No. 789,358. PATENTED MAY 9, 1905.

C. F. & H. E. COWDREY.

CHAMBERED PROJECTILE.

APPLICATION FILED APR. 21, 1904.

Fig. 1.

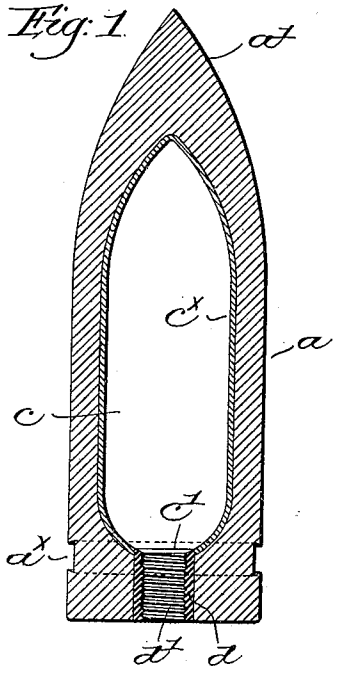


Fig. 2.

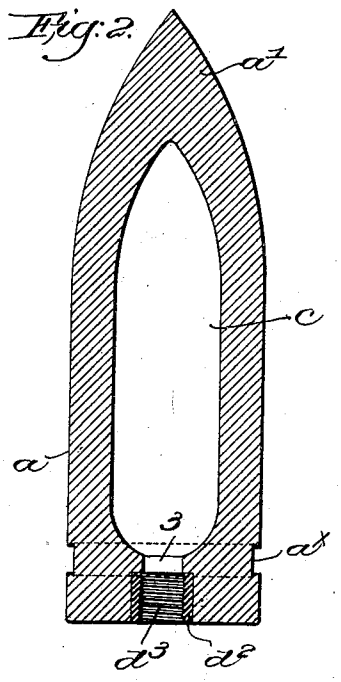


Fig. 3.

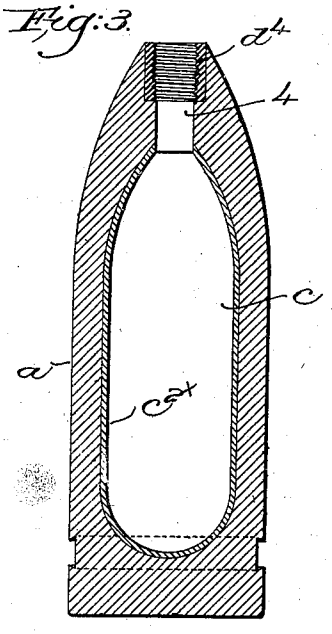


Fig. 4.

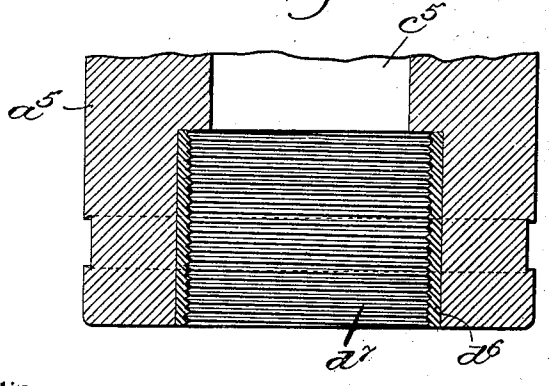
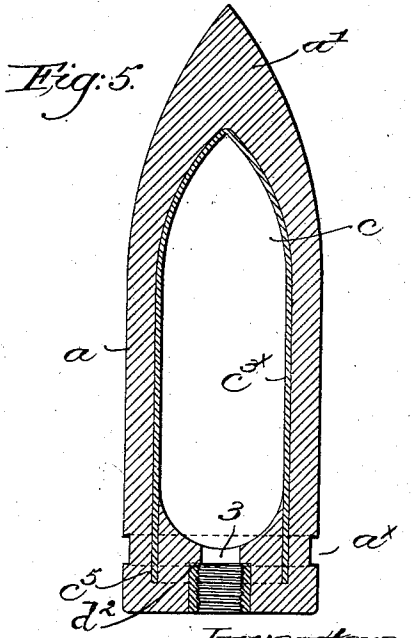


Fig. 5.



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No. 789,358. Patented May 9, 1905.

UNITED STATES PATENT OFFICE.

CHARLES F. COWDREY AND HENRY E. COWDREY, OF FITCHBURG, MASSACHUSETTS.

CHAMBERED PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 789,358, dated May 9, 1905.

Application filed April 21, 1904. Serial No. 204,206.

To all whom it may concern:

Be it known that we, CHARLES F. COWDREY and HENRY E. COWDREY, citizens of the United States, and residents of Fitchburg, county of Worcester, State of Massachusetts, have invented an Improvement in Chambered Projectiles, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

Our present invention relates more particularly to cast-iron high-power ordnance projectiles chambered to receive a bursting charge; and it has for its objects the production of a stronger projectile having a larger chamber and capable of being charged with greater safety than is now common, with improved and novel means for seating the plug, whether the latter be a base, point, or fuse plug.

The capacity of the charge-chamber in a cast-iron projectile of a given size is limited by the thickness of the walls thereof, as sufficient cast-iron must be used to give the requisite strength to the projectile to resist fracture when fired from the gun. As the strength of cast-iron is relatively low, the walls of a chambered projectile made therefrom must be and are in practice made relatively thick, increasing the weight of the projectile and reducing the capacity of the charge-chamber. Furthermore, much care has to be exercised by the makers of such projectiles to secure a smooth surface for the interior of the chamber in order to avoid as much as possible the danger of premature explosion when loading the charge into the projectile. To this end the interior of the chamber is first carefully cleaned after removal from the mold to remove all traces of the core, and after washing the chamber is coated with a suitable paint to present as smooth a surface as possible. Such treatment increases the cost of the projectile and at times fails of the desired object. In our present invention we are enabled to reduce the thickness of the cast-iron walls of the projectile (and thereby the weight of the latter) while increasing the strength thereof and enlarging the capacity of the chamber by providing a relatively thin lining for the chamber, preferably of steel. By such construction we are also enabled to secure a smooth surface for the chamber-walls, thereby obviating any danger of premature explosion when loading and doing away with the cleaning, washing, and coating operations hereinbefore referred to. We have also made provision for securing a tighter and more thoroughly gas-proof seat for the fuse or base plug, as the case may be, by providing a steel seat for the plug, made as a lining for the charging-opening, whether the same be located at the base or point of the projectile. Heretofore such opening has been provided with a screw-thread cut in the cast-iron, and it is not always possible to cut such a thread with the desired degree of accuracy or fineness, so that at times there is an opportunity for the highly-penetrative gases generated by the high-power explosives used for the propulsive charge in the gun to work their way between the plug and the threaded seat and enter the chamber, causing premature explosion of the bursting charge therein. By making the plug-seat of steel a thread of any required fineness and accuracy can be readily cut therein, so that an absolutely gas-tight closure is secured when the plug is screwed into place, the thickness of the plug-seat being materially greater than the depth of the thread, so that there can be no possible interference with the integrity of the union between the plug-seat and the body of the projectile. Both the lining of the chamber and the plug-seat in accordance with our invention form component parts of the projectile, as they are united in a perfect manner with the cast-iron forming the body of the projectile when such cast-iron is in molten condition.

The several novel features of our invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a longitudinal sectional view of a chambered projectile embodying our invention and arranged for a base-fuse. Fig. 2 is a similar view of a base-fuse chambered projectile, showing a different arrangement of

our novel plug-seat. Fig. 3 is a longitudinal section of a point-fuse projectile, showing the lining for the chamber and the form of plug-seat illustrated in Fig. 2. Fig. 4 is a sectional detail of the base portion of a larger projectile, such as is used in mortars, with a seat for the base-plug embodying our invention; and Fig. 5 is a view of a projectile similar to that shown in Fig. 1, but illustrating a modified form of lining for the chamber.

In Figs. 1, 2, and 5 the projectile a, having an ogival point or head a', is made of cast-iron and provided with a chamber c to receive the bursting charge, and the base has a longitudinal opening leading into the chamber, by which the bursting charge may be loaded thereinto, the projectile having an undercut annular groove $a^{\times}$ to receive the usual copper or soft-metal band or ring (not shown) to cooperate with the rifling-grooves of the gun.

Referring now to Fig. 1, the chamber c is provided with a relatively thin metallic lining $c^{\times}$, having greater tensile strength and a higher melting-point than cast-iron, and we prefer to use steel for the purpose. This lining is spun or otherwise shaped to the proper dimensions and contour of the chamber and is placed in the mold as a core; but previously it is treated in any suitable manner to secure a perfect union with the cast-iron without the formation of blow-holes or other imperfections. We have secured the most satisfactory results by cleaning and tinning the lining. When the latter is placed in the mold and suitably supported, the molten cast-iron is poured into the mold, and the outer surface of the lining is perfectly united with the cast-iron forming the body of the projectile. The lining is provided at its base with an opening c', Fig. 1, to register with the charging-opening of the projectile, and at the time the latter is cast a tubular steel plug-seat d is united with the cast-iron in the manner described with relation to the lining of the chamber. Subsequently the plug-seat is internally screw-threaded, as at d', to receive the fuse-plug. The plug-seat is shown as extending from the lining-opening c' to the extreme end of the projectile-base, thus constituting a lining from one to the other end of the charging-opening; but, as will be explained hereinafter, the plug-seat may be made shorter. In casting the projectile the lining will be supported on a spindle, the latter being extended through the plug-seat or lining d, and then the molten cast-iron is poured into the mold. A very fine and accurate thread can be made in the steel-lining tube, so that an absolutely gas-tight fit can be had for the plug.

In Fig. 2 the chamber of the projectile is unlined, and it will be observed by comparison with Fig. 1 that the walls are very much thicker in order to secure the requisite strength, and consequently the chamber has materially smaller capacity. The charging-opening 3 is shown in the base of the projectile, communicating with the base of the chamber, and the steel plug-seat or lining d^2 extends for only a part of the length of the opening 3, its length, however, being sufficient to properly support the plug when screwed into the internal thread d^3, with which the seat is provided.

In Fig. 3 the projectile is arranged for a point-fuse, and the charging-opening 4 has a steel seat d^4 for the fuse-plug, the seat being similar to the one shown in Fig. 2, except that it is in the head of the projectile. We have shown the chamber c as having a steel lining $c^{2\times}$, communicating at its upper end with the charging-opening 4, and inasmuch as the entire base of the chamber is lined it will be manifest that such lining also forms a gas-shield for the chamber. This is also true of the construction shown in Fig. 1, as the plug-seat at its inner end meets the lining of the chamber.

In the structure illustrated in Fig. 2 and, if necessary, in that shown in Fig. 5 a gas-shield may be employed, as shown and described in United States Patent No. 763,370, granted to us on the 28th day of June, 1904.

The base portion of a larger cast-iron projectile a^5, such as is used for mortars, is shown in Fig. 4, and the large opening in the base communicating with the chamber c^5 is provided with a tubular steel lining d^6, united with the cast-iron when the same is in molten condition, as before, and subsequently screw-threaded, as at d^7, for the reception of a base-plug of usual construction.

In the projectile shown in Fig. 5 the steel lining $c^{3\times}$ has its base portion made cylindrical, as at c^5, and in this arrangement the bottom of the chamber c is formed separately by a core-piece inserted in the end of the lining and so shaped that the cast-iron will flow around the end c^5 of the lining when poured into the mold. This construction can be used when it is not deemed necessary or desirable to shape the lower end of the lining to conform strictly to the contour of the base of the chamber. The charging-opening 3 is shown as provided with a steel plug-seat d^2 of the character illustrated in Fig. 2. The steel plug-seat is of such thickness that when the internal screw-thread is formed therein it will be wholly within the steel, leaving a considerable thickness of the latter between the bottom of the thread and the outer wall of the plug-seat where the latter is united with the body of the projectile.

Whatever the particular arrangement of the lining for the chamber or the plug-seat for the charging-opening, the cast-iron when poured into the mold forms a perfect union therewith and makes lining or plug-seat a component part of the projectile.

Various changes or modifications may be made by those skilled in the art without de-

parting from the spirit and scope of our invention.

Having described our invention, what we claim, and desire to secure by Letters Patent, is--

1. A cast-iron projectile having a chamber therein and a longitudinal charging-opening communicating therewith, a relatively thin steel lining for the chamber, and a tubular, steel plug-seat in the charging-opening, both the lining and the plug-seat being united with the surrounding cast-iron when the same is in molten condition.

2. A cast-iron projectile having a chamber therein, and a longitudinal charging-opening communicating therewith, a relatively thin steel lining for the entire chamber and united with the surrounding cast-iron when the same is in molten condition, and a tubular, steel plug-seat embedded in the walls of the charging-opening, extending the length thereof and of sufficient thickness to be internally threaded.

3. A cast-iron projectile having a chamber therein, and a longitudinal charging-opening communicating with the chamber, a relatively thin steel lining for the entire chamber and permanently united with the cast-iron body portion of the projectile, and a tubular, steel plug-seat embedded in the walls of said charging-opening and of sufficient thickness to be internally threaded to receive the plug.

4. A cast-iron projectile having a chamber therein, and a longitudinal charging-opening communicating with the base of the chamber, an internally-smooth and relatively thin metallic lining for the entire chamber having greater tensile strength and a higher melting-point than the cast-iron and united to the latter when the same is in molten condition, and a tubular plug-seat of like metal embedded in the walls of the charging-opening and of sufficient thickness to be internally threaded to receive the plug.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES F. COWDREY.
HENRY E. COWDREY.

Witnesses:
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E. A. MERRIAM.