

(No Model.)

J. CLARK.
EXPLODER FOR PROJECTILES.

No. 502,348.

Patented Aug. 1, 1893.

Fig. 1.

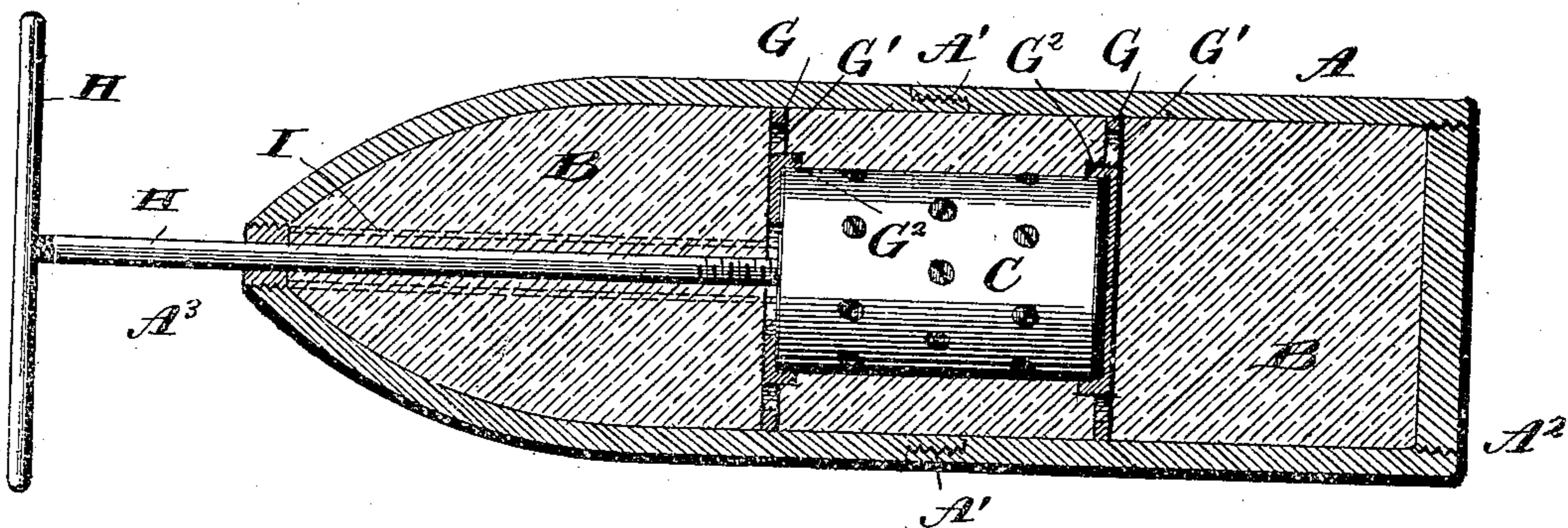


Fig. 2.

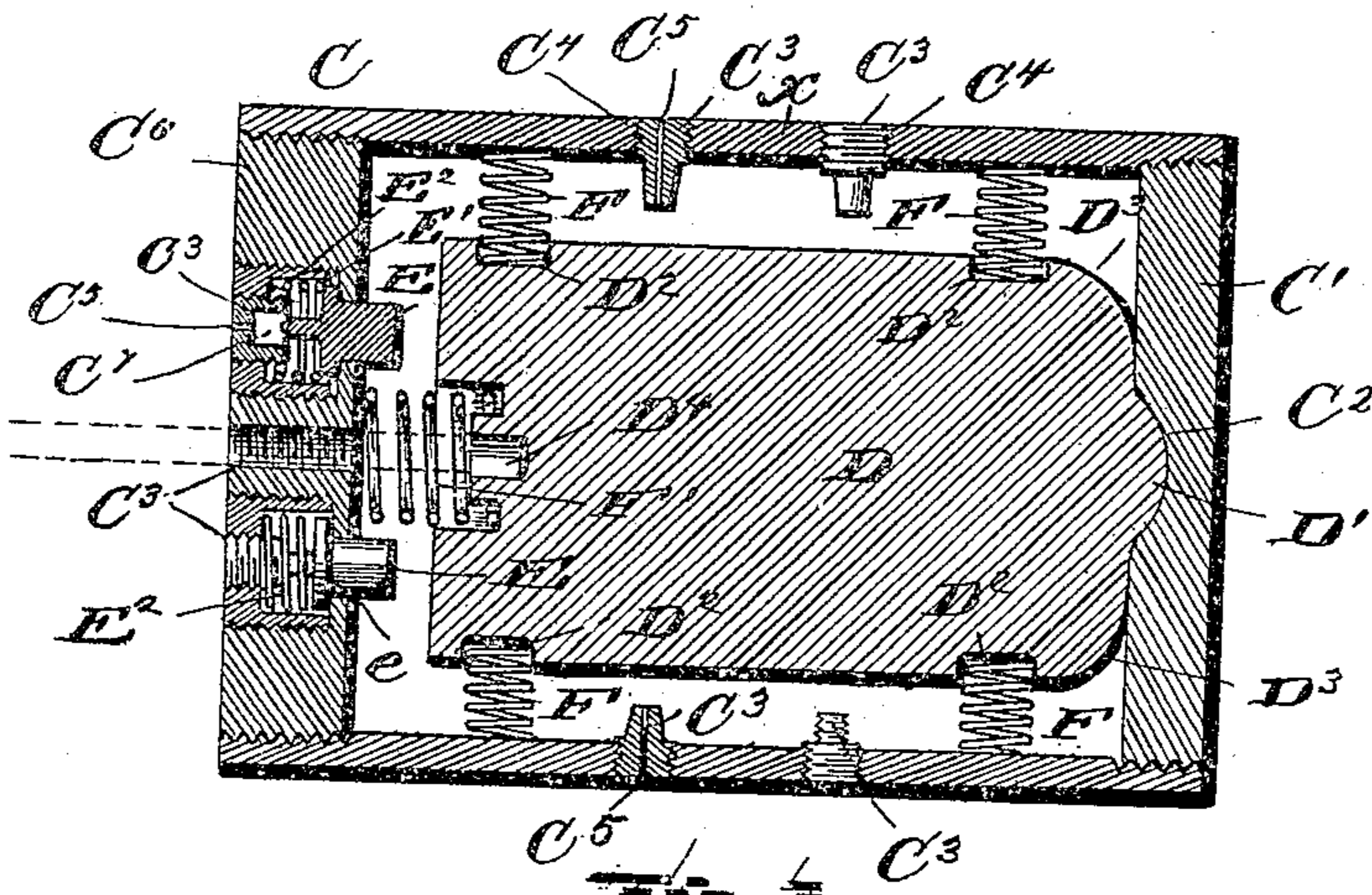
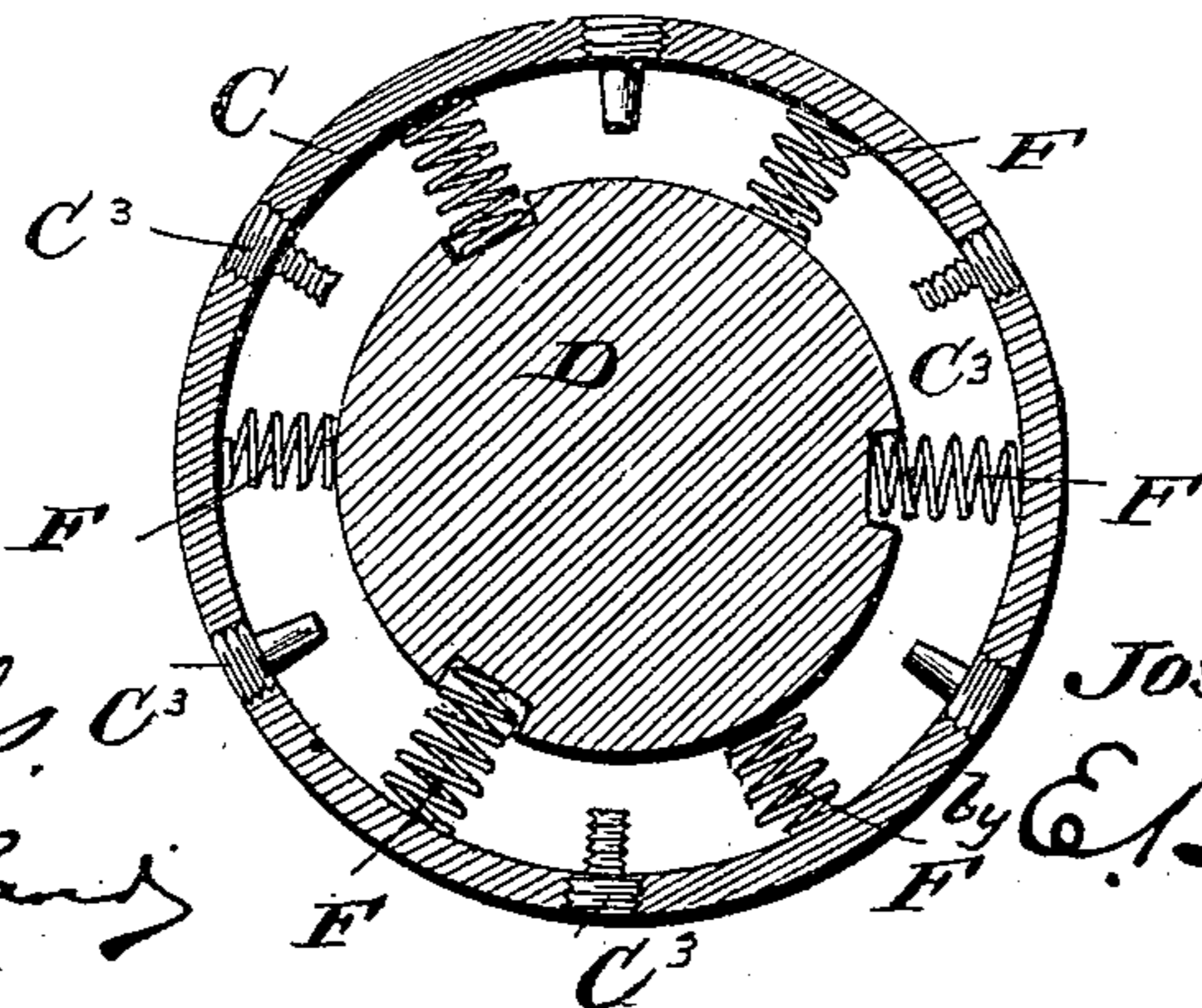


Fig. 3.



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UNITED STATES PATENT OFFICE.

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EXPLODER FOR PROJECTILES.

SPECIFICATION forming part of Letters Patent No. 502,348, dated August 1, 1893.

Application filed June 21, 1892. Serial No. 437,463. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CLARK, a citizen of the United States, residing at San Francisco, in the county of San Francisco, State of California, have invented certain new and useful Improvements in Exploders for Projectiles, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention has relation to explosive projectiles and the object of the invention is to insure the explosion of the projectile at the instant that it strikes an object. In the practical use of projectiles of this character, it is a matter of fact that a very large proportion of shells projected from ordnance or otherwise, fail to explode and in that class of shells where the cap or primer is at the point, failures often occur because the shell does not strike the object with its point. In that class of shells which are provided with time fuses, an accurate determination of the proper length of fuse for certain distances through which the shell is to be projected and imperfections existing in the fuse contribute to failure in many instances. The employment of a movable plunger or hammer has been essayed for the purpose of utilizing its rebound when the shell strikes on its point for the purpose of striking a cap having communication with the explosive material within the projectile, but in these instances no provision has been made for insuring an explosion in case the shell should fail to strike the object with its point and this failure to so strike an object is exceedingly common so that notwithstanding all that has heretofore been essayed in this character of devices the object sought, that is absolute certainty of explosion regardless of the portion of a shell which comes into contact with an object, is still unattained. Devices heretofore used are also liable to be accidentally brought into action.

By my invention I secure substantially absolute certainty of explosion and absolute safety against accidental explosion.

Referring to the drawings:—Figure 1 represents a longitudinal section of an explosive shell with my improved exploder applied thereto. Fig. 2 is a longitudinal vertical section of the exploder ready for action. Fig. 3

is a substantially central transverse section of the exploder.

Like letters refer to like parts in all the figures.

A represents a shell which may be of any desired construction and B represents an explosive compound within the shell which compound may also be of any nature, character or name as desired and placed within the shell in any desirable suitable manner. My invention has no relation to any shell or explosive compound employed therein.

C represents my exploder and it consists of a shell which may be of any desired contour and can be cylindrical as illustrated in this case. It has a bottom or rear head C' which may be threaded into the shell or cast or otherwise formed integrally therewith. The bottom C' has a counter-sink or recess or it may be a hole C² therein which receives a projection D' formed on the hammer or plunger D. Any desired number of nipples C³ either plain or screwthreaded to retain a cap or primer by friction or by coacting screwthreads in the cap are arranged in any desired manner within the shell C with their cap holding ends pointed inwardly. A convenient form of connection for the nipples with the shell is by screwthreads C⁴. Each of the nipples has openings C⁵ to communicate with the explosive material B within the shell or projectile in which the exploder is embedded. I may employ other forms of nipples, in fact any form that may be preferred. I have illustrated in the head or closing plug C⁶ of the exploder a form of nipple which has the flash opening C⁵ and a recess C⁷ to receive that form of cap known as a primer. I have also provided a supplementary hammer E, held away from the primer by a coiled spring E', so that when the main hammer or plunger D comes into contact therewith the primer will be exploded by the projecting lug E² on the hammer E. This lug E² would be dispensed with in case an ordinary nipple were used instead of a primer nipple and the face of the hammer E would be plain as shown at the lower one of the two hammers E in Fig. 2.

The plunger or hammer D is supported centrally but yieldingly within the shell C of the exploder. This yielding support may be se-

cured by the use of springs of any character and I have shown one form which consists of coiled springs F and these are in this instance, arranged radially and they may be seated for
 5 a desired depth in recesses D² formed in the hammer. The number and stiffness of the springs may be as desired and the latter characteristic may be far beyond what is necessary for the mere support of the plunger so
 10 as to insure against accidental movement of the plunger toward any of the nipples projecting inwardly from the shell of the exploder. The plunger is made of any suitable material which will give it a desired weight
 15 sufficient to be forced against the nipple or against one or more of any of the nipples so as to explode the cap or caps thereon. A wide margin exists in the tension of the spring because of the much greater force exerted when
 20 the shell strikes an object after it has been projected from a cannon, rifle or other piece of ordnance. The tension of the spring is therefore permissible to such an extent that the accidental dropping of a shell provided
 25 with my exploder will not cause the plunger, to contact with any of the nipples in the exploder. A spring F' may be employed between the front end of the plunger and the inner face of the closing plug C⁶ of the shell to insure
 30 against the forward movement of the plunger from accidental causes but the friction of the springs F upon the inner wall of the exploder-shell will ordinarily be sufficient to prevent such a movement of the plunger. It
 35 will be observed that as a shell is projected and while it is still within the gun, the rear end of the plunger D presses with great force (its weight multiplied by the momentum of the shell) against the bottom C' of the exploder so that the liability of the plunger
 40 coming into contact with any of the nipples is exceedingly limited and the broader the base of the plunger the less of such liability exists; still the spring F' may be employed
 45 if desired to increase the safety of accidental displacement or rebounding of the plunger. The rear end of the plunger is rounded as at D³ for the purpose of facilitating a radial movement of the front end of the plunger so
 50 that said end may come in contact with nipples in the forward part of the exploder.

As thus far described it will be seen that in my invention there is embedded in the explosive material of a projectile an exploder
 55 comprising a shell having nipples projecting inwardly and having supported therein a plunger the manner of its support being such that it may move in any direction excepting in a right line rearwardly in the direction of
 60 movement of the projectile. With this construction it is impossible for a shell, i. e., a projectile, to strike an object in any direction with any portion of the projectile in contact therewith without causing the plunger to ex-
 65 plode one or more of the caps upon its nipples.

My exploder may be arranged within a shell

and secured therein by any suitable means or in any suitable manner. It may be simply embedded in the explosive material or the shell may be provided with one or more par-
 70 titions, diaphragms or spiders G, with or without openings G' and with or without sockets G² for receiving and supporting the ends or periphery of the exploder shell. The projectile may be divided into sections A' or have
 75 a removable bottom A² or may be of any other well known construction that will facilitate the introduction of the exploder and the explosive compound.

For purposes of safe transportation and
 80 handling and to absolutely prevent an accidental movement of the plunger and therefore the accidental explosion of a projectile provided with my exploder, I have devised a
 85 securing bolt H which is threaded into and through the plug C⁶ and which is adapted to enter a recess D⁴ in the front end of the plunger so that when by any suitable means the
 bolt H is passed through the plug or head C⁶ and into the recess D⁴, it firmly locks the
 plunger against the bottom of the exploder and together with the projection D', main-
 90 tains the plunger rigidly and centrally within the exploder so that it is utterly impossible for the plunger to contact with the nipples. 95

In order to insure the unlocking of the plunger before a projectile provided with my exploder is seated in a gun, I have provided
 on the bolt H, an angularly-disposed handle H' which projects in one or more directions be-
 100 yond the periphery of the projectile so that it is impossible to place such a projectile within a gun without removing the bolt H. The handle H' also serves as a means of carrying the shell from place to place. In order
 105 to insure against the accidental abrasion and explosion of the material within the projectile, a tube I of paper or other material may be inserted within the shell and extending
 110 from its point to the opening in the plug C⁶ into which the bolt H is screwthreaded. If desired a plug similar to the plug A³ through which the bolt H passes may be inserted at
 the point of the projector so as to close said
 115 opening after the bolt H is removed from the exploder and projectile or a simple hole at the point of the projectile for receiving the
 bolt H may be employed or if desired an ordinary nipple with a cap on the outer end
 120 and communicating with the interior explosive material may be after the bolt H is removed, mounted upon the point of the projectile so that if the shell strikes upon the point its explosion is further insured.

As before indicated I may use any form of
 125 nipple in the sides or front of the exploder shell, those shown in the front being used indiscriminately in the sides or front and vice versa. The hammer E has its body smaller than the head thereof passing through an
 130 aperture e, in the plug or head C⁶, and a plug E' is screwthreaded into the head C⁶ and

in this plug the nipple C is screwthreaded, the coiled spring E² encircling the nipple and bearing against the head of the hammer.

While the projection D' of the plunger serves to center the plunger by entering the recess E² when the bolt H is employed to lock the plunger against any movement, still it is apparent that a plain flat ended plunger without a projection bearing against a plain unrecessed bottom C' will be firmly locked by the bolt H; therefore while the projection D' and recess C² are preferred still the invention is not limited to these details.

What I claim is—

1. An exploder comprising a plunger supported yieldingly to permit movement in radial directions.

2. An exploder comprising a plunger supported yieldingly to permit movement in a forward and in radial directions.

3. An exploder provided with a plunger supported rigidly at its rear and yieldingly at its sides, whereby it may move radially.

4. An exploder comprising a plunger and means for locking said plunger against movement, said means extending beyond an area in cross section greater than the caliber of the shell in which said exploder is employed.

5. An exploder consisting of a shell provided with a nipple arranged on a diametric line in its side and of a plunger yieldingly supported within the shell and capable of radial movement.

6. An exploder consisting of a shell provided with a plurality of nipples arranged diametrically in its sides and a plunger yieldingly supported within the shell whereby it is adapted to move radially in all directions.

7. An exploder consisting of a shell provided with nipples arranged diametrically in its sides and front end and with an interior

plunger yieldingly supported in all directions except against rearward movement.

8. An exploder consisting of a shell having nipples arranged diametrically in its sides and front and having a plunger and means for rigidly supporting it against rearward movement and for yieldingly supporting it in all other directions.

9. An exploder, consisting of a shell having nipples and a recessed bottom and a plunger provided with a projection fitting said recess and with springs projecting diametrically from the plunger and supporting it within the shell.

10. A projectile having rigid partitions provided with sockets, an exploder seated in said sockets and having a spring-supported plunger and a bolt screw-threaded into the exploder and provided with a T-head, a branch of which extends beyond the periphery of the projectile.

11. An exploder shell provided with a nipple and a spring-held hammer both of which are co-operatively seated in a wall of the shell, in combination with an interior yieldingly-supported plunger, substantially as specified.

12. An exploder having seated in a wall thereof a nipple, an encircling spring and a hammer against which said spring takes bearing and an interior plunger operating to strike said hammer.

13. An exploder provided with a plunger surrounded upon all sides and at its front end by springs and rigidly supported at its rear, substantially as specified.

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

JOSEPH CLARK.

Witnesses:

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HEATH SUTHERLAND.