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PATENTED FEB. 6, 1906.

W. M. KERSHAW.

SHELL FUSE.

APPLICATION FILED NOV. 11, 1904.

2 SHEETS—SHEET 1.

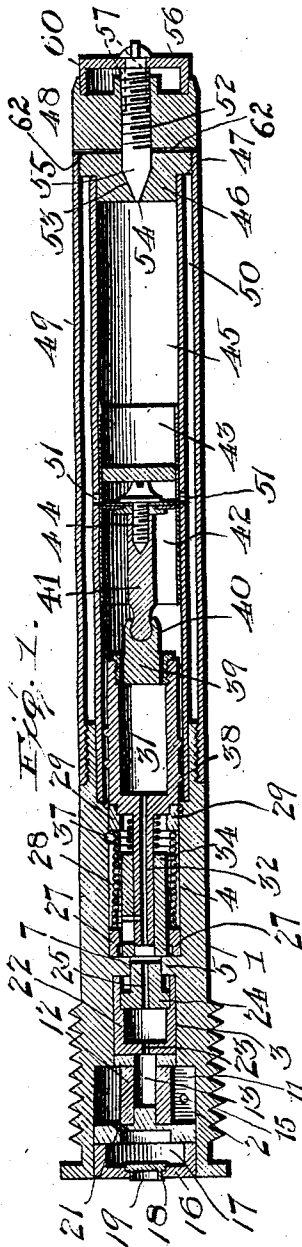


Fig. 1.

Fig. 2.

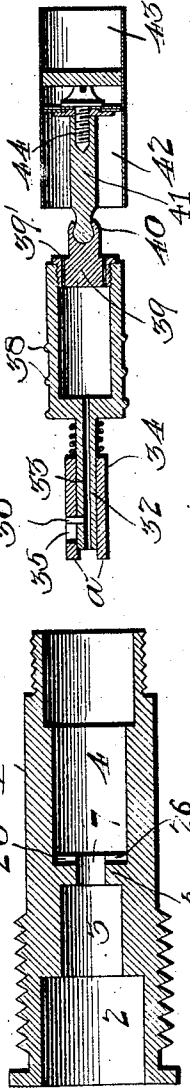
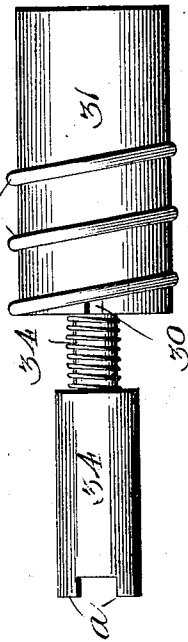
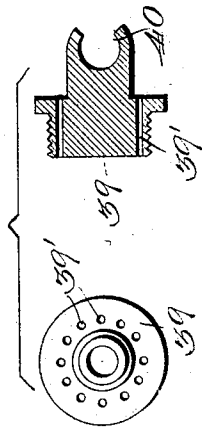


Fig. 3.

Fig. 4.



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2 SHEETS—SHEET 2

Fig. 6.

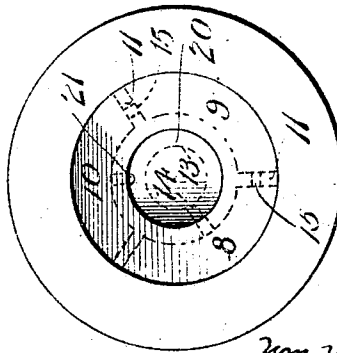
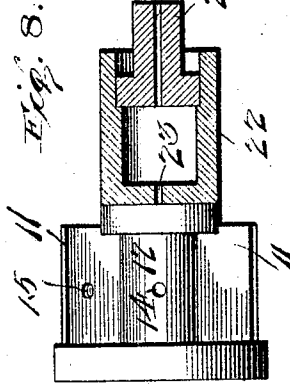
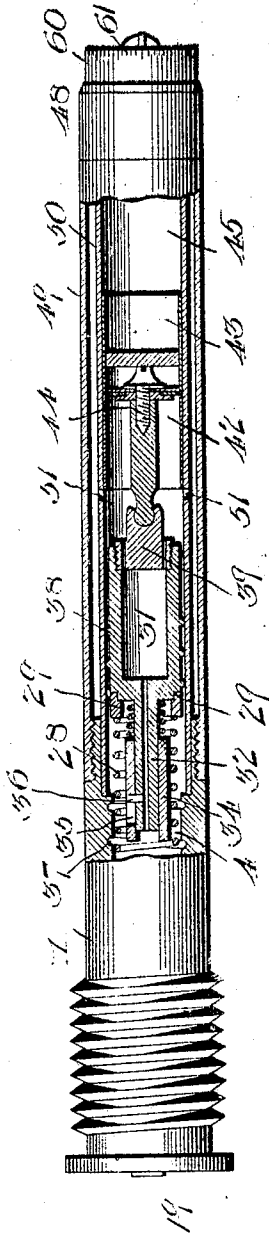


Fig. 7.

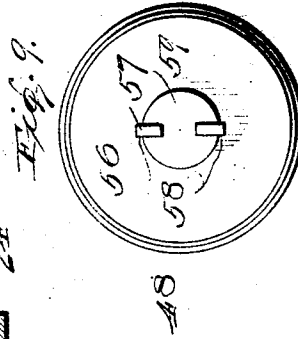


Fig. 9.

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UNITED STATES PATENT OFFICE.

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SHELL-FUSE.

No. 812,046.

Specification of Letters Patent.

Patented Feb. 6, 1906.

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To all whom it may concern:

Be it known that I, WILLIAM M. KERSHAW, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful improvements in Shell-Fuses; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates in general to shell-fuses, but more particularly to that type of fuse commonly known as "time-fuses," wherein the shell in which the fuse is placed is exploded at a predetermined time; and the invention consists, first, in providing a suitable stock and arranging therein an automatically-traveling powder-magazine, a chemically-actuated ejector, and a fixed powder-magazine, said fixed magazine being adapted to be fired by the flame from the exploded powder charge of the gun and cause the ejector to discharge a projectile against a locking mechanism, also arranged within the stock, to release the traveling magazine; second, in providing the traveling magazine with a mechanism that will cause said traveling magazine to automatically travel at any desired speed; third, in providing means to regulate the travel or movement of the traveling magazine, and, fourth, in providing a powder-containing chamber adapted to be exploded by the flame from the traveling magazine to cause the explosion of the shell.

The invention further consists of the peculiar arrangement of the several parts and their novel combination, as will be hereinafter fully described in this specification and briefly stated in the claims.

The prime objects of the invention are to provide a fuse of the type mentioned that can be safely handled without endangering the lives of persons handling them and which will operate with certainty to cause an explosion of the shell to which it is affixed in any desired length of time.

Further objects of the invention will become apparent upon a more detailed description thereof.

In the drawings, Figure 1 is a longitudinal sectional view of my improved fuse, showing the parts in inoperating or "safe" position; Fig. 2, a similar view of the stock; Fig. 3, a longitudinal sectional view of the traveling magazine and the attached devices for causing it to move automatically; Fig. 4, a longitudinal

sectional view of the traveling magazine detached; Fig. 5, detached views of the traveling-magazine bonnet; Fig. 6, a plan view of the fuse, partly in section, to show the traveling magazine in the position when it has reached its time limit; Fig. 7, a rear end view of the stock, the disk and protecting-plug being removed to show the rear fixed magazine; Fig. 8, a detached view of the fixed magazine and the ejector, showing the latter in longitudinal section; and Fig. 9, an inner face view of the time-indicator.

Referring to the several views, the numeral 1 indicates the stock, which is provided with the usual screw-threads, by means of which it is adapted to be screwed into the breech of the shell or projectile. The stock is suitably bored to provide chambers 2, 3, and 4, a partition 5 being arranged between the chambers 3 and 4. The partition 5 is provided with a central aperture 7 for a purpose to be hereinafter explained. The chamber 2 is preferably divided into three compartments 8, 9, and 10 by wings or partitions 11, radiating from a central post 12, having a hub 6, Fig. 8, and said chamber will be hereinafter referred to as a "fixed" magazine. The post for a portion of its length is provided with a central passage 13, a firing-hole 14 affording communication between said passage and the compartment 10. The compartments 9 and 8 are in communication with compartment 10 by means of firing-holes 15 in the wings 11, which separate compartment 9 from compartment 8 and compartment 10 from compartment 9, respectively, as shown in Figs. 1 and 7. The outer end of the chamber 2 is closed by a tightly-fitting disk 16, which has a recess 17 in its inner face and is provided with a central aperture 18. The aperture 18 is closed by a flanged protecting-plug 19, which is inserted from the inner face of the disk and fastened in the aperture by upsetting the flange, as shown in Fig. 1. With the disk and protecting-plug in position the magazine 2 is perfectly protected against moisture and accidental contact with fire.

It will be obvious that instead of dividing the magazine-chamber 2 into several compartments it may consist of a single chamber; but where a longer time is required before the time mechanism is set into operation the divided magazine is preferred.

The outer or rear face of the fixed magazine is provided with a recess 20, which is in

communication with the compartment 10 by means of a firing-hole 21. (See Fig. 7.) The fixed magazine is charged with slow-burning powder, and a pellet of powder may be placed in the recess 20.

Fitted or seated in the chamber 3 is an ejector 22, having its closed end provided with a firing-hole 23, communicating with the passage 13 in the post 12. The ejector 22 is preferably charged with grain powder and has fitted in its forward or open end a projectile or bullet 24, said projectile having a firing-hole 25, as shown in Figs. 1 and 8.

The partition 5 is provided on its front or inner face with oppositely-disposed slots 26 26, Fig. 2, in which are adapted to fit or be seated engaging lugs 27 27, Fig. 1, secured to one end of a coil-spring 28, the other end of the coil-spring being provided with similar engaging lugs 29 29, which are adapted to fit into or be seated in oppositely-disposed slots 30 30 in the rear end of a traveling magazine 31, which is charged with a slow-burning powder. The rear end of the traveling magazine is provided with a stem 32, having a longitudinal passage or firing-hole 33, communicating with said magazine. Loosely mounted on the stem 32 is a spring-pressed locking-sleeve 34, which is slidably secured on said stem by means of a slot 35 in the sleeve and a pin 36 in the stem. The sleeve and stem project through the coil-spring, and the end of the sleeve is provided with two oppositely-disposed lugs *a a*, which are adapted to engage the slots 26 and through the torsional action of said coil-spring when compressed serve to lock the traveling magazine against accidental release or disengagement.

The inner surface or wall of the chamber 4 is provided with screw-threads 37, and the outer surface of the traveling magazine is provided with screw-threads 38, adapted to fit the screw-threads 37. The screw-threads 37 and 38 are preferably about four to the inch and serve to assist in holding the traveling magazine in its locked position and also to prevent a too rapid initial movement of said magazine when released to the action of the coil-spring. The forward or open end of the traveling magazine is closed by a bonnet 39, which is screwed into said open end and provided with firing-channels 39'. The bonnet is provided with a socketed stem 40, and swiveled in the socketed stem is a stem 41 of a cup-washer or valve 42. Secured to the cup-washer 42 in an inverted position is a second cup-washer or valve 43, the connection being made by means of a screw 44, screwed into the stem 41, as shown in Fig. 3. The cup-washers are inclosed in an air-cylinder 45, which has one end fitted into the inner end of the stock and the other end fitted over a boss or hub 46 and against the shoulders 47 of an air-valve 48, the cup-washers serving to cushion the air to cause the travel-

ing magazine to move at a uniform rate of speed and the air-valve serving to control the rate of speed.

The traveling magazine, coil-spring, and cup-washers constitute the time mechanism. The air-cylinder is inclosed in a tubular extension 49, which has one side screwed onto the inner end of the stock, the other end being closed by the air-valve, which is screwed therein. The diameter of the extension-tube is somewhat greater than that of the air-cylinder, so as to provide a primer-chamber 50, surrounding said air-cylinder. The air-cylinder is provided with one or more apertures 51 to provide communication with the primer-chamber for a purpose to be hereinafter explained. The air-valve is provided with a suitable valve-chamber 52, having a conical seat 53, and the air-cylinder is in communication with the valve-chamber by means of a small port 54, which is adapted to be closed by a conical valve 55, screwing into the valve-chamber, the wall of said chamber being also screw-threaded. Attached to the outer end of the valve is an indicator 56, which is slidable on said valve by means of one or more lugs 57, projecting into longitudinal slots 58 58 in the valve, a set-screw nut 59 being employed to secure the indicator in any adjusted position. The indicator is provided with a flange 60, on which are placed graduated marks 61, running from zero up to any desired number, whereby the time mechanism may be set to explode a shell in a predetermined time. Leading from the valve-chamber are one or more air-vents 62, through which the air from the air-cylinder may be permitted to escape during the time the time mechanism is operating.

When the several parts of my improved fuse are assembled in the position shown in Fig. 1 and the several magazines charged with the grades of powder heretofore mentioned, the indicator may be set to indicate the length of time in which it is desired to have the shell explode. When placed in a gun and fired, the explosive force of the gun charge will force in the protecting-plug 19 and allow the flame to ignite the slow-burning powder in the fixed magazine, the flame passing through the aperture 21 into the powder-charged compartment 10, and thence to the powder-charged compartments 9 and 8 by way of the firing-holes 15. From compartment 8 the flame passes through firing-hole 14 into the passage 13, and thence through firing-hole 23, igniting the charge in the ejector 22 and causing the discharge of the projectile 24 against the lugs *a a* on the spring-pressed locking-sleeve 34, disengaging said sleeve from its locked engagement with the slots 26 in the partition 5 and freeing the traveling magazine to the expansive action of the coil-spring 28. At the time the projectile is fired from the ejector 22 the flame

passes through the firing-hole 25 in said projectile and through firing-hole 33 in the stem 32 and ignites the charge in said traveling magazine. As the time mechanism travels forward the air in the air-cylinder is being expelled through the valve and out through the vents 62. When the time limit is reached, the cup-washers will have passed beyond the apertures 51, and the powder in the chamber 50, some of which drops or sifts through the apertures into the air-cylinder, will be ignited by the flame from the charge in the traveling magazine passing through the firing-channels 39' in the bonnet 39. The ignition of the powder in the chamber 50 causes an explosion which ruptures the extension-tube 49 and explodes the charge in the shell.

Various modifications or changes in the detail construction of my invention may be made without limiting the scope thereof, and it will be obvious that any suitable liquid, such as mercury, may be used in the place of air in the air-cylinder.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a shell-fuse, the combination with a suitable stock, of a normally restrained time mechanism, a fixed magazine, and means fired by the charge in the fixed magazine to release the time mechanism.

2. In a shell-fuse, the combination with a suitable stock of a normally restrained time mechanism, a fixed magazine, means fired by the charge in the fixed magazine to release the time mechanism, and means for regulating the speed of travel of said time mechanism.

3. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained time mechanism, and an ejector for releasing said time mechanism.

4. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained time mechanism, an ejector for releasing said time mechanism, and means for regulating the speed of travel of the time mechanism.

5. In a shell-fuse, the combination with a suitable stock, of a normally restrained time mechanism, a fixed magazine, means fired by the charge in the fixed magazine to release the time mechanism, and a valve for regulating the speed of travel of said time mechanism.

6. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained time mechanism, an ejector for releasing said time mechanism, and a valve for regulating the speed of travel of the time mechanism.

7. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained traveling magazine, means for releasing said traveling magazine, and

means for causing the traveling magazine to move at a uniform rate of speed.

8. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained traveling magazine, means for releasing said traveling magazine, and cup-washers or valves adapted to cause the traveling magazine to travel or move at a uniform rate of speed.

9. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained traveling magazine, means for releasing said traveling magazine, and cup-washers or valves attached to the traveling magazine, and adapted to cause the same to move at a uniform rate of speed.

10. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained traveling magazine, means for releasing said traveling magazine, cup-washers or valves adapted to cause the traveling magazine to move at a uniform rate of speed, and means for controlling the speed.

11. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained traveling magazine, means for releasing said traveling magazine, cup-washers or valves swiveled to the traveling magazine, and an air-valve for controlling the speed of said traveling magazine.

12. In a time-fuse, the combination with a movable magazine, of an air-cushioning device, whereby the said magazine is caused to move at a uniform rate of speed.

13. In a time-fuse, the combination with a movable magazine, of an air-cushioning device, whereby the said magazine is caused to move at a uniform rate of speed, and means for controlling the speed.

14. In a time-fuse, the combination with a movable magazine, of an air-cushioning device adapted to cause said magazine to move at a uniform rate of speed, and an air-valve for regulating the escape of air to control the speed.

15. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained traveling magazine, an ejector adapted to release said traveling magazine, and an air-cushioning device, adapted to cause the traveling magazine to move at a uniform rate of speed.

16. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a normally restrained traveling magazine, a powder-containing ejector adapted to release said traveling magazine, an air-cushioning device, adapted to cause the traveling magazine to move at a uniform rate of speed, and a valve for controlling the speed.

17. In a time-fuse, the combination with a suitable stock, of a time mechanism composed of a spring-actuated traveling magazine having a locking-sleeve at one end and an air-cushioning device at the other end.

18. In a time-fuse, the combination with a suitable stock, of a spring-actuated traveling magazine having a locking-sleeve at one end and an air-cushioning device at the other end, and means for controlling the rate of speed of said traveling magazine.

19. In a shell-fuse, the combination with a suitable stock, of a normally restrained time mechanism, a fixed magazine, means fired by the charge in the fixed magazine to release said time mechanism, and a primer-chamber surrounding the air-cylinder.

20. In a shell-fuse, the combination with a suitable stock, of a normally restrained time mechanism, a fixed magazine, means fired by the charge in the fixed magazine to release said time mechanism, a cylinder inclosing the time mechanism, and a primer-chamber surrounding said cylinder and in communication therewith.

21. In a shell-fuse, the combination with a suitable stock, of a fixed magazine, a spring-actuated traveling magazine, adapted to be normally restrained, means for releasing said traveling magazine, means for causing the traveling magazine to move at a uniform rate of speed, a primer-chamber, and means for controlling the speed of said traveling magazine.

22. In a shell-fuse, the combination with a suitable stock, of a traveling magazine, a fixed magazine, and means fired by the charge in the fixed magazine to release the traveling magazine.

23. In a shell-fuse, the combination with a suitable stock, of a traveling magazine normally held against movement, and an ejector adapted to be fired by the charge in the fixed magazine to release the traveling magazine.

24. In a shell-fuse, the combination with a suitable stock, of a traveling magazine, an air-cushioning device carried by the traveling magazine, and means fired by the charge in the fixed magazine to release said traveling magazine.

25. In a shell-fuse, the combination with a suitable stock, of a traveling magazine, means for normally holding the traveling magazine against movement, a fixed magazine, means fired by the charge in the fixed magazine to release said holding means and release said traveling magazine.

26. In a shell-fuse, the combination with a suitable stock, of a traveling magazine, means for normally holding the traveling magazine against movement, a fixed magazine, an air-cushioning device attached to said traveling magazine, and means fired by the charge in the fixed magazine to release said holding means and thereby release the traveling magazine.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM M. KERSHAW

Witnesses:

SIGMUND J. BLOCK,
CHAS. C. LOVE.