No. 672,828.

Patented Apr. 23, 1901.

L. GATHMANN.

SHELL FOR HIGH EXPLOSIVES

(Application filed Apr. 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.

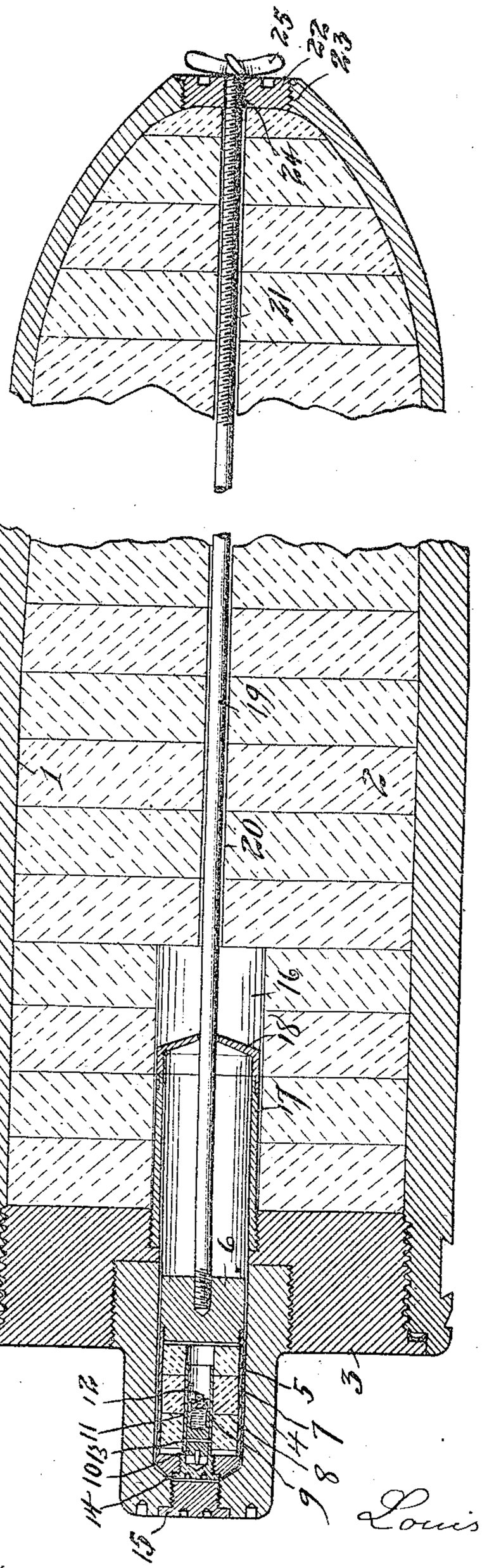

Fig. 1.

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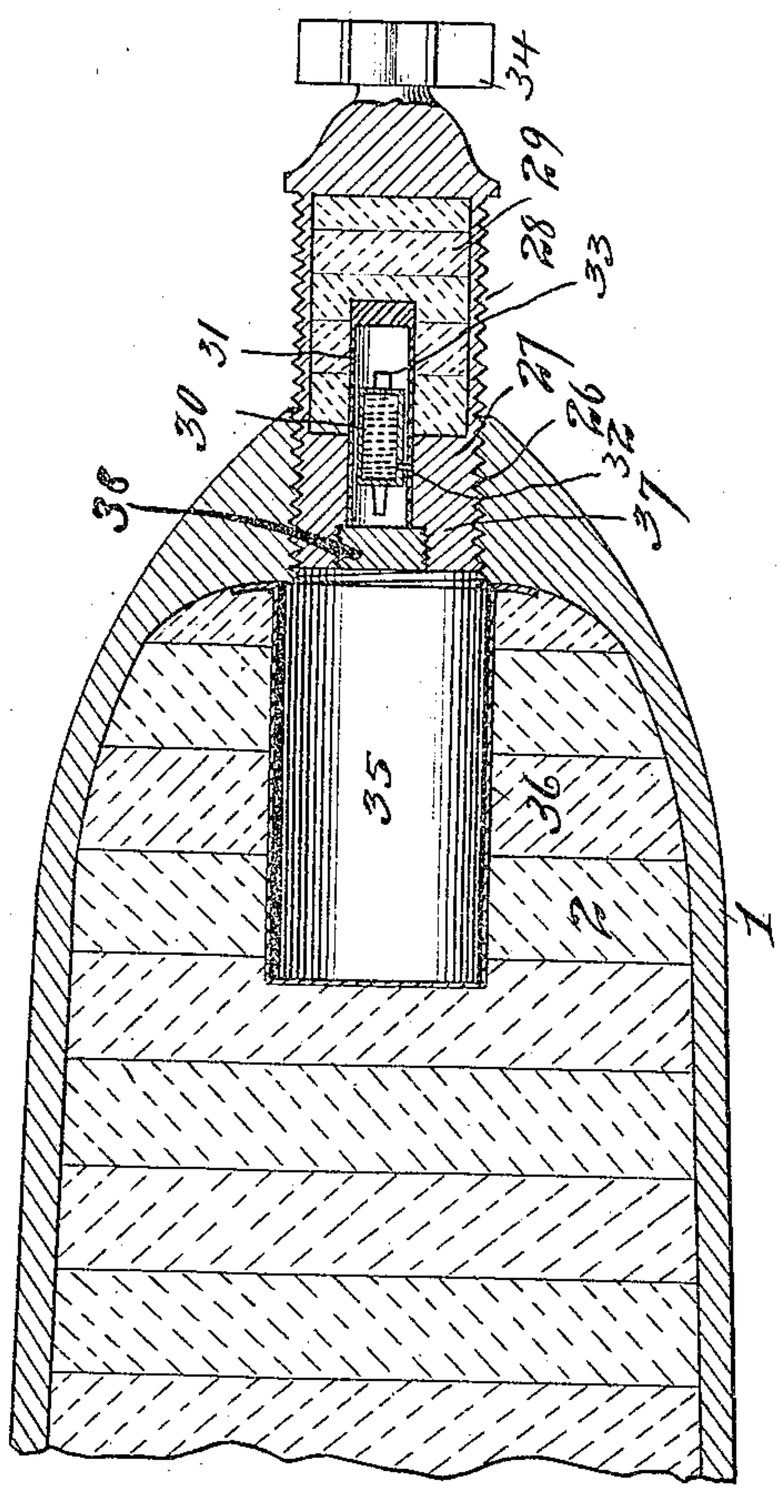
Fig. 2.



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UNITED STATES PATENT OFFICE.

LOUIS GATHMANN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GATHMANN TORPEDO GUN COMPANY, OF SAME PLACE.

SHELL FOR HIGH EXPLOSIVES.

SPECIFICATION forming part of Letters Patent No. 672,828, dated April 23, 1901.

Application filed April 27, 1899. Serial No. 714,623. (No model.)

To all whom it may concern:

Be it known that I, LOUIS GATHMANN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Shells for High Explosives, of which the following is a specification.

This invention relates to shells for high explosives, and has for its object to provide means whereby the fuse or detonating charge may be positively separated and isolated from the main or bursting charge of the shell prior to its discharge from the gun and may be positively moved from its separated or isolated position into close proximity to said bursting charge after the discharge of the shell from the gun.

To these ends my invention consists in certain novel features which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional view, partly broken away, of a shell embodying my invention in one form; and Fig. 2 is a similar view of the forward portion or head of a shell embodying my invention in a modified form.

Referring first to the construction shown in Fig. 1 of the drawings, 1 indicates the body of the shell, which may be of any suitable construction adapted for use in connection with high explosives. This shell contains a bursting charge 2, of wet guncotton or the like, and is closed at its base by means of a base-plug 3, having a central opening, into which the fuse-stock 4 is screwed. The fuse as a whole is indicated by the reference-numeral 5 and comprises a block or shutter 6, of comparatively thick metal, and a fuse-case 7, of thin metal, connected therewith and containing a charge 8 of dry guncotton or the like. Within this fuse is located a tubular stock 9, in which moves the detonator-plunger 10, carrying the charge of fulminate 11 and its cap 12 and held in position by a suitable break-pin 13. The fuse is provided at its rear end with an opening closed by a plug 14, and the fuse stock or chamber 4 is provided at its rear end with a similar or larger opening closed by a screw-plug 15, this latter opening being large enough to permit the passage of the detonator and of the screw-plug 14, so that the charge of fulminate may be inserted into the shell after all the other parts are assembled and immediately before the placing of the shell in the gun.

There is formed through the stock 4, base-plug 3, and charge 2 a fuseway 16, through which the fuse may travel, a portion of said fuseway being formed by a tubular shell 17, secured to the base-plug 3 and extending inward therefrom along the fuseway 16 for a portion only of its distance. At its forward end this tubular shell 17 is provided with a cap or cover 18, having a frictional connection with the shell, so as to normally close the forward end thereof, but be free to slip from its position and move forward along with the fuse when sufficient pressure is brought to bear upon it.

In order to impart to the fuse a positive forward movement after the discharge of the shell from the gun, the fuse is provided with a threaded portion, which in the construction shown in Fig. 1 is in the form of a rod 19, which extends forward through a suitable aperture in the cap 18 and through a passage or way 20, formed through the charge 2, said rod extending to and through the forward end of the shell and being threaded at its front portion, as indicated at 21. The aperture at the front end of the shell, through which said rod extends, is correspondingly threaded, and I prefer to employ for this purpose a screw-plug 22, which screws into a correspondingly-threaded aperture 23 in the front end of the shell and is provided with a centrally-threaded aperture 24, in which the threaded portion 21 of the rod 19 fits. The projecting forward end of the rod 19 is provided with a fan or propeller wheel 25, secured thereon.

The shell thus constructed operates in the following manner: Before the discharge of the gun the detonating charge is separated from the main or bursting charge, lying, as it does, at some distance therefrom and outside of the body of the shell and being additionally separated or isolated by the block or barrier 6, which lies between the detonating and bursting charges, so that any premature or accidental explosion of the detonating charge will not affect the main or bursting charge and

will not cause the explosion of this latter and of the shell. The parts are held firmly in this position by reason of the rod 19, which by reason of its threaded engagement with the forward end of the shell prevents any accidental bringing together of the fuse and bursting charge by a direct forward movement of the former. After the discharge of the shell from the gun, however, the fan wheel or propeller 25 meets with resistance from the atmosphere during the flight of the shell and is caused thereby to rotate, thus imparting a rotary motion to the rod 19. Owing to the threaded engagement of this latter with a threaded portion of the shell, the rod 19 moves forward relatively to the body of the shell during such rotation, and in thus moving forward carries forward with it the fuse and brings this latter into immediate proximity to the bursting charge within the shell. During this forward movement of the fuse it comes in contact with the cap 18, in case this latter is employed, and carries the same forward with it, so that there is nothing interposed between the detonating charge and bursting charge except the extremely thin wall of metal of the shell 7, so that an effective detonation may be readily produced. This detonation occurs upon the contact of the shell with any resisting object by the forward movement of the detonating-plunger and the consequent explosion of its cap and fulminate, thereby exploding the detonating charge and effecting the explosion of the main or bursting charge of the shell.

The construction hereinbefore described is one adapted for use in a shell in which the fuse is located at the base of the shell; but my invention is equally applicable to the type of shell in which the fuse is located at the front end or head thereof, and in Fig. 2 of the drawings I have shown a construction embodying my invention in this form. In this construction a threaded opening 26 is formed in the front end or point of the shell, and the body of the fuse, which is indicated at 27, is threaded externally, as indicated at 28, to fit within said threaded opening. This fuse has a fuse-chamber containing a charge of dry guncotton 29, and the detonator 30 is mounted in a tube or stock 31, having thin lateral walls and extending into the charge 29, the detonator being held in position by a break-pin 32 and being provided with a cap 33 on its front end. The fuse is provided at its forward end with a wind-wheel or fan 34, which in the present instance is shown not as a propeller-wheel, as in the case of the construction shown in Fig. 1, but as a fan-wheel, having its vanes at right angles to the plane of its body, or, in other words, to its plane of rotation. The fuseway 35 extends rearward from the threaded opening 26 into the body of the charge 2 and may be inclosed in a thin case 36, of metal, such as brass, which is easily ruptured. The base of the fuse is thickened to form a partition, separating the detonating charge from the bursting charge of the shell, as indicated at 37, and there is provided an aperture closed by a screw-plug 38 and giving access to the detonator and its tube or stock. The shell thus constructed operates in the following manner: The normal position of the parts before firing is that shown in the drawings, in which the detonating charge is separated and isolated from the bursting charge of the shell not only by being located outward beyond the same, but also by the interposition between the two of the block or partition 37, which is formed by the thickened base of the fuse. Upon the discharge of the shell from the gun, however, the vanes of the wheel 34 encounter the resistance of the air as the shell rotates on its axis, and the entire fuse is thus caused to rotate relatively to the shell and to be screwed back into the fuseway until it assumes a position within the body of the shell and with the detonating charge in immediate juxtaposition to the bursting charge of the shell. When the shell strikes a resisting object, the detonator is released by the fracture of its break-pin, and, moving forward, explodes the detonating charge, and consequently the bursting charge of the shell.

I do not wish to be understood as limiting my invention to the precise details hereinbefore set forth. For instance, although I have shown in Fig. 1 a particular form of fuse, while in Fig. 2 a second form of fuse is shown, my invention is equally applicable to other forms of fuse. Again, although I have shown a wind-wheel of the propeller type employed in the construction shown in Fig. 1, while a wind-wheel of the transverse vane type is shown in Fig. 2, yet these wheels are obviously interchangeable, it being immaterial for the purposes of my invention whether the resistance of the air, which serves to actuate the threaded rotary portion of the fuse, is obtained by reason of the forward motion of the shell or by reason of its rotary motion around its axis, the essential feature being that the normally-isolated fuse shall have a threaded portion engaging with a threaded portion of the shell to produce a longitudinal movement of the fuse relatively to the shell and a part, such as a wind-wheel, exposed to the external atmosphere and adapted by the resistance thereof to impart a rotary motion to the threaded portion of the fuse, and thereby cause longitudinal motion of the fuse proper. It is obviously immaterial whether the threaded portion be formed upon the body of the fuse itself or whether it be formed upon an extension or rod connected with the fuse, and thus becoming, so far as its operative effect is concerned, a portion of the fuse.

I claim—

1. In a shell for high explosives, the combination, with a shell-body having a threaded portion, of a fuse provided with a correspondingly-threaded portion to engage that of the shell and by its rotation relatively to the

shell-body, move the fuse longitudinally, and a part connected to said threaded portion of the fuse, exposed to the resistance of the external air and adapted to be rotated relatively to the shell-body by such resistance, whereby the detonating charge is brought into juxtaposition to the bursting-charge, substantially as described.

2. In a shell for high explosives, the combination, with a shell-body having a threaded portion, of a fuse provided with a portion correspondingly threaded to engage the threaded portion of the shell and adapted when rotated relatively to the shell-body to move the fuse longitudinally, and a wind-wheel connected with said threaded portion and exposed to the resistance of the external air, said wind-wheel being adapted by reason of such resistance to impart a rotary movement to the threaded portion of the fuse relatively to the shell-body, whereby the detonating charge is brought into juxtaposition to the bursting charge, substantially as described.

3. In a shell for high explosives, the combination, with a shell-body containing a bursting charge and provided with a threaded aperture at its forward end, of a fuse longitudinally movable relatively to the shell-body and provided with a threaded portion to engage the threaded aperture of the shell-body, and with an exposed wind-wheel adapted to be actuated by atmospheric resistance, said fuse having its detonating charge normally separated from the bursting charge of the shell and being moved longitudinally by the rotation of its threaded part relatively to the shell-body to bring the detonating charge into proximity to said bursting charge, whereby the detonating charge is brought into juxtaposition to the bursting charge, substantially as described.

4. In a shell for high explosives, the combination, with a shell-body provided with a threaded aperture at its forward end, a bursting charge, and a fuseway extending through its base and into the bursting charge, of a fuse longitudinally movable in said fuseway and provided with a forwardly-extended portion threaded to fit the aperture of the shell-body, and a wind-wheel connected with said threaded portion and exposed to atmospheric resistance, whereby the detonating charge is brought into juxtaposition to the bursting charge, substantially as described.

5. In a shell for high explosives, the combination, with a shell-body having an aperture in its forward end, a bursting charge, and a fuseway at its rear end, of a fuse longitudinally movable in said fuseway and provided with a forwardly-extending rod threaded to fit the aperture in the shell-body and extending beyond the same, and a propeller-wheel secured on the forward end of said rod and adapted to be rotated relatively to the shell-body by the atmospheric resistance due to the forward motion of the shell, whereby the detonating charge is brought into juxtaposition to the bursting charge, substantially as described.

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