

(No Model.)

W. J. SMITH.
TIME FUSE FOR SHELLS.

No. 570,065.

Patented Oct. 27, 1896.

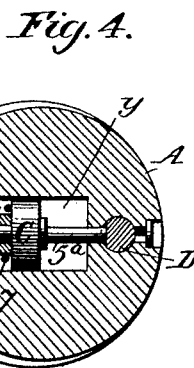
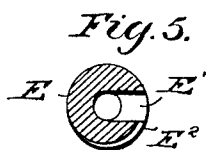
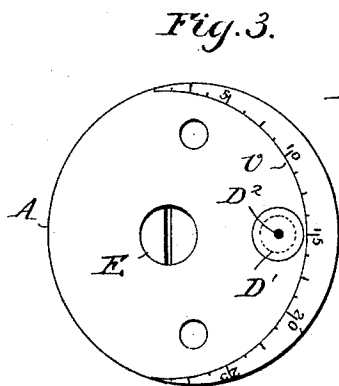
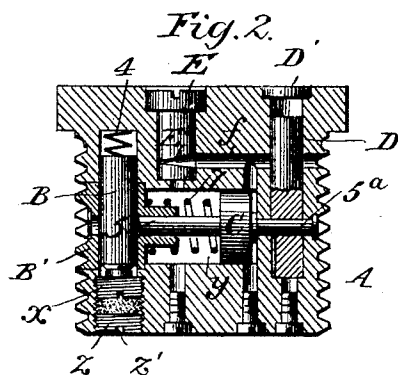
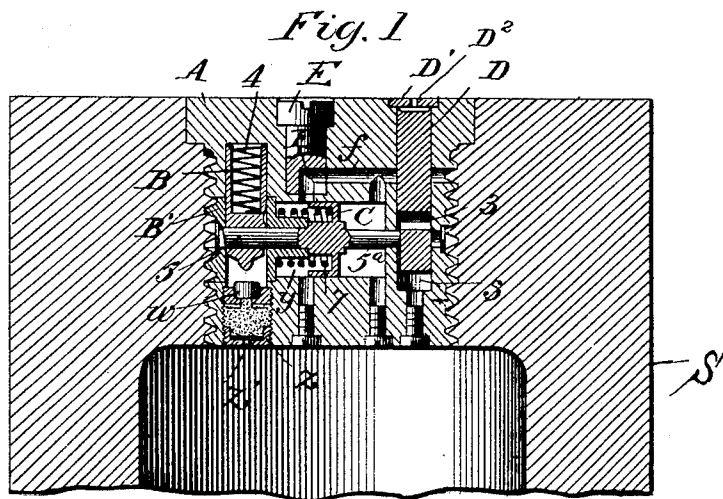
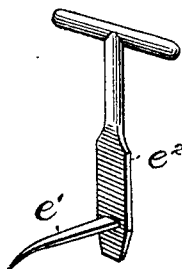


Fig. 6



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TIME-FUSE FOR SHELLS.

SPECIFICATION forming part of Letters Patent No. 570,065, dated October 27, 1896.

Application filed October 5, 1894. Serial No. 525,012. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JOHN SMITH, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Exploders or Fuses for Projectiles, of which the following is a specification.

My invention relates to exploders or fuses for projectiles which are adapted more particularly to what are generally known as "time fuses" or "exploders," that is, they will explode after a given time, which may be predetermined, and this may be counted from the discharge of the projectile from the gun or from the impact of the projectile on the object against which it is fired, and my present invention relates to improvements on my prior patents, Nos. 527,222 and 527,250, granted October 9, 1894; and it consists in certain details of construction and arrangement of parts substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, wherein I have illustrated the preferred embodiment of my invention, Fig. 1 is a sectional view of a portion of the shell and the exploder, showing the parts in their normal or charged condition. Fig. 2 is a similar section of the exploder, showing the parts in their discharged position. Fig. 3 is an end view of the exploder. Fig. 4 is a transverse horizontal section. Fig. 5 is an enlarged detail of the regulating-valve; and Fig. 6 is a perspective view of a convenient device for adjusting the regulating-valve.

The exploder or fuse is made as a complete article of manufacture, containing within itself all the necessary parts to its operation, and is adapted to be secured to a shell or other projectile by screw-threads or other equivalent means, and it comprises a hammer actuated by a spring or equivalent, a locking device for the hammer, means for controlling the lock, and means for regulating the movement of the lock, so that its time of operation may be controlled, and these parts are arranged and combined substantially as hereinafter set forth.

The drawings show a section of a portion of a shell S, in the rear wall of which is an

opening in which the exploder or fuse is secured, it being shown as arranged in the central portion of the base of the shell, and while this is the preferred location of the fuse it can, of course, be arranged in different locations, as desired.

There is a cylindrical case A, which is fitted with certain recesses and passages containing the operative parts of the exploder, and mounted in one of the recesses is a hammer B, which is shown as having a recessed rear end in which is mounted a spring 4, tending to force the hammer forward, and beneath the hammer or in front thereof is placed some sort of an igniter, shown as provided with a percussion-cap *w*, having fulminate or similar explosive material. This hammer is held in position by some sort of a locking device, shown in the present instance as being provided with a rod 5, entering a recess or opening in the hammer-head and serving to retain the hammer in position against pressure of the spring. This rod is shown as provided with a piston C, sliding in a transverse recess *y* in the case, and actuated by a spring 7, tending to force the locking device to the right or to a position to unlock the hammer.

Of course it will be understood that some means must be provided for holding the lock in position until the proper time or when it is desired to use the projectile, and while various means may be used for this purpose I have shown a sliding bolt or detent D, which is mounted in a recess in the case, in this instance parallel with the recess of the hammer, and which is provided with an opening, as 3, through which an extension 5^a of the locking-rod can pass when the detent is in the proper position. It is necessary that the detent or bolt should be prevented from turning in this recess, and it may be made square or provided with ribs or other well-known form, although it is shown in the present instance as circular in cross-section and as having a flattened lower portion against which the end of the rod 5^a normally impinges, thus serving to hold the detent in position against rotation as well as against accidental movement. This rod may extend to the outer surface of the case A and be acted upon directly by the force of the expansion of the

gases; but in order to furnish a protection against accidental movement of the bolt I provide a disk D' , which is mounted on a shoulder of the recess and is preferably flush with the face of the exploder, and is provided with a small opening D^2 , through which the gases can pass and act upon the bolt.

The parts as thus far described may be utilized as an exploder operating by concussion or impact of the shell, which would force the bolt forward, releasing the lock, when the spring would quickly release the hammer and cause an almost instantaneous explosion. It is, however, desirable in many instances to have an interval of time before the shell explodes after it strikes the object aimed at or to cause the shell to explode at a certain definite time after it is fired from the gun, and in order to do this I provide means for retarding the movement of the lock after the detent or bolt has been operated, either by impact or by the force of the exploding gases in firing the gun. To do this, I provide the recess or chamber γ with some sort of fluid, and provide also a by-pass or channel f , connecting the two ends of the recess γ on opposite sides of the piston C, so that the fluid in front of the piston has to pass through the channel to the rear thereof before the lock can release the hammer. Any suitable fluid or liquid may be used, as oil or glycerin, which may be found available or desirable under the circumstances.

In order to control the flow of this fluid through the by-pass and thus regulate to a nicety the exact time of the movement of the locking-bolt, I provide a regulating-valve E, which is arranged to form a part of the by-pass f , having an opening E' in its side communicating with the central opening in its lower end, and it will be seen that by turning this valve to the right or left the size of the by-pass can be varied, or it can be throttled to control the rate of flow of the fluid therethrough. In order that this can be more accurately and delicately adjusted, I preferably also make a tapering slot or recess E^2 in the side of the valve, the wide portion of which opens into the slot E' , and with this means an exceedingly accurate and delicate adjustment of the flow of fluid can be attained. This regulating-valve preferably projects practically flush with the surface of the case and is provided with a slot, as shown in Fig. 3, for the reception of a suitable adjusting device, such, for instance, as that illustrated in Fig. 6, which consists of a pointer e' and a blade or handle e^2 , which can be fitted into the slot in the valve E, and the pointer coöperates with the scale v on the face of the case to indicate the exact relative location of the valve, so that the time necessary for the operation of the locking device can be adjusted to suit the requirements of any particular case.

While the piston and locking-rod may be mounted in any desired way, I preferably provide a plug B' , which enters a recess in the

side of the case and is provided with an opening for the hammer and forms a sleeve or abutment for the spring 7.

While any suitable igniter may be used, I have shown a construction which I have found exceedingly effective and which consists of a hollow gland x , supporting the fulminating-cap w on its end, and is provided with a notch whereby it can be accurately adjusted in the recess beneath the hammer. This gland is filled with some explosive material and the recess closed by another gland z , also screw-threaded, which confines the exploding charge in the recess. This gland z is provided with a narrow transverse slit z' , which not only furnishes means by which it can be readily adjusted but furnishes a narrow slit or channel through which the products of combustion of the explosive material can flash in a thin sheet of flame, and I have found that with this construction, with a relatively small amount of explosive, a longer penetrating flame is produced, which insures the explosion of the main charge of the shell.

It will thus be seen that this device is a very simple and compact exploder, which can be readily constructed, all the openings being bored from the outside by proper tools, and some may be closed by screws or pins and the parts can be readily adjusted in position.

It will also be seen that there is little danger of the accidental operation of the exploder, as the locking-bolt is protected against accidental movement, and nothing but a serious concussion could possibly operate the bolt, and that when in a right direction and of sufficient severity to cause the bolt to move under tension of the locking-rod.

The operation of the device will be understood from what has been set forth, and need not be described in detail. It will be seen that this exploder answers all the requirements of such a device, in that it can be used simply as a concussion or impact exploder, so that the shell will explode practically instantaneously on impact. It can be used as a time fuse or exploder operated by impact, that is, the impact will move the detent or bolt and release the locking rod or device, which will be controlled by the regulating means, so that the hammer will be released in a given time after impact. It can be used as a time fuse or exploder, operating at a given time after it is fired from the gun when the bolt or detent is operated by the explosive force of the gases passing through the opening D^2 in the disk D' , and this releases the bolt, which releases the hammer after a given time, depending upon the adjustment of the regulating-valve. Of course when it is used as an impact-exploder the disk D' is imperforate, to prevent the detent D being moved by the explosive gases.

While I have thus described the preferred embodiment of the essential features of my invention, I may state that I have embodied the same in many and various different ar-

rangements, all involving the same general mode of operation, and it is evident that my invention is not limited to the precise location and construction of the parts, but that the essential features of the invention may be embodied in many and various different ways without departing from the spirit thereof.

What I claim is—

1. In an exploder for projectiles, the combination with a spring-actuated hammer, a lock for the hammer, and a detent for the lock, of a passage-way for the fluid controlling the lock, and an adjusting-valve controlling the passage-way, the head of the valve having a slot and extending practically in line with the outer face of the case, whereby the valve may be adjusted, substantially as described.

2. In an exploder for projectiles, the combination with the case having a spring-actuated hammer, a lock for the hammer, and a detent for the lock, of a passage-way for the fluid controlling the lock, and an adjusting-valve controlling said passage-way, the valve having an opening in its side and end and a

tapering slot leading to the opening in the side, the valve being adjustable from the outer face of the case whereby accurate adjustment may be attained, substantially as described.

3. An exploder for projectiles, comprising a cylindrical case having a longitudinal recess, a spring-actuated hammer, an igniter arranged in said recess, a lock for the hammer a transverse recess, a spring-actuated piston controlling the lock and mounted in said recess, a passage for the fluid controlling the piston, an adjusting-valve controlling the passage of the fluid and having its head extending to the outer face of the exploder, a second longitudinal recess, a detent therein, and a perforated disk closing said recess and protecting the detent, substantially as described.

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

WILLIAM JOHN SMITH.

Witnesses:

F. L. FREEMAN,
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