(No Model.) 2 Sheets—Sheet 1.

J. K. BAKEWELL.

EXPLOSIVE PROJECTILE AND METHOD OF FIRING SAME.

No. 572,401. Patented Dec. 1, 1896.

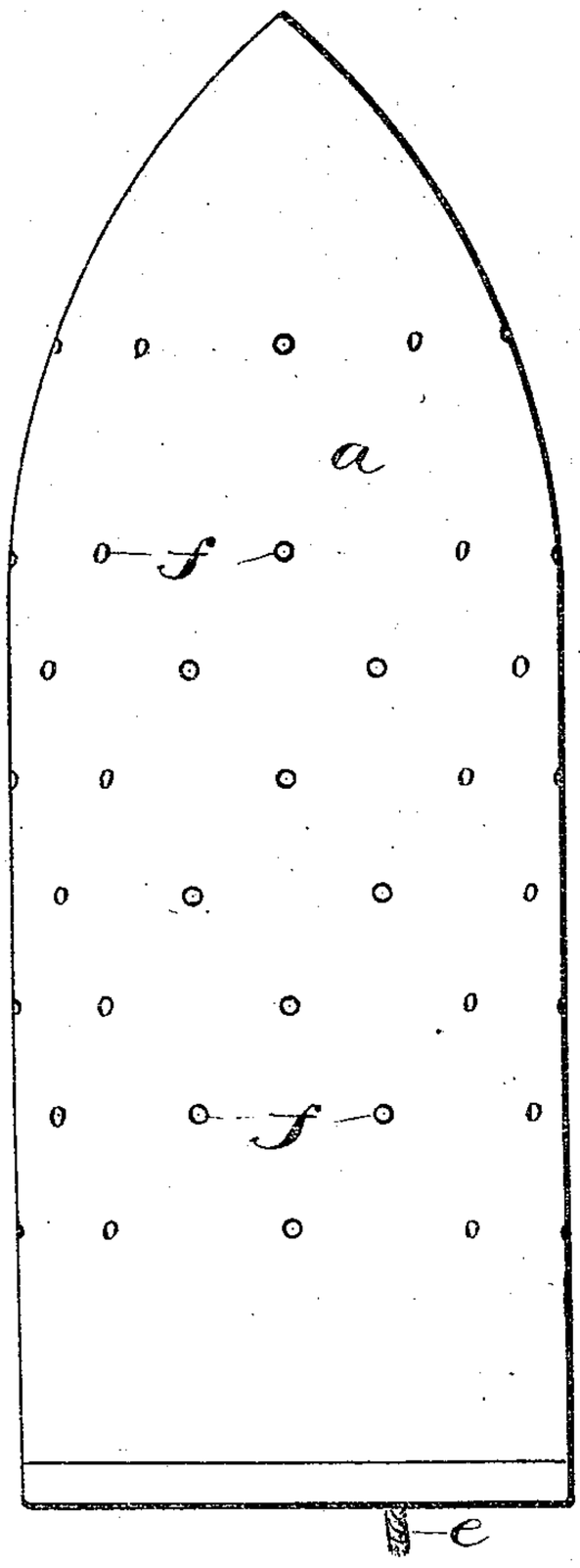

Fig. 2.

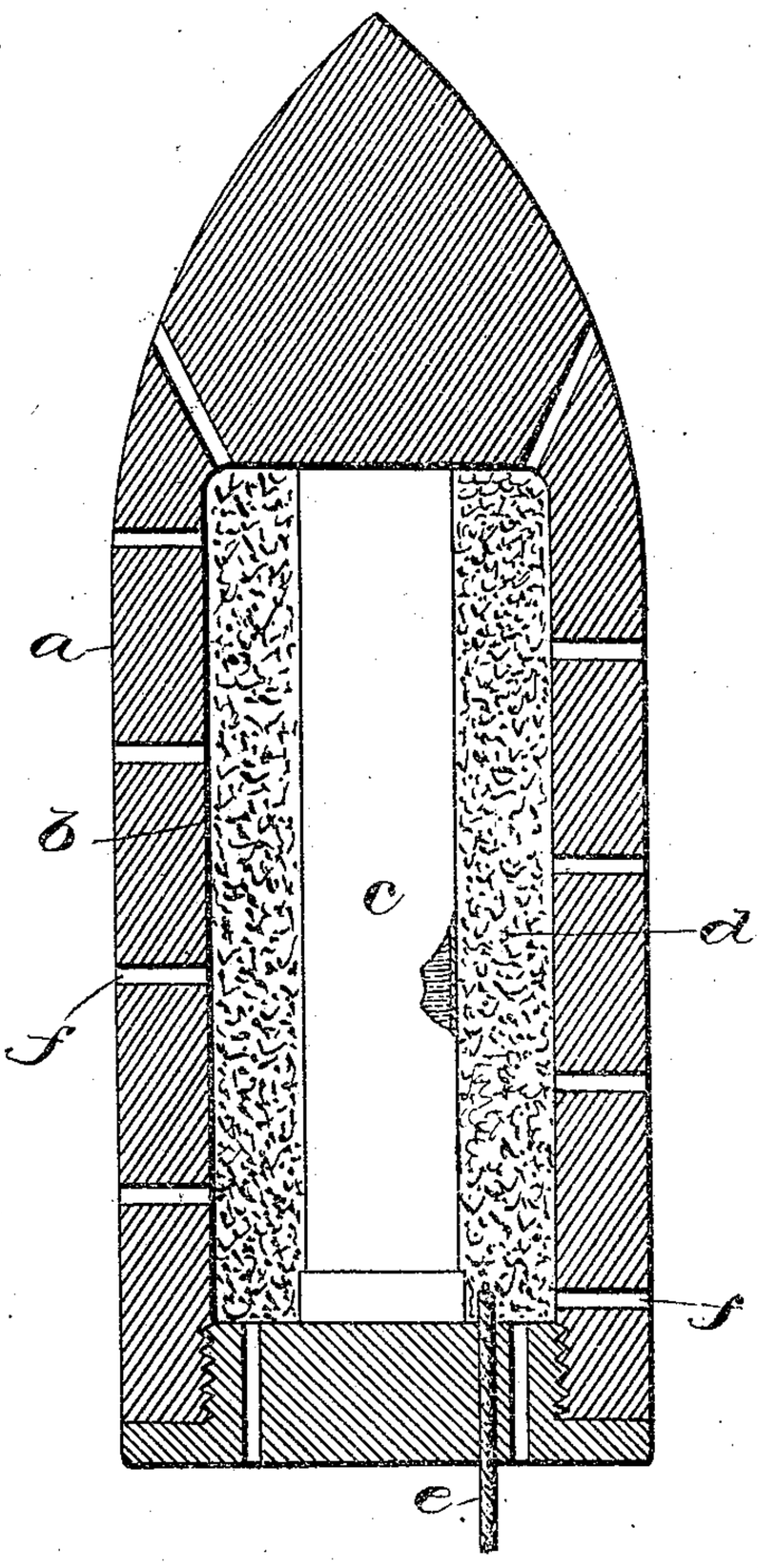

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

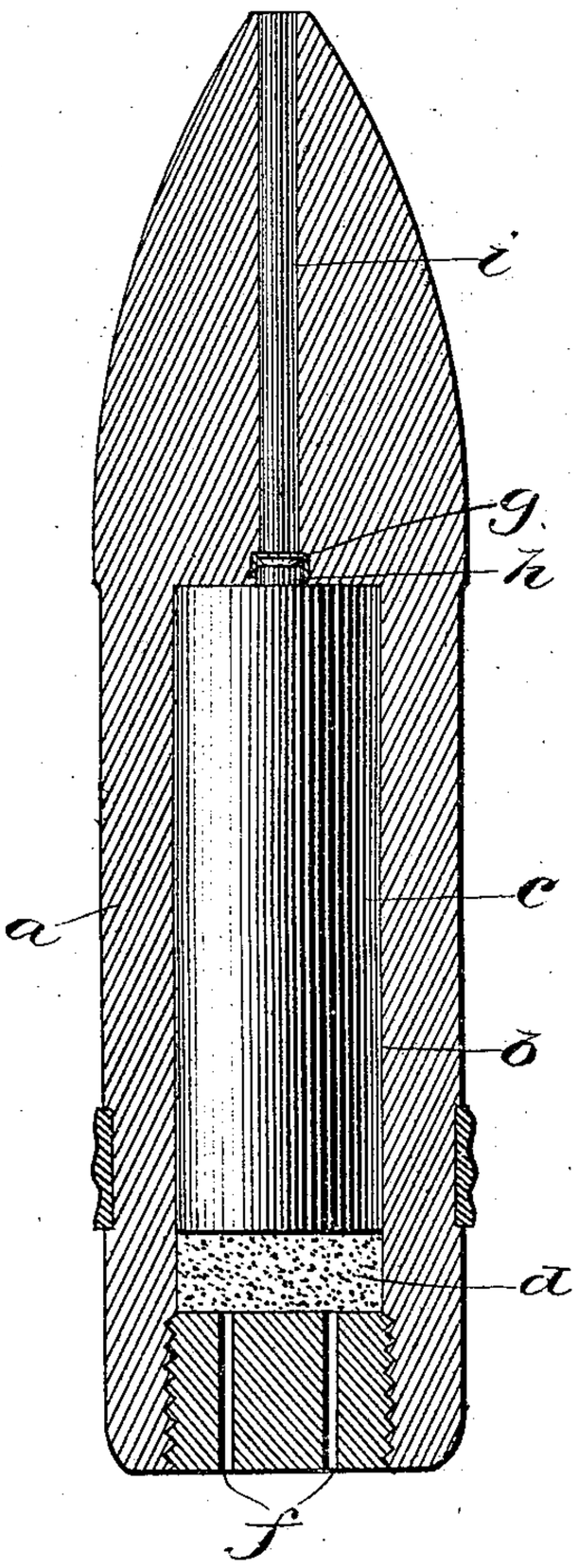
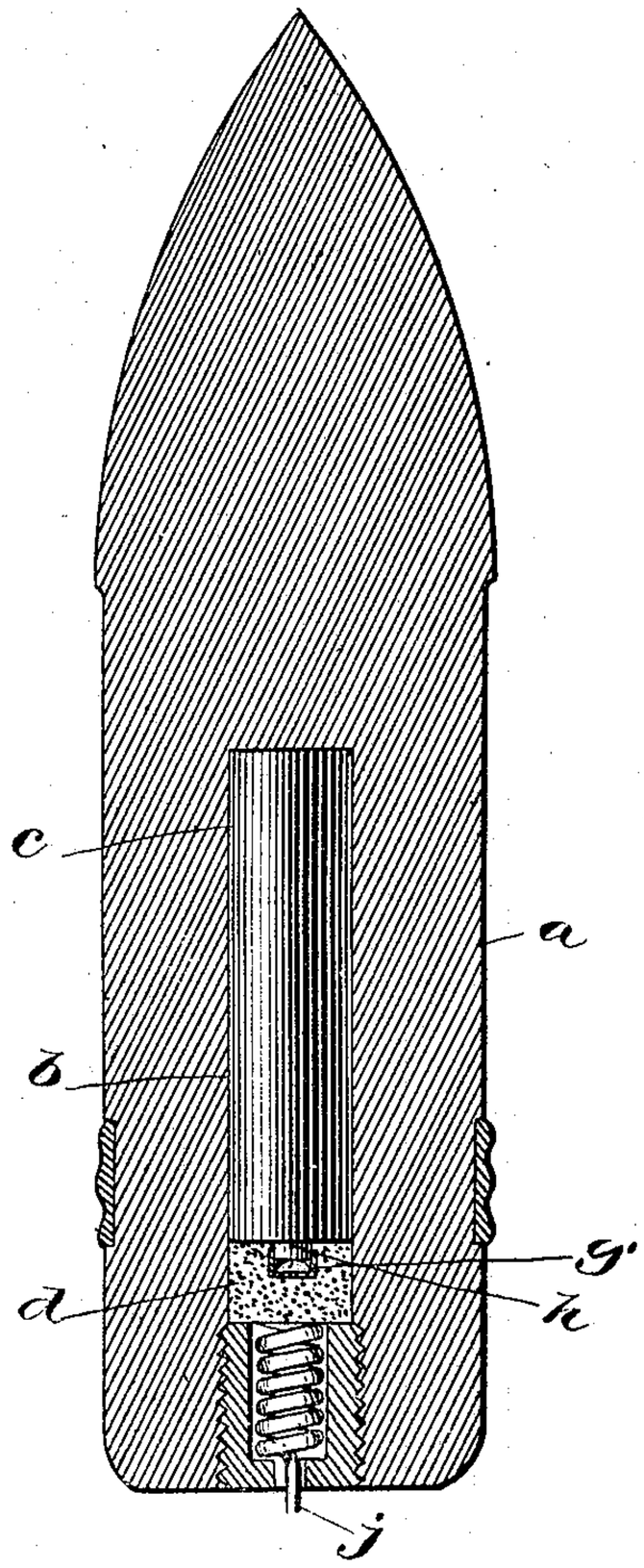


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES K. BAKEWELL, OF ALLEGHENY, PENNSYLVANIA.

EXPLOSIVE PROJECTILE AND METHOD OF FIRING SAME.

SPECIFICATION forming part of Letters Patent No. 572,401, dated December 1, 1896.

Application filed November 11, 1896. Serial No. 611,706. (No model.)

To all whom it may concern:

Be it known that I, JAMES K. BAKEWELL, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Explosive Projectiles and Methods of Firing the Same, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view of a projectile made in accordance with my invention. Fig. 2 is an elevation thereof. Fig. 3 is a vertical section of a modified form of shell, and Fig. 4 is a like view of a second modification.

In a prior patent application, Serial No. 611,705, I have described and claimed an invention consisting in part in charging a projectile with dynamite or like explosive compound, freezing the explosive, so that it may be fired from a gun with safety, and then firing and exploding the same. In said application the specific means described in the descriptive part of the specification for effecting the explosion is the impact of the projectile against the target.

The present specification is intended to describe a subsidiary improvement on said invention; and it consists in providing the projectile with means whereby during its flight the frozen explosive is warmed, so that it can be more readily exploded at the proper time.

In the drawings I have shown a shell *a*, having a cavity *b*, in which is placed a canister *c* of dynamite or nitroglycerin or other high explosive which may be rendered less explosive by bringing it to a low temperature. Dynamite is preferably used. The canister in the cavity *b* is surrounded by a quantity of slow-burning powder *d*, such as is capable of producing heat by its combustion, and a fuse *e* extends from the powder to the exterior of the shell. Extending between the exterior of the shell and the cavity *b* are perforations *f*, the purpose of which is to permit the escape of gas from the combustion of the powder *d*. I do not limit myself to the exact form of projectile shown and described. Nor do I limit myself to any kind of powder or heat-producing agent, as any of the well-known slow-burning powders may be employed or an equivalent heat-producing agent.

The body of the shell may be made of steel, having the perforations *f*, and then charged with dynamite or other explosive in the canister *c*, the explosive being frozen by a suitable refrigerating apparatus before or after it is placed in the shell and before firing from the gun. The slow-burning powder *d* may then be placed in the cavity *b* next to the canister *c*, and the cavity *b* is closed. The shell or projectile is then ready to be fired from a gun, or it may be kept ready for use at a temperature below 40° Fahrenheit.

The projectile is charged into a cannon in the usual way, and when the cannon is discharged the slow-burning powder will be ignited as the projectile traverses the cannon and, burning within the cavity *b* during the projectile's flight, will heat and thaw the frozen explosive within the canister, so that when the projectile strikes the target it will have been brought to a highly-explosive condition. I thus secure a maximum of explosive effect, together with entire safety to those who fire the cannon, for the nitroglycerin explosive being frozen at the time of discharge of the shell cannot explode in passing from the cannon.

The minimum desirable amount and the kind of slow-burning powder to be used in each case are matters of easy calculation, based upon the size of the projectile and the shortest length of intended flight. With a projectile having a long flight a slower-burning powder may be used than where the flight is short and where the time of exposure of the explosive to the thawing influence of the powder is to be correspondingly short.

Instead of exploding the contents of the canister solely by impact of the projectile, I may provide the projectile with a fulminate placed upon an anvil in contact with the explosive and adapted to be exploded by a firing-pin in the usual way when the projectile strikes a target, or the projectile may be arranged for explosion during flight or independently of impact by providing it with a fulminate connected with a time-fuse adapted to be ignited either directly by the charge in the cannon or by the slow-burning powder in

the cavity *b*. I illustrate these modifications in Figs. 3 and 4. In Fig. 3 *g* is the fulminate set on an anvil *h* and adapted to be detonated by a firing-pin *i* when the projectile strikes the target. In this case the slow-burning compound is ignited by the flame from the gun entering the vents or openings *f* in the end of the shell. In Fig. 4 the fulminate *g'* is adapted to be ignited by a time-fuse *j*, which may be so timed as to explode the charge at the desired period of time after the projectile has been fired and before or after it has reached the end of its flight. By bringing the dynamite to a very low temperature below the freezing-point its explosion on impact can be so retarded that the projectile can be made to penetrate a hard object before it is brought to a condition for firing by the action of the heating agent aided by the heat generated by impact.

The advantages of my invention in respect of safety of firing and certainty of explosion will be appreciated by those skilled in the art.

I do not limit my invention to the use of nitroglycerin or its compounds, but intend to cover other equivalent high explosives which are rendered less explosive by cold.

I claim—

1. The method of firing high explosives herein described which consists in charging a shell with a high explosive that is rendered less explosive by cold, and reducing the temperature of the explosive charge to a degree at which it may be fired from a gun without danger of premature explosion, and in subjecting the explosive charge during the flight of the projectile to heat created within the projectile.

2. As a new article of manufacture, an explosive projectile charged with a high explosive reduced to a temperature sufficiently low to render it practically non-explosive when fired from a gun, and a heat-giving agent for heating the explosive charge during the flight of the projectile.

3. As a new article of manufacture an explosive projectile consisting of the outer body having a cavity, a case or cylinder in the projectile for containing the explosive, a charge of a high explosive in a chilled condition, and a charge of a heat-giving agent for thawing the high explosive.

4. As a new article of manufacture, an explosive projectile charged with chilled dynamite and a heat-giving agent in the projectile for thawing the chilled dynamite, substantially as described.

5. As a new article of manufacture, an explosive projectile consisting of the outer body having a cavity, a case or cylinder in the projectile for containing the explosive, a charge of a high explosive in a chilled condition, and a slow-burning compound for heating the explosive after the discharge of the projectile from the gun.

6. As a new article of manufacture, an explosive projectile consisting of the vented outer body having a cavity, a case or cylinder in the projectile for containing the explosive, a charge of a high explosive in a chilled condition, and a slow-burning compound for heating the explosive after the discharge of the projectile from the gun.

In testimony whereof I have hereunto set my hand.

JAMES K. BAKEWELL.

Witnesses:
JOS. H. BLACKWOOD,
W. B. CORWIN.