

B. B. HOTCHKISS.

Shell-Fuse.

No. 36,465.

Patented Sept. 16, 1862.

Fig. 1.

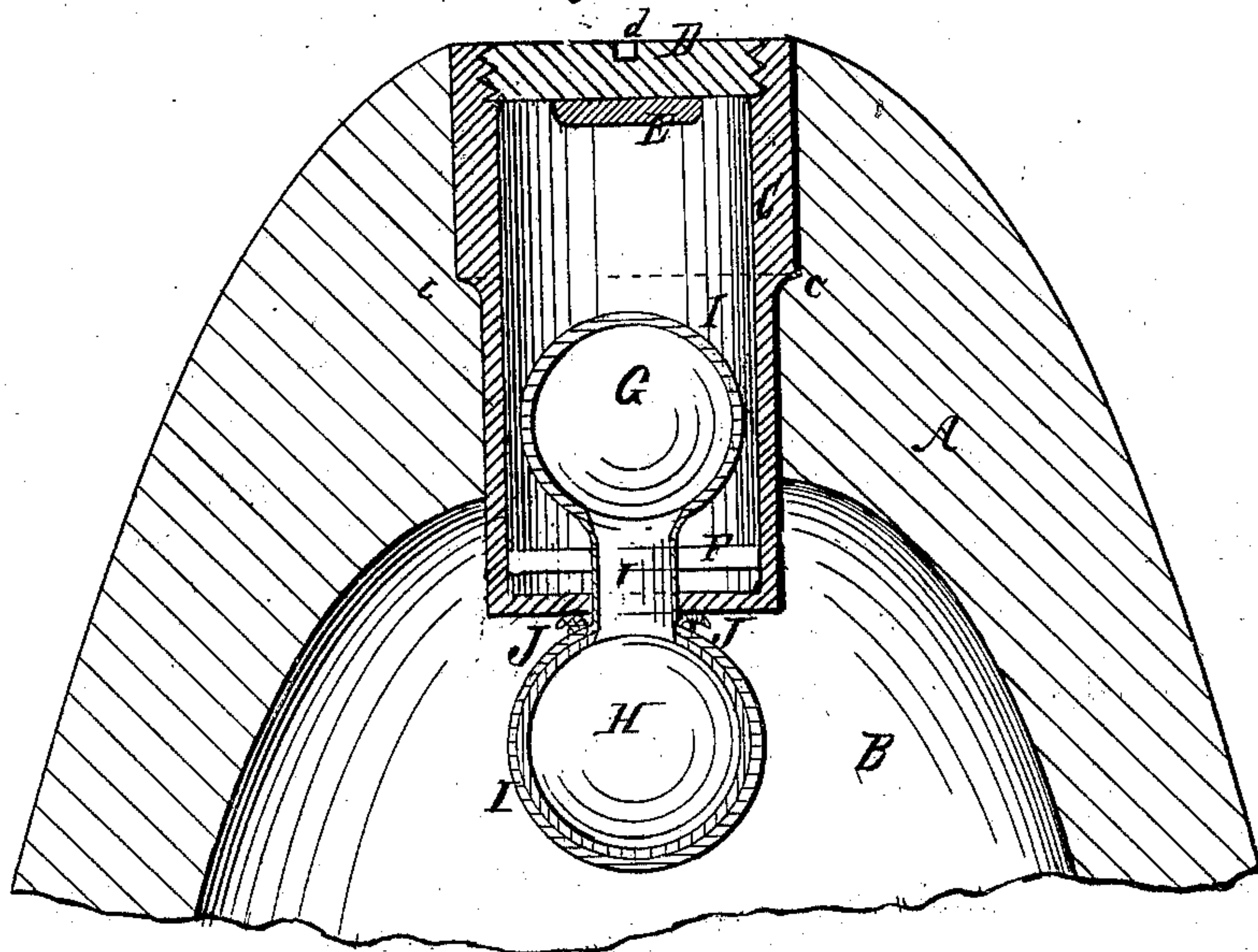


Fig. 2.

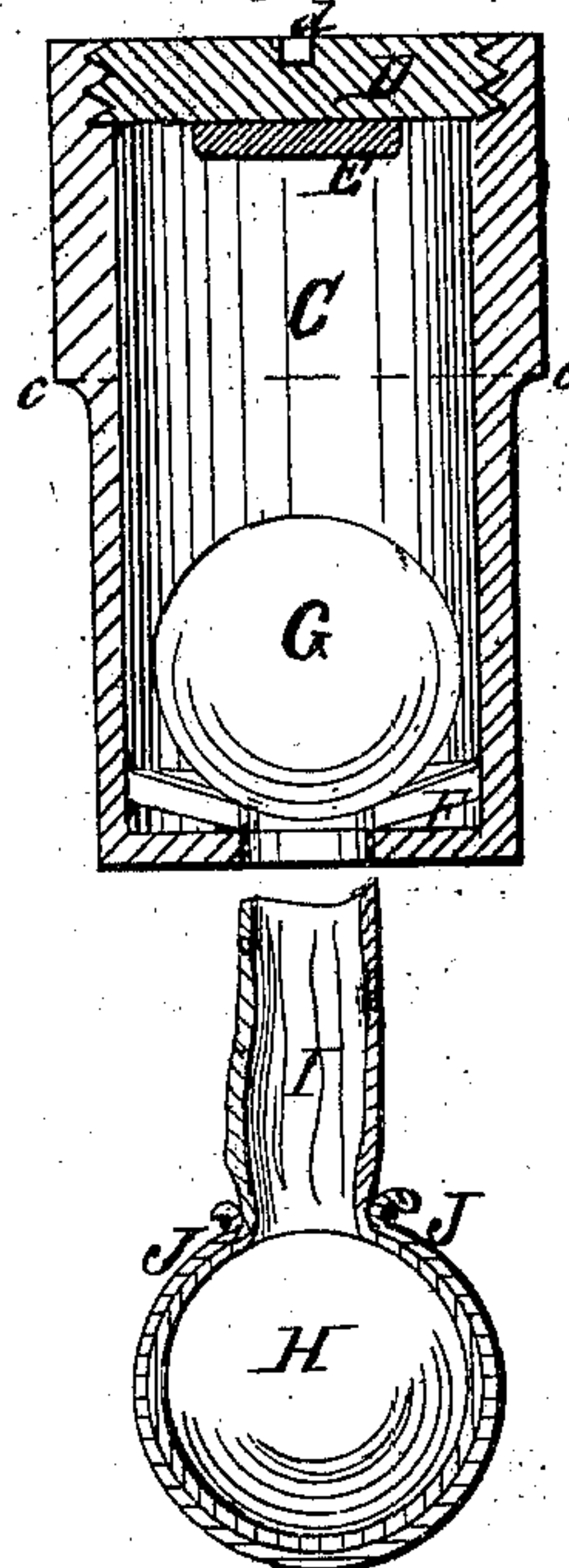
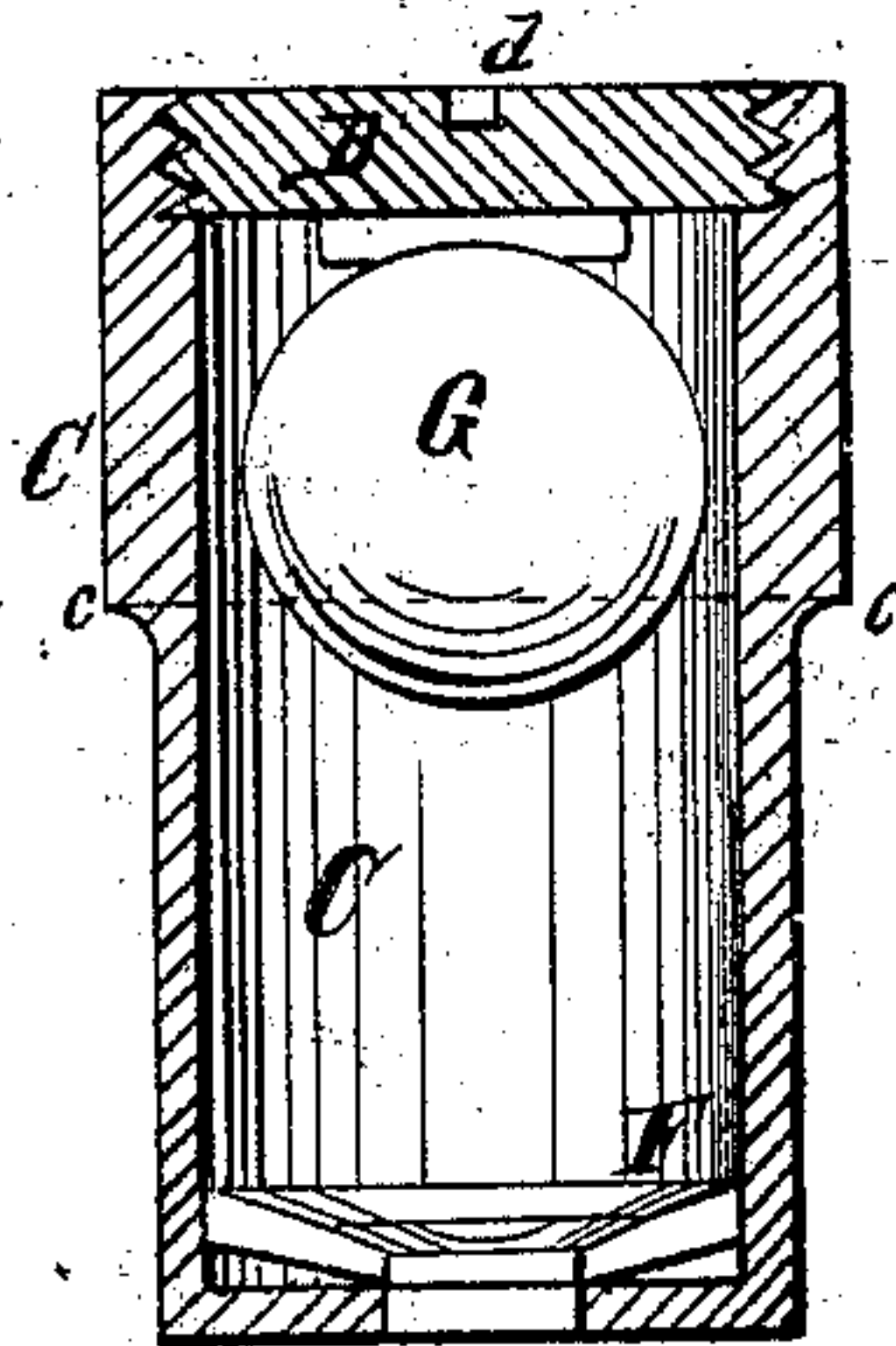


Fig. 3.



Witnesses.

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IMPROVEMENT IN PERCUSSION-FUSES FOR EXPLOSIVE SHELLS.

Specification forming part of Letters Patent No. 36,465, dated September 16, 1862.

To all whom it may concern:

Be it known that I, B. B. HOTCHKISS, of Sharon, in the county of Litchfield, in the State of Connecticut, have invented a new and useful Improvement in Percussion Mechanism of Explosive Projectiles; and I hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which all the figures are longitudinal sections through the center of my improved mechanism.

Figure 1 shows the condition of the parts when in their usual positions for handling, and, in addition to the case and its contents, which constitute the percussion mechanism, shows a portion of a section of the forward end of a conical projectile adapted for rifled-cannon practice. My invention is applicable to all forms of rifled-cannon projectiles and to all other projectiles of an explosive character in which the end or side which will strike the object can be determined, and its use is not confined to the conical form of projectile. Fig. 2 shows the condition of the parts of the mechanism proper immediately after the projectile has been discharged from the cannon and while it is flying through the air. Fig. 3 shows the condition of the parts, or of so much thereof as remains important, at the instant of the projectile striking the object.

Similar letters of reference indicate like parts in all the figures.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings and of the letters of reference denoted thereon.

Fig. 1 alone indicates the material of the projectile proper, but the same is to be assumed in the other figures.

A is the said material of the projectile proper.

B is the cavity in its interior, supposed to be loosely filled with powder or with powder mingled with balls or other destructive material, and CD is the case, which is fitted therein in any ordinary or known manner, so that the end stopped by the part D shall move foremost, and so that the case shall be well secured, by the shoulder *c* or otherwise, against sinking backward into the cavity B of the projectile

at the instant of firing the projectile from the cannon. There is a screw-thread to connect D and C, a nick, *d*, to allow these parts to be applied together, or separated by a screw-driver or wrench, a percussion cap or wafer, E, in the front of the case, and a hole in the center of the back of the case, all as represented. All of the above-described parts and their arrangement and functions are well known.

F is a washer, of lead, introduced from the front of C, and of such size as to fit tightly therein. It is pushed in with a proper force and urged nearly to the bottom, but not quite, and it remains secured by the friction of its tight contact with the interior of C, or by suitable projections on itself or on the interior of C, in the position represented in Fig. 1.

G is a ball, of iron or other hard material, as nearly spherical as may be, and of less diameter than the interior of C. H is another ball or weight, of the same or a different material. I prefer that H shall be a ball of lead.

I is a cloth envelope, wrapped tightly around both balls G and H, and holding them firmly together in the position shown in Fig. 1 so long as it is not exposed to any strain sufficient to rupture it.

J is string or wire wound round the parts represented, so as to firmly and safely secure the ends or edges of the cloth I against all ordinary strain; and, in addition to the security due to J, I prefer to saturate the cloth enveloping the weight H with a strong solution of shellac, so as to cement it firmly to H. I apply the cloth in the form of a nearly perfect equilateral triangle, or rather of a kind of star-formed piece having three equal salient angles and three equal re-entering angles. The piece of cloth is cut in that form and laid extended upon a table. Upon its center is then laid the ball G, taking care that no shellac or other material is present to prevent a ready separation of these parts. In the center of the cloth is cut a hole, *i*, smaller than the ball G, but adapted to be enlarged by the tearing of the material and to allow G to freely escape whenever the strain is too great to be resisted. I lift the corners or salient angles of the cloth I, and, having G now loosely inclosed, introduce these corners through the front end of the case C, the plate D not having been yet screwed in, but the lead washer having been

fitted in its place near the bottom. The corners of I are then urged entirely through the case C and drawn out through the hole in the base, so as to draw the ball G to its position within the case C resting upon the lead washer F, in the manner shown in Fig. 1. The lead ball H is next applied between the protruding parts of I, and the three parts separately and tightly folded over the same and tied by the cord or wire J. The greater portion of the whole of H, with its fibrous envelope, is then dipped in the solution of cement and allowed to dry, all these operations being of course performed before the case C and its connections are introduced within the projectile A. The cloth I is of sufficient strength to hold the two balls G and H together under all ordinary concussions. The projectile thus equipped and filled with powder may be turned over, rolled, tossed about, dropped from the hands or from a wagon, and rammed with considerable force by percussion, if necessary, in driving it home in the gun, without in any wise endangering the integrity of the cloth I; but at the moment of the discharge of the cannon the shock is so much greater as to immediately tear open the cloth and release the ball G. The law by which this is effected is the well-recognized inertia of the ball H, which pulls with great violence and carries itself and its attached cloth inward into the cavity of the shell or projectile. The ball G, after its release, remains in contact with the lead washer F, which it slides backward, or bends backward, as represented, or rolls forward gradually to the front of the case C, which may be long or short, as desired, but does not press with any great violence against the percussion cap or wafer E until the projectile is suddenly checked by striking. At this latter junction the ball G acts by its inertia or momentum to press with violence upon the wafer E, and causes its explosion. The flame from the explosion flows readily past the ball G, which is smaller than C, and, rushing through the base into the cavity of the projectile, ignites its contents with the usual destructive effect. The sliding or bending of the lead washer F, as also its crushing in the ordinary manner, tends to absorb the elasticity of the parts and prevent a violent rebound of the ball G after the rending of the cloth I. The difference in the strain induced on the cloth I at the instant of firing the cannon and that produced by handling and dropping the ball is very great, and there may be a very wide variation in the strength of the cloth and in the manner of its fastening without overstepping this very broad margin. It is obvious that until the cloth I is ruptured the wafer E cannot be subjected to any shock whatever, except that due to its own inertia, and that my projectile is therefore very safe as regards danger of accidental ignition from very severe ordinary concussions. This is one important feature of my invention. The spherical form of the ball or plunger G al-

lows it to roll and assume every conceivable position at will within the case C without possible danger of jamming or getting foul. Cylindrical plungers as commonly employed are liable to assume an angular position and get foul unless of less diameter than their length, and great length is objectionable, especially in small shells, because of the limited space for explosive material which it involves. Cylindrical plungers also act at great disadvantage when, as is often the case at very long ranges, the shell or projectile does not strike directly point foremost, but quite obliquely. My ball rolls so freely and is so clear of entanglements as to operate well under circumstances where cylindrical plungers would fail or be very objectionable. This is another important feature and advantage of my invention.

The balls G and H, as held together in my invention, apply themselves closely to the aperture in the back end of the case C, and secure it most effectually against the admission of any powder or other material from the cavity B until after its discharge from the cannon, when it is certain to be open. As percussion mechanism is ordinarily employed, the loose material in B is liable, during the transportation or handling of the projectile, to enter the case C, and partially or entirely fill it, so as to prevent the action of the mechanism. This is another important feature of my invention.

The part H of my mechanism need not necessarily be a sphere, though I prefer such form for convenience, and because it is best adapted to contribute to the destructive effect of the explosion when it is thrown out of the projectile into space by the action of the powder in common with the other loose material of the contents. The weak connection of the balls G and H through the hole in the back of the case C need not necessarily be by means of cloth I and wire and gum, because many other ready means for securing the cloth to H may be devised or produced by any good mechanic without altering the effect or the action of the invention. It is necessary simply to make the connection very secure against all ordinary concussions; but even if by any fault this condition fails to obtain in any one of my projectiles, the danger of accidental discharge in handling, or of filling the case C with powder, so as to clog the mechanism, is no greater than with ordinary percussion mechanism. A convenient means of producing an equivalent of my cloth I and its attachments consists in the use of a soft wire of iron or copper or the like, which may be inserted loosely through both balls, or firmly in one and slightly in the other, and the end which extends through, being bent, will confine the balls very effectively, and yet release them very certainly by the straightening of the wire when the cannon is fired. This use of my invention differs from any device of analogous character previously known to me,

in that it dissolves the connection entirely between the two balls, or between the plunger and the rearmost weight, at the moment of the discharge of the cannon without a possibility of again restoring it, even in part, by any subsequent movement of either part.

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

The weakly-connected plunger G and a weight, H, so arranged as to stop the orifice

in the back of the case C until the discharge of the cannon, and so as to open the orifice certainly at the instant of said discharge, and no longer maintain any connection between the plunger and the weight, all substantially as and for the purpose herein set forth.

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Witnesses:

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O. E. VOSSNACK.