

(No Model.)

J. K. BAKEWELL.

EXPLOSIVE PROJECTILE AND METHOD OF FIRING SAME.

No. 572,400.

Patented Dec. 1, 1896.

Fig. 1.

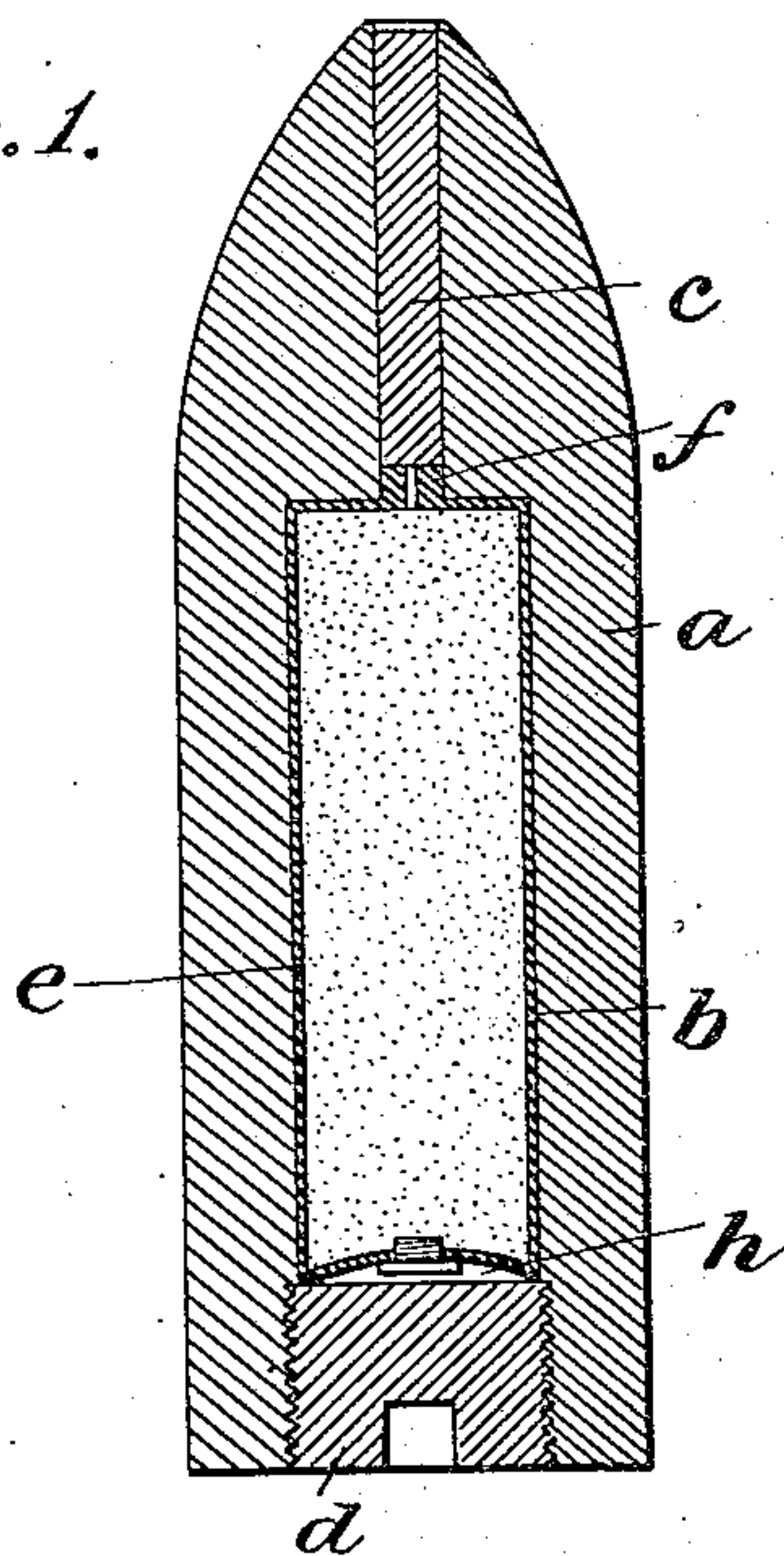


Fig. 2.

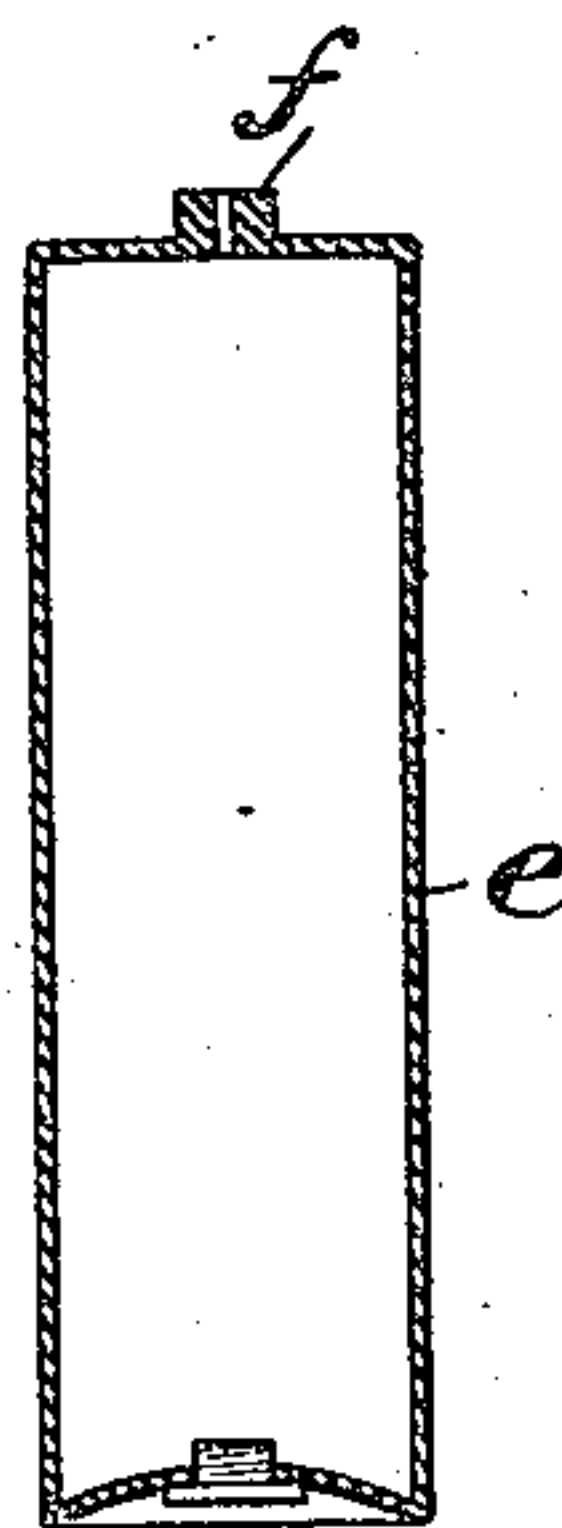
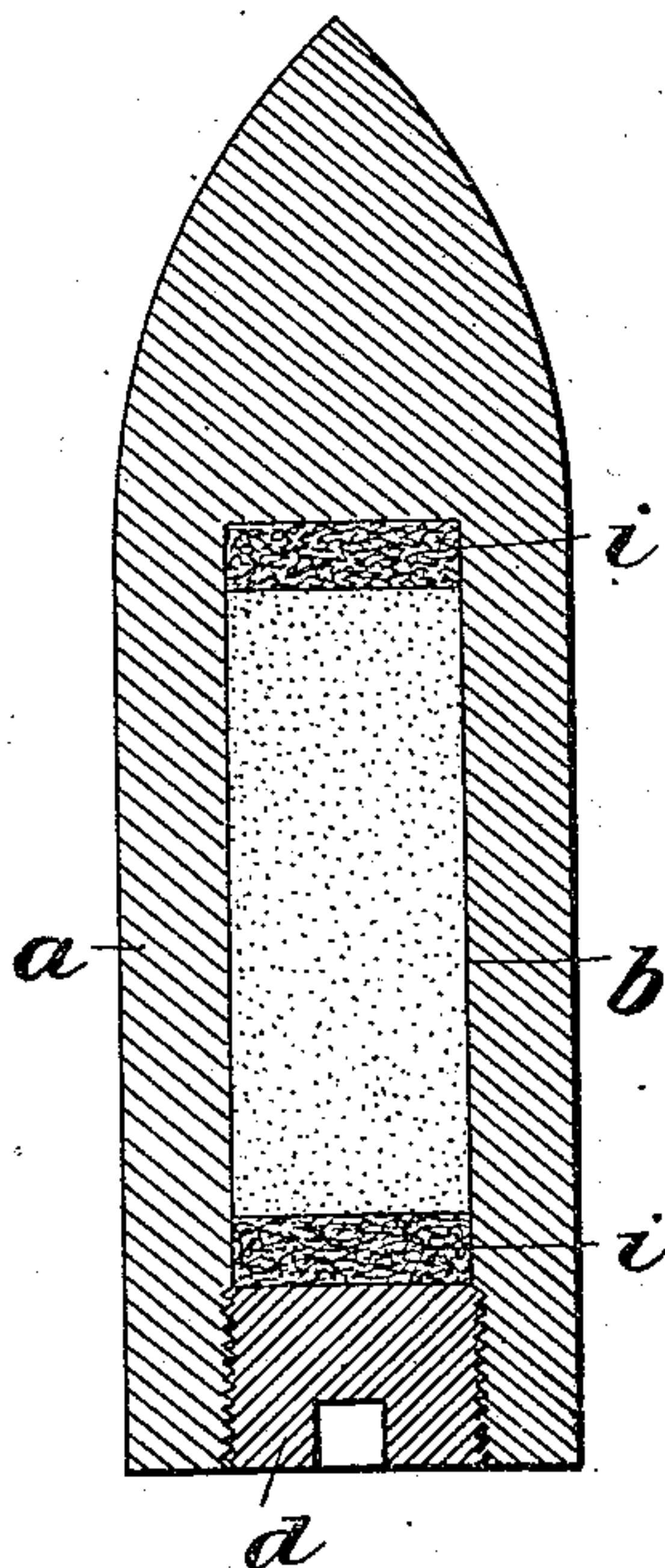


Fig. 3.



WITNESSES

S. D. Stoddard

J. A. Comer

INVENTOR

James K. Bakewell
by Bakewell & Bakewell
his Attorneys.

UNITED STATES PATENT OFFICE.

JAMES K. BAKEWELL, OF ALLEGHENY, PENNSYLVANIA.

EXPLOSIVE PROJECTILE AND METHOD OF FIRING SAME.

SPECIFICATION forming part of Letters Patent No. 572,400, dated December 1, 1896.

Application filed November 11, 1896. Serial No. 611,705. (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.

My invention relates to an improvement in explosive projectiles or shells and the firing thereof, whereby nitroglycerin, dynamite, and other high explosives may be safely employed as the explosive agent.

Heretofore the practical use of dynamite as a charge for explosive projectiles has been considered too dangerous to employ the same in connection with the ordinary gun where the shell is thrown from the gun by the explosion of gunpowder, and therefore pneumatic guns and other appliances have been devised for this purpose, all of which are more or less objectionable in practical use.

The object of my invention is to produce a shell charged with dynamite or other high explosive, which shell may be fired from an ordinary gun, using gunpowder as a propelling agent, without danger of the premature explosion of the shell.

To this end it consists, broadly, in charging the shell with nitroglycerin, dynamite, or other high explosive and in reducing the temperature of the explosive agent to a point at which it may be fired from a gun without danger of explosion from the shock produced by the discharge of the gun.

I will now describe my invention so that others skilled in the art may employ the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view of my improved shell. Fig. 2 is a like view of the cylinder for containing the explosive charge, and Fig. 3 is a like view of a modified form. Like symbols of reference indicate like parts wherever they occur.

I have discovered by actual experiment that when dynamite is reduced to a temperature of 40° Fahrenheit, or to a lower temperature, it may be used as an explosive agent in projectiles without danger of its being exploded by the firing of the gun, and the same

is true of liquid nitroglycerin and its compounds, and while I do not desire to limit my invention to the use of any particular form of shell I have shown in the drawings a convenient form of shell adapted to this purpose.

In the drawings, *a* represents the body of the projectile, having a cavity *b* for the reception of the charge and a firing-pin *c*, adapted to strike the explosive, or a detonator when the shell strikes the object at which it is fired. This firing-pin *c* may be omitted, as is shown in Fig. 3. Although the charge of dynamite may be placed in the cavity *b* and the opening closed by a plug *d*, I prefer to employ a cylinder *e*, into which the dynamite is charged, the cylinder being then placed in the cavity *b* and secured by the plug *d*. This cylinder is preferably formed of metal, such as lead, copper, iron, or steel, and provided with a concave bottom forming an air-space *h*; but it may be of any suitable material and is preferably of such shape and size as to fit snugly in the cavity *b*. Although it will be found that the shell charged with dynamite will invariably explode when fired against a hard body, yet in certain cases it may be advisable to employ a detonating cap placed on an anvil *f*, which may be on the end of the cylinder *e* and adapted to be struck by the firing-pin *c*.

In the manufacture of my improved projectile the body *a* of the shell may be manufactured of steel in the usual manner, and then charged with dynamite with or without a fibrous packing *i*, the dynamite being brought to a temperature below 40° Fahrenheit before or after it is placed in the cavity of the shell and before it is fired from the gun. I prefer, however, to employ the charging-cylinder *e*, which is filled with dynamite or liquid nitroglycerin or other like high explosive which explodes by concussion and contains or is an explosive liquid or viscous material and is capable of being congealed by reduction of temperature. The explosive is then frozen in the cylinder by any suitable refrigerating apparatus, after which the cylinder containing the frozen dynamite or nitroglycerin is placed in the cavity *b* and secured in the cavity by the plug *d*. It is then ready to be fired from the gun, or it may be retained at a temperature of 40° Fahrenheit

or less until it is required for use. The shell may be charged into the gun in the usual way over a charge of gunpowder or other propelling agency and fired with safety from the gun.

5 I have ascertained by experiments that while frozen nitroglycerin or dynamite cannot be practically exploded by the usual shock of the explosion of gunpowder in a cannon it will explode when the shell, after being fired from the gun, strikes a hard body.

10 The facts just stated, that nitroglycerin and its compounds, owing to their high explosive character and to the fact that they readily and instantaneously explode on being subjected either to concussion or percussion with such force as to render it utterly unsafe to use them in guns or ordnance of any description, have heretofore prevented such use. Hitherto also frozen nitroglycerin has
20 been regarded as practically incapable of explosion. Recognizing these facts, I saw that it was necessary, in order to utilize these high explosives for ordnance purposes, first, to reduce them to a non-explosive temperature before firing, and, secondly, to render them explosive after firing. By my improvement I secure both of these necessary conditions by freezing the explosive before firing it from the gun. I believe that its explosion is then
30 effected by elevation of temperature, to some degree no doubt caused by the rapid passage through the atmosphere and from the gun, and also by the great heat produced in the metallic inclosing shell by reason and at the moment of impact with the object which it strikes.

40 The advantages of my invention will be apparent to those skilled in the art, as by it nitroglycerin, dynamite, and other high explosives which are affected by cold may be used as an explosive agent in projectiles with perfect safety.

45 I am aware that it is a known fact that dynamite and nitroglycerin are rendered difficult to explode by bringing them to a temperature below 40° Fahrenheit. I am not aware, however, that any practical use has been made of this knowledge, or that it has been known that while frozen nitroglycerin
50 is practically non-explosive in the gun when used as a charge for explosive projectiles it

will explode from the impact of the projectile against a hard body when fired from the gun. The freezing of nitroglycerin in practical use has always been avoided, owing to its non-explosive properties while in that condition and the danger of accidental explosion incident to the thawing of the nitroglycerin by artificial means.

I do not desire to limit my invention to the use of nitroglycerin or its compounds, such as dynamite, as other high explosives which are rendered less explosive by cold may be substituted therefor.

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

1. The method hereinbefore described which consists in freezing a high explosive subject to explosion by concussion, and then while the explosive is frozen firing it from the gun and effecting its explosion; substantially as and for the purposes specified.

2. As a new article of manufacture, a projectile charged with a high explosive reduced to a temperature sufficiently low to render it practically non-explosive when fired from a gun, substantially as and for the purpose specified.

3. As a new article of manufacture, a projectile consisting of the outer body having a cavity, a case or cylinder for containing the explosive, and a charge of a high explosive in a frozen condition; substantially as and for the purpose specified.

4. As a new article of manufacture a projectile charged with frozen dynamite; substantially as described.

5. The method hereinbefore described which consists in freezing a high explosive embodying a liquid subject to explosion by concussion, firing the same in a shell from a gun while in such frozen condition and exploding the same by impact when it strikes; substantially as described.

In testimony whereof I have hereunto set my hand.

JAMES K. BAKEWELL.

Witnesses:

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