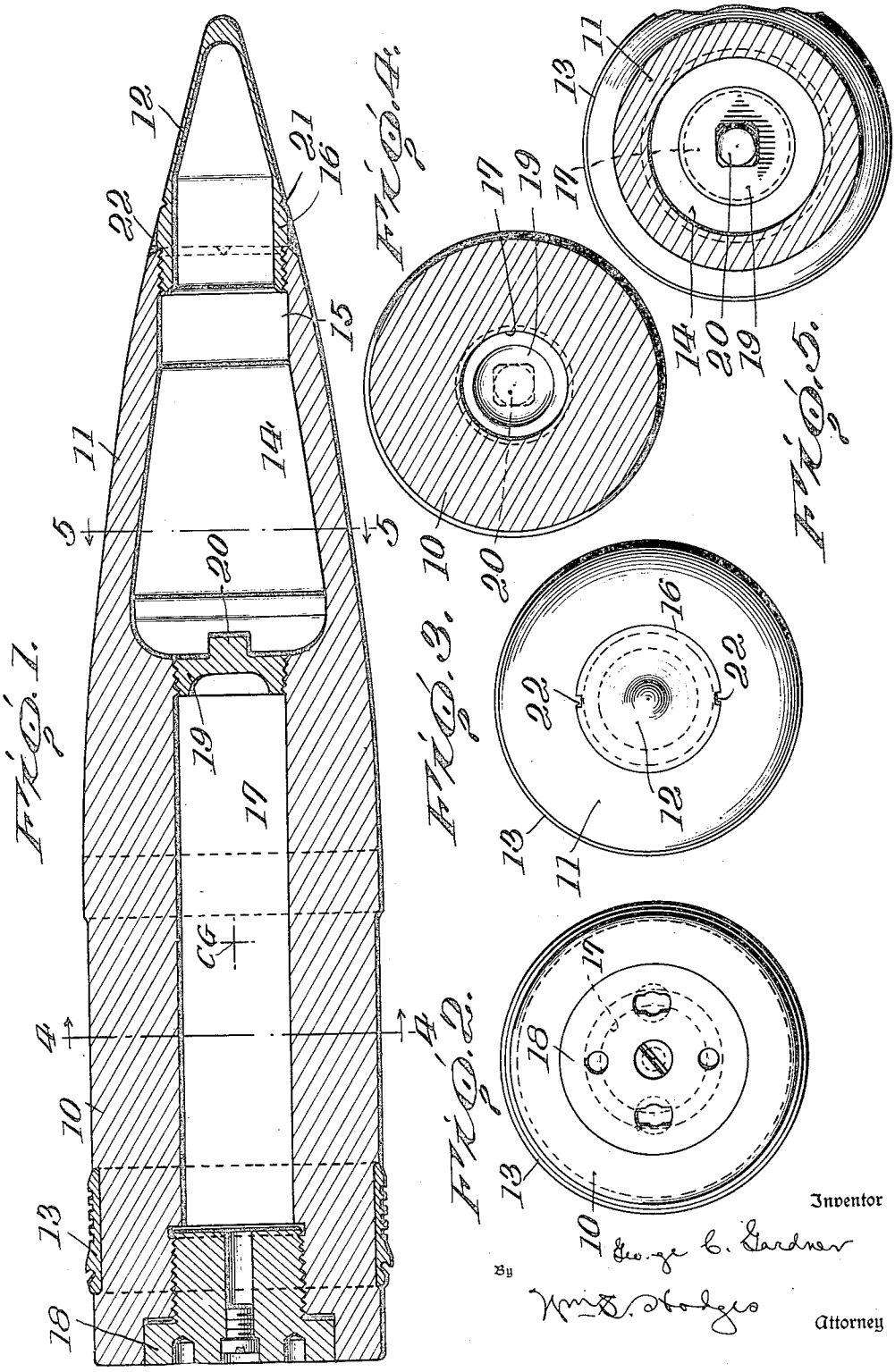
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PROJECTILE

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PROJECTILE

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This invention is a projectile of the character which is employed in connection with heavy ordnance target practice.

One of the objects of the invention is to provide a projectile of the character mentioned, in which the head and body are formed in one integral piece, thereby producing a much stronger projectile than those of the old style, and greatly reducing the time and labor normally involved in the manufacture of such devices. A further object is to provide a target projectile having an internal cavity, and means for dividing the same so as to provide an independent head cavity which may be used for spotting. A further object is to provide a projectile body with a head cavity and a second, axially disposed cylindrical cavity, in the rear of the head cavity and in advance of the usual base plug, the said cylindrical cavity being surrounded by a wall of uniform thickness, so that excess material may be readily removed therefrom, so as to bring the projectile to a prescribed weight and at the same time maintain the center of gravity of the projectile at a predetermined location.

The invention will be hereinafter fully described and particularly pointed out in the claims.

In the accompanying drawings:—

Figure 1 is a longitudinal sectional view illustrating a projectile constructed in accordance with the invention. Figure 2 is a rear end view thereof. Figure 3 is a front end view thereof. Figures 4 and 5 are transverse sectional views on the lines 4—4 and 5—5 respectively of Figure 1, looking in the direction of the arrows.

Referring to the drawings, the projectile body is provided with a cylindrical body portion 10, the forward end of which is tapered at 11 to provide a standard type "windshield". The forward extremity of the windshield is provided with a nose cap 12, and the cylindrical portion of the projectile body is provided with the usual type of rifling band 13.

The projectile is provided with an internal chamber or cavity having an enlarged chamber section 14, the shape of which conforms to the contour of the tapered portion 11 of the forward end or head of the projectile. The forward end of said chamber section 14 has a cylindrical extension 15, which is internally screw threaded at its forward extremity, to receive a correspondingly threaded portion of a rearward cylindrical projection 16, of the nose cap 12. Communicating with the chamber section 14 and extending rearwardly therefrom to the rear extremity of the projectile, is a cylindrical chamber section 17, the rear end of which is closed by a standard type base plug 18. The forward end of the cylindrical chamber section 17 is closed by a plug 19, which is threaded to removably engage a correspondingly threaded portion at the forward end of the chamber section 17, so as to separate the internal cavity into two chamber sections 14 and 17. Said plug 19 is provided with an angular projection 20, so that it may be readily engaged by a wrench.

So far as shape and weight are concerned, the projectile, as shown, conforms to the general specifications of a standard-type eight inch shell, and the body portion is cast of any suitable metal or alloy in a manner well understood in the art. With the proportions shown in the drawings, the forward chamber section 14 follows the outside head contour, and displaces sufficient metal to balance the projectile at a predetermined point indicated at CG, specified as the center of gravity. The back shoulder of said chamber section 14, which shoulder is defined in the drawing by the forward face of plug 19 terminates on the axial line of the projectile at a distance forward of said point CG corresponding to the distance that the front end of plug 18 is to the rear of said point. In other words, the ends of the cylindrical chamber 17 are equi-distant from said point CG, which point is located at the axis of said cylindrical chamber section 17. Thus, the cylindrical portion of the cavity is kept in an axially disposed relation with respect to the center of gravity of the projectile, the fab-

ricated windshield is eliminated, and the windshield is formed with the head of the projectile proper. At the same time, the center of gravity is fixed in a determined specified location, so that the cylindrical portion of said chamber section 17, forward of the base plug 18 and aft of the enlarged chamber section 14 of the cavity may be varied in diameter, to bring the projectile to a prescribed predetermined weight and said predetermined center of gravity will be maintained.

In other words, the projectile body is formed around the predetermined center of gravity, with the cylindrical chamber section 17 and the enlarged forward chamber section 14. The base or rear end of the cylindrical portion 17 is plugged with a base plug 18, which forms the projectile base into a fabricated disk, as to the original length of the base plug. The length of the cylindrical portion of the cavity is determined by the distance the center of gravity is located forward of the base plug 18, and whatever this distance may be, the cylindrical portion 17 must extend the same distance forward of the specific center of gravity, so that the rear shoulder of the enlarged chamber section 14, as defined by the forward face of the plug 19 is the same distance from the center of gravity as the forward end of said plug 18. Thus, the open cylindrical cavity section 17 is divided equally fore and aft of the center of gravity. In the displacement of metal from the forward enlarged portion 14, the profile of the cavity must follow the contour of the tapered head and connect with the cylindrical portion 17 at the forward end of the latter, by any suitable radius, and as the base of the projectile is a solid mass of metal as to the length of the base plug, said base becomes a counter-weight with respect to the head portion of the projectile, affected by the enlarged forward cavity portion 14. When sufficient metal has been displaced from said enlarged chamber section 14, the projectile will become balanced on the specified center of gravity indicated at the point CG, which is located axially in the cylindrical portion 17 of the chamber. With the parts arranged as above specified, the cylindrical portion of the cavity may now be varied in diameter, i. e. its diameter may be increased or diminished, so as to control the weight of the projectile and at the same time maintain the center of gravity fixed at the predetermined point CG, irrespective of the dimensions of the shell or the character of the metal from which it is fabricated. For this purpose, the section chamber 17 is made cylindrical, and disposed axially and concentrically with the outer surface of the rear body 10, so that the wall surrounding the cavity is of uniform thickness. Taking a given metal, such as high test gray cast iron or semi-steel, the proportions fixing the center of gravity are approximately as shown. If a dense heavy metal is used, and the proportions of the cavity 17 are maintained as shown in the drawings, the projectile would be over weight. Therefore, the chamber section 17 is made cylindrical and axially disposed with respect to the body of the shell and concentric with the axis thereof and also with respect to the center of gravity indicated at the point CG, so that a uniform quantity of metal may be removed from the surface of said chamber section to bring the projectile down to the prescribed weight and to also maintain the center of gravity at the approximately fixed point CG, as shown. Likewise, if a shell of larger caliber is constructed, it may be necessary to remove a portion of the metal surrounding the chamber section 17, so as to bring the projectile to the prescribed weight and also to maintain the center of gravity at the approximately fixed point.

The cavity section 14, in addition to providing for the fixing of the center of gravity at a predetermined location within the cavity section 17 by the displacement of metal in the manufacture of the projectile, may also be used for spotting, in a manner well understood in heavy ordnance target practice. To facilitate the use of the projectile for spotting purposes, the nose cap 12 is provided with an annular groove 21 to receive an inwardly pressed portion of the thin metal cover which is commonly used under such circumstances. No claim is made for the use of the cover and therefore the same is not shown. The nose cap is also provided with notches 22, to be engaged by a spanner wrench.

The advantages of the invention will be readily apparent to those skilled in the art to which it belongs. An important advantage is that the projectile body is made in one integral piece instead of being fabricated in several parts, as is now the practice, thereby reducing the time and labor involved in the manufacture, and at the same time maintaining the full tensile strength of the old style projectile. A further and important advantage is that the cylindrical chamber section extending axially through the body of the projectile with respect to the center of gravity, provides a simple arrangement which will permit of the removal of such excess metal which must be eliminated in order that the projectile may be brought to a predetermined weight and the center of gravity maintained at the predetermined position, thereby maintaining the balance of the projectile irrespective of the caliber, or of the character of metal employed in its con-

struction. By providing the forward chamber and separating it from the center of gravity maintaining chamber, a convenient spotting chamber is provided if its use is desired.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed is:—

1. A projectile comprising a cylindrical body tapered at its forward end and balanced with respect to a predetermined center of gravity, the cylindrical portion of said body having a concentric internal cylindrical chamber section, the thickness of the wall of which controls the weight of the projectile, the said predetermined center of gravity being located at the axis of said chamber, the ends of said chamber being equi-distant from said predetermined center of gravity, so that the diameter of the cavity may be increased or diminished to bring the projectile to a predetermined weight and at the same time maintain said predetermined center of gravity.

2. A projectile comprising a cylindrical body tapered at its forward end, said body having an internal cavity extending the length thereof, the forward portion of said cavity having an enlarged cavity section so as to displace sufficient material to balance the projectile with respect to a predetermined center of gravity, the cylindrical portion of the body having a cylindrical chamber section, the thickness of the wall of which controls the weight of the projectile, the said predetermined center of gravity being located at the axis of said cylindrical chamber section, the ends of said cylindrical chamber section being equi-distant from said center of gravity, so that the diameter of said cylindrical chamber section may be increased or diminished to bring the projectile to a predetermined weight and at the same time maintain said predetermined center of gravity.

3. A projectile comprising a cylindrical body tapered at its forward end and provided with an internal chamber extending the length thereof, the forward portion of said body having an enlarged chamber section following the outside contour of the forward end of said body, so as to displace sufficient material to balance the projectile with respect to a predetermined center of gravity, said cavity having a back shoulder, the cylindrical portion of said body having a concentric internal cylindrical chamber section extending to said back shoulder, the thickness of the wall of said cylindrical chamber section controlling the weight of the projectile, said predetermined center of gravity being located at the axis of said cylindrical chamber section, said back shoulder and the rear end of said cylindrical chamber section being equi-distant from said predetermined center of gravity, so that the diameter of the cavity may be increased or diminished to bring the projectile to a predetermined weight and at the same time maintain said predetermined center of gravity.

4. A projectile of the character described comprising a cylindrical body tapered at its forward end and provided with an internal chamber extending the length thereof, the forward portion of said body having a cavity section enlarged to displace sufficient material to balance the projectile with respect to a predetermined center of gravity, said chamber having a cylindrical chamber portion concentric to the cylindrical portion of said body, the thickness of the wall of the cylindrical chamber section controlling the weight of the projectile, the said predetermined center of gravity being located at the axis of said chamber, a removable plug closing communication between said chamber sections, the rear end of said cylindrical chamber section and the forward face of said plug being equi-distant from said predetermined center of gravity so that the diameter of the cavity may be increased or diminished to bring the projectile to a predetermined weight and at the same time maintain said predetermined center of gravity.

5. A projectile of the character described comprising a cylindrical body tapered at its forward end and provided with an internal chamber, said chamber having a forward chamber section enlarged to displace sufficient material to balance the projectile with respect to a predetermined center of gravity, the forward end of said chamber section having an opening therein, a nose cap closing said opening and having an annular peripheral groove near its base, said chamber having a cylindrical chamber section concentric with the cylindrical portion of said body, the thickness of the wall of said cylindrical chamber section controlling the weight of the projectile, the said predetermined center of gravity being located at the axis of said cylindrical chamber section, the ends of said cylindrical chamber section being equi-distant from said predetermined center of gravity, so that the diameter of the cavity may be increased or diminished to bring the projectile to a predetermined weight and at the same time maintain said predetermined center of gravity.

6. A projectile of the character described comprising a cylindrical body tapered at its forward end and balanced with respect to a predetermined center of gravity, the cy-

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GEORGE C. GARDNER.