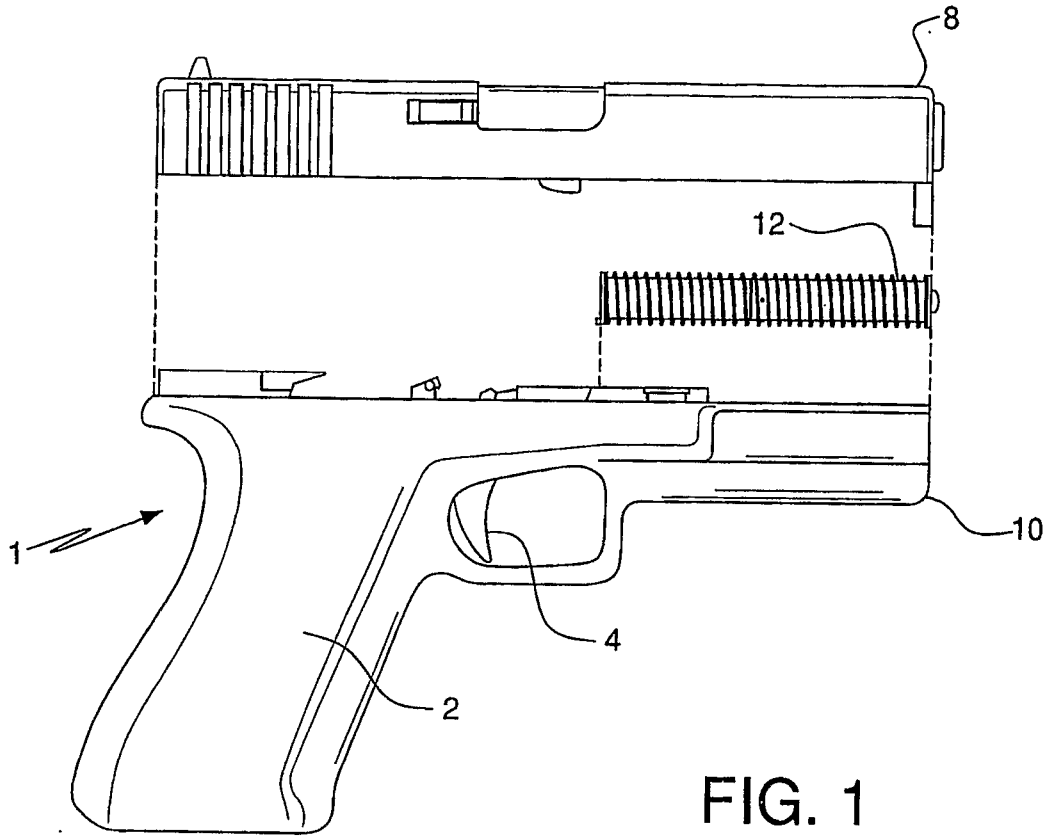


FIG. 1

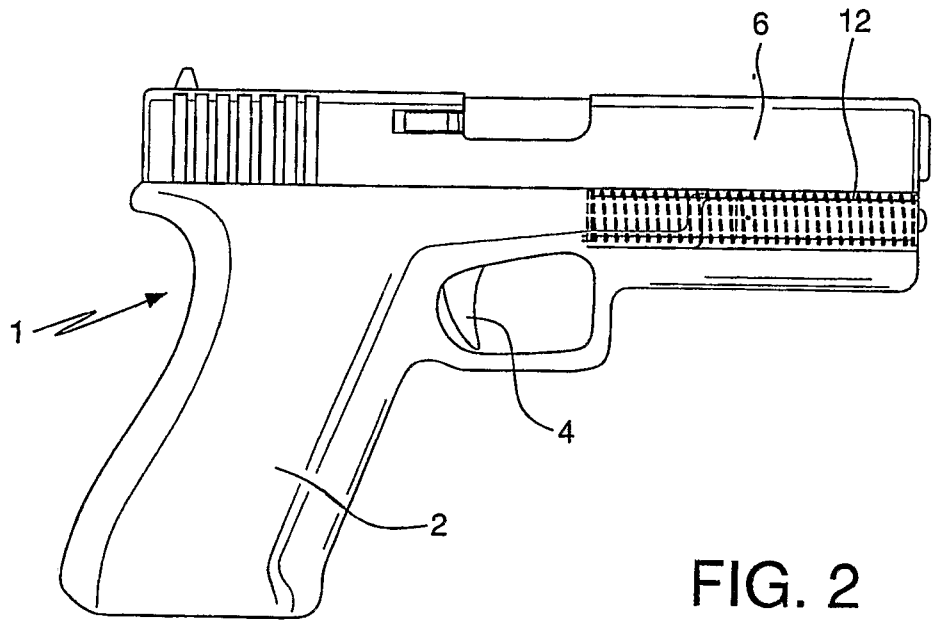


FIG. 2

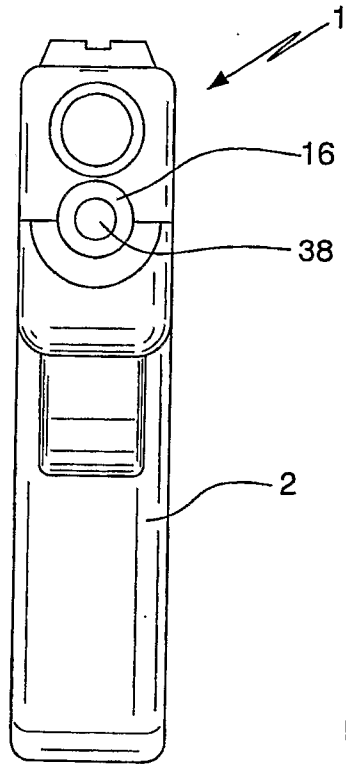
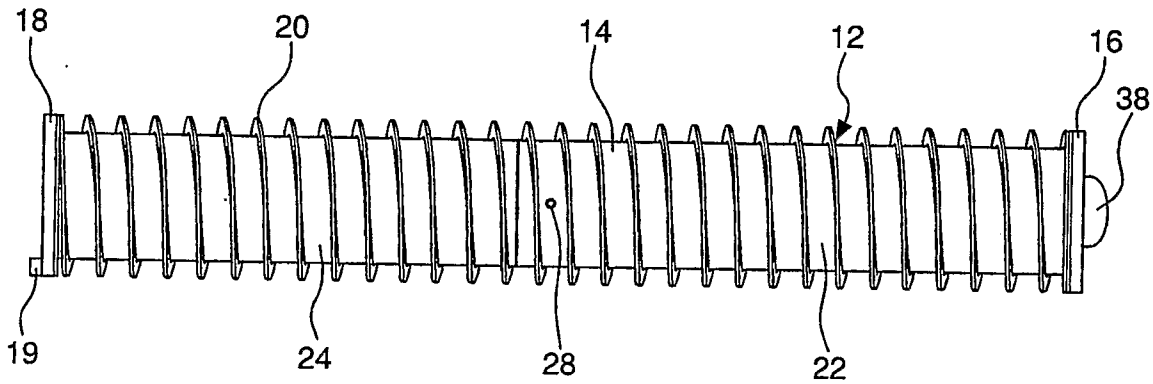


FIG. 3



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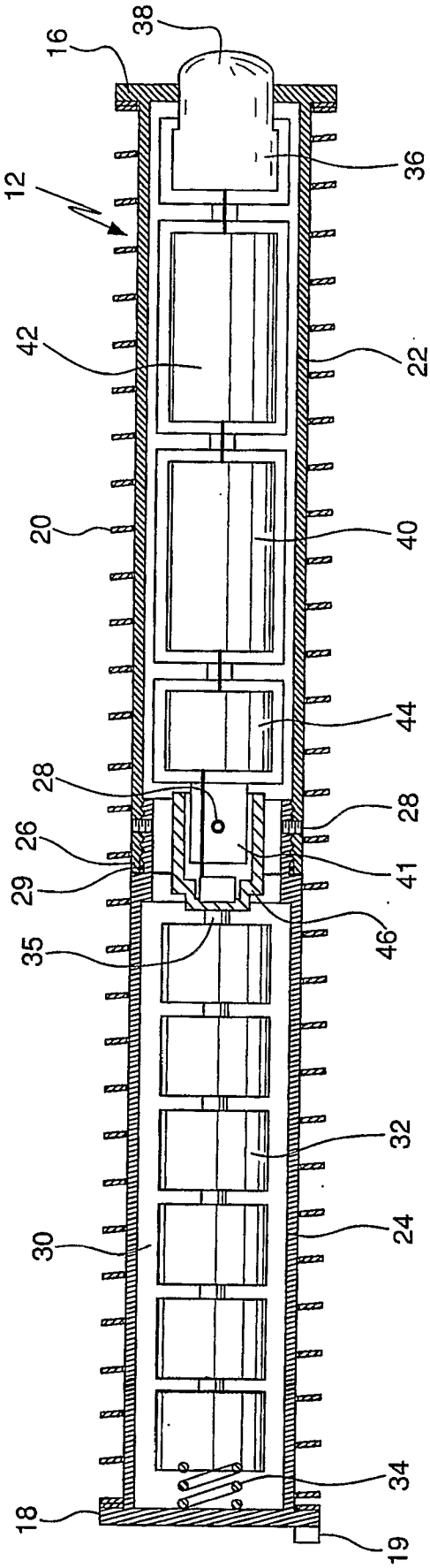

FIG. 5

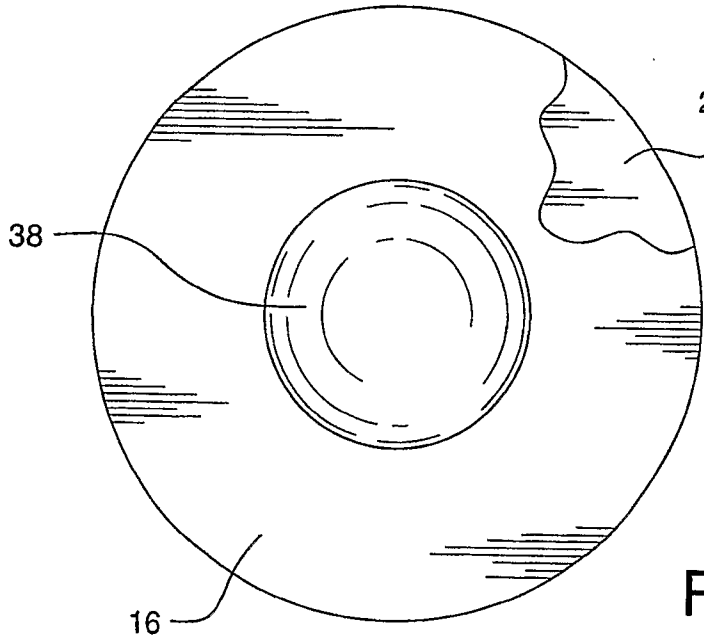

FIG. 6

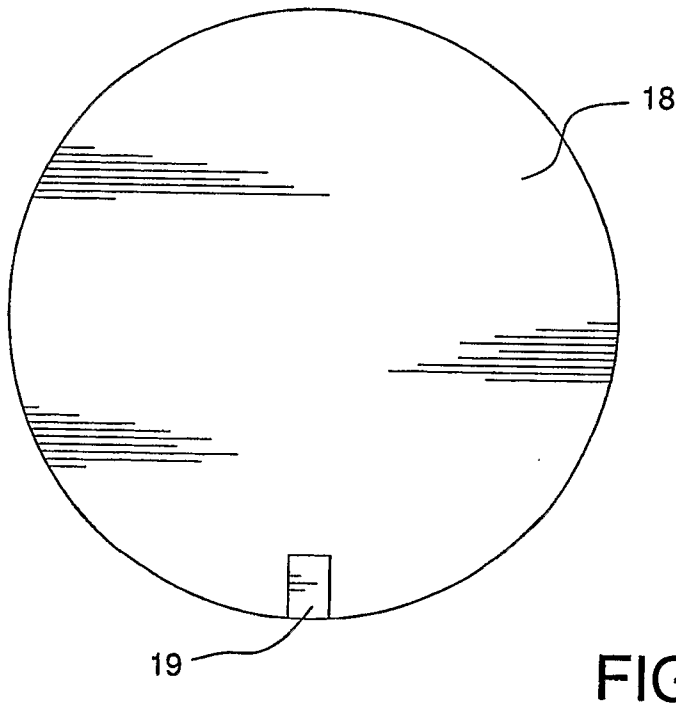

FIG. 7

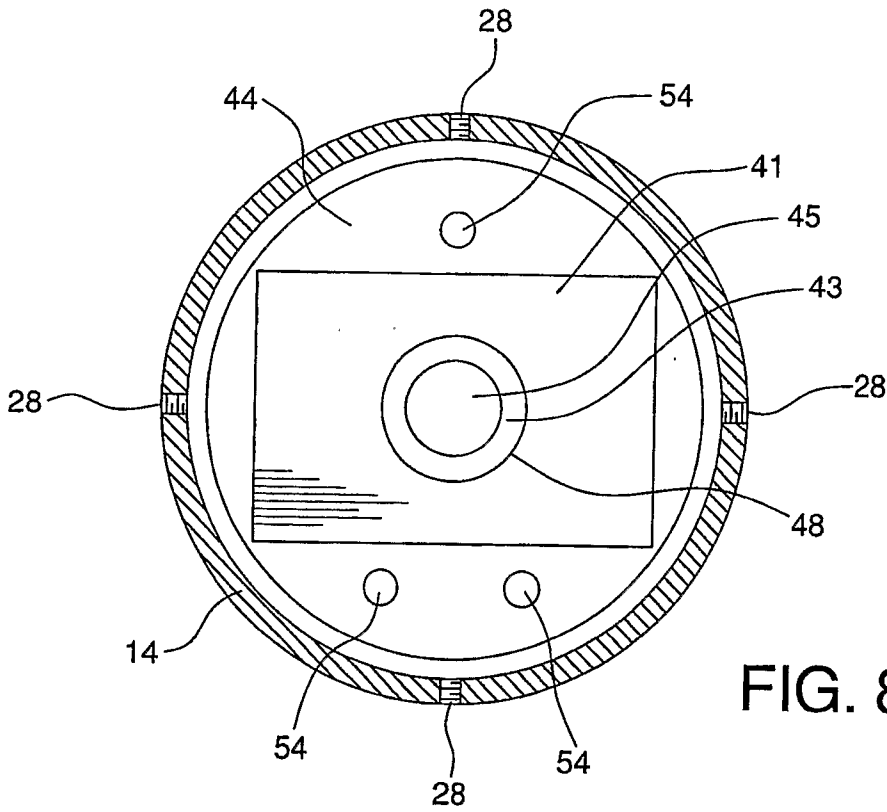

FIG. 8

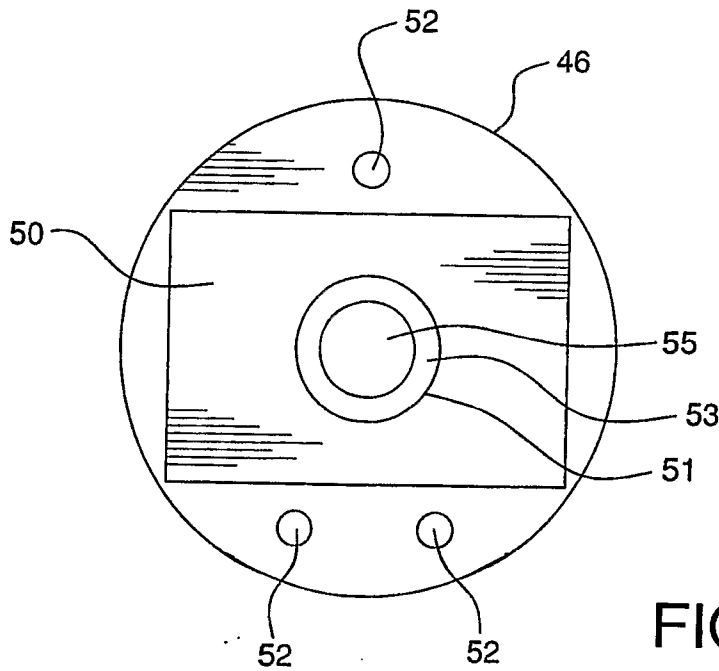

FIG. 9

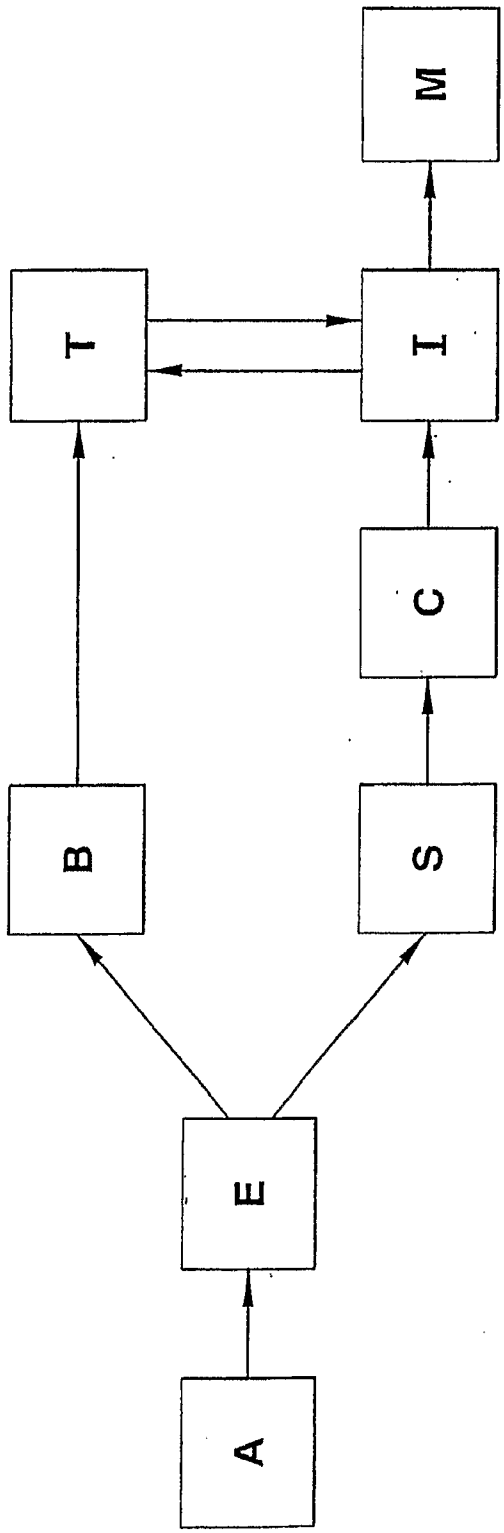
A
E
B
S
T
C
I
M
A - ACTUATING TRIGGER
E - EXPLOSION IN CHAMBER
B - BULLET FIRED
S - EXPLOSION SENSOR / SWITCH
T - TARGET
C - CAMERA
I - PICTURE
M - MEMORY

FIG. 10