July 5, 1938. D. G. WILLIAMS 2,122,996

LOADING OF ORDNANCE

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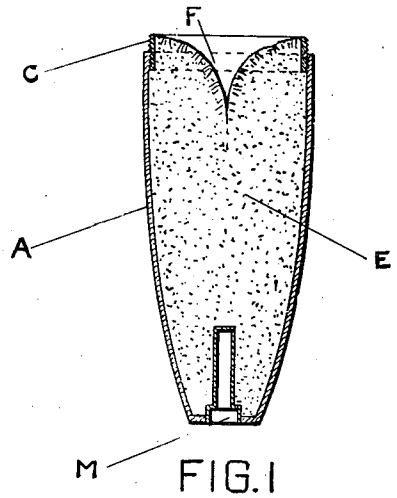


FIG. 1

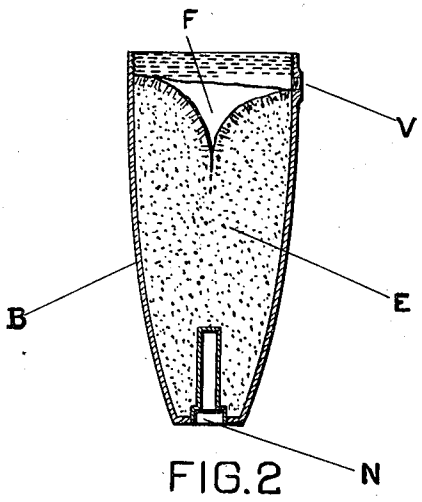


FIG. 2

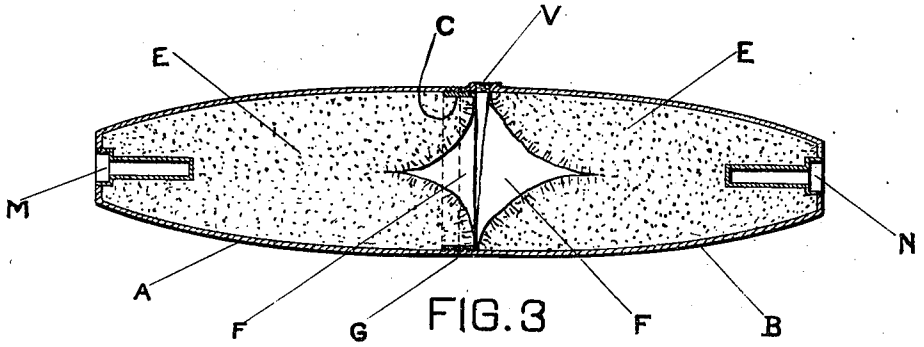


FIG. 3

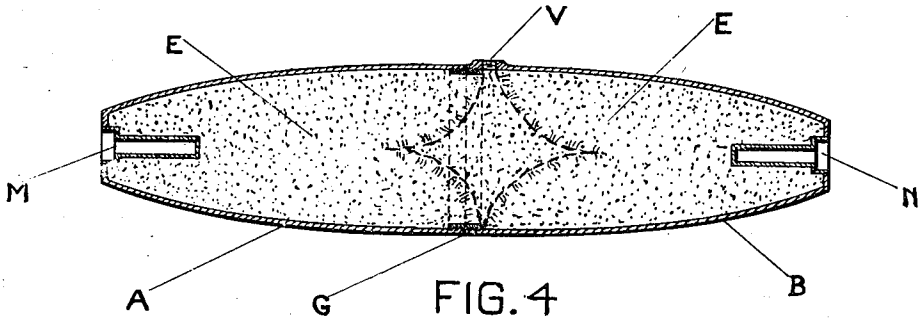


FIG. 4

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LOADING OF ORDNANCE

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9 Claims. (Cl. 86—20)

My invention relates to improvements in the loading of ordnance, and more particularly relates to improvements in the loading of drop bombs, high explosive shell and the like, by methods which improve the intimacy of contact and the continuity of explosives action between the charge of high explosive and the explosives charge employed to initiate detonation. One of the objects of my invention is to provide means for the production of ordnance provided with high explosive chambers, cavities or openings for the reception of bursting charges of high explosive, possessing increased probability of proper functioning, and another of the objects of my invention is to provide means for facilitating the loading of large drop bombs, with a saving of time and labor, and a reduction in the percentage of non-functioning or mal-functioning units.

For the purpose of better explaining the features of my invention I have illustrated one form of the invention in the accompanying drawing, in which

Figure 1 is a vertical section through the forward half of a drop bomb made in accordance with my present invention and Figure 2 is a vertical section through the rear half of a drop bomb made in accordance with my present invention. Figure 3 is a vertical section through the assembly formed by attaching together the two halves shown in Figure 1 and Figure 2. Figure 4 is a vertical section through a complete unit assembled and loaded in accordance with my invention.

In the customary method of loading high explosive shell, drop bombs and the like, with explosives such as trinitrotoluene or amatol, for example, the charge of explosive is poured into the shell cavity or bomb cavity through the opening used for holding the detonating assembly or the booster charge. After the explosive charge has solidified an opening is reamed in the solidified explosive of a suitable size and shape to receive the booster assembly. In large drop bombs, provided with both a nose fuse and a tail fuse, the charge is sometimes poured into the bomb cavity through the nose fuse opening, and sometimes through the tail fuse opening, the choice being usually determined by whichever of these openings is the larger.

The well known tendency of molten explosives to contract upon cooling causes a certain amount of cavitation to occur at the point where the explosive is poured into the bomb or shell, and means must always be taken to prevent or overcome this cavitation by adding the last portions of molten explosive in small portions at a time, and by stirring the semi-molten material with a stick or rod, as it solidifies. Whatever the method employed, the final result is the same, and the location of the booster charge is necessarily at the point, with reference to the main charge of explosive, at which the solidity or uniformity of the explosive charge is the poorest. If sufficient care is taken to prevent cavitation, and if sufficient care is taken in boring out the cavity for the booster charge, reasonably good explosives efficient in the finished ordnance may be obtained, but a study of the loading operation as now performed shows clearly that the detonating unit is normally located in the least homogeneous portion of the explosive charge, and is normally located at the point where cavitation and interruptions of the explosives charge are most likely to occur.

I have discovered that by forming a bomb body or a shell body in two portions fitting together at some point away from either end of the assembled unit, and preferably at the zone of maximum diameter or perimeter of the explosives chamber or cavity, and then separately loading the halves or portions of this assembly separately so that the booster charge is located in the midst of the first portion of the explosive charge to solidify, I obtain improved explosive results.

In Figure 1, A represents the metal wall of the forward portion of a bomb body, filled with a solidified explosive E which upon cooling and contracting left a cavity F. The bomb body C is provided with an assembling or coupling ring C with which to attach to this portion of the bomb body the remaining portion of the bomb body, and with a booster casing M.

In Figure 2, B represents the metal wall of the rear portion of the bomb body shown in Figure 1, this portion of the bomb body being also filled with a solidified explosive E, which upon cooling and contracting has left a cavity F. The bomb body B is provided with a filling opening V located at a point approximately within its zone of greatest diameter, and with a booster casing N.

In Figure 3 is shown the assembly produced by screwing together the forward portion of the bomb body shown in Figure 1 and the rear portion of the same bomb body as shown in Figure 2, by means of the ring C, leaving a substantially smooth or flush joint as shown at G, and with the explosive filling charges E, E, almost completely filling the bomb body, and possessing

the greatest density and continuity at the points adjacent to the booster casings M and N.

In Figure 4 is shown the completely loaded bomb, after additional explosive has been poured through the vent V to unite the explosive charges and produce a continuous charge of explosive E, E throughout the interior of the bomb body, this explosive charge being of maximum density and explosives continuity at the points in the vicinity of and adjacent to the booster casings M and N at the two ends of the bomb.

It will be evident that because of its being much less necessary to prevent cavitation in the loading of ordnance in accordance with my present invention, the loading can be carried on much more rapidly than by the methods now known and used. Upon the two halves or the two portions, of the shell or bomb being loaded in the manner described, they are screwed together or otherwise assembled, but even if this leaves a slight space not filled with explosive at the center of the bomb, this is of relatively little importance, in view of the high explosive efficiency of the explosive at this portion of the bomb, and this open space may be filled, if desired, by explosive poured through the opening V in the shell or bomb body or through any suitable opening in the ring connecting the two portions of the bomb body.

It will be noted that the significant feature of my present invention is the use of a divided shell body or bomb body, preferably divided at the zone of maximum diameter or cross-sectional area of the explosive cavity, the separate or individual loading of the portions of this divided body with charges of an explosive, so that the solidified explosive is first poured over the booster casings and is densest and most homogeneous in the vicinity of the booster charges or detonating charges, and is least dense and least homogeneous in the center portions of the bomb or shell, where perfect explosive homogeneity of the charge is least important. If desired, I may provide means for explosively connecting the forward and the rear portions of my shell or bomb by means of a core or leader of more sensitive explosive than used in loading the body of the bomb or shell, but in general I do not find that this is necessary, and I prefer to complete the loading of any cavity which may remain after the loading of the separate portions of the divided body, by filling such cavity with molten explosive of the same composition and nature as the explosive used in filling the main body of the bomb or shell.

Since my invention is applicable to the loading of ordnance material of the general type of high explosive shell, drop bombs, torpedoes, sea-mines and the like, the term "high explosive chambers" as used in this specification and in the claims shall be considered to broadly cover ordnance material of any type containing a cavity or chamber adapted to be filled with a charge of high explosive.

It will be evident that many modifications may be made, without departing from the features of my invention as herein described, and accordingly no limitations should be placed upon my invention except such as are indicated in the appended claims.

I claim:

1. The hereinbefore described method which consists in filling the space between an explosive charge filling one end of an explosive charge container and an explosive charge filling the other end of an explosive charge container with a fused explosive.

2. The hereinbefore described method which consists in filling the space between an explosive charge filling one end of an explosive charge container divided at the zone of its largest diameter and an explosive charge filling the other end of the explosive charge container with a fused explosive.

3. The hereinbefore described method which consists in filling the space between an explosive charge filling one end of an explosive charge container and surrounding a booster casing located at the end of such explosive charge container and an explosive charge filling the other end of the explosive charge container with a fused explosive.

4. The hereinbefore described method which consists in filling the space between an explosive charge filling one end of an elongated explosive charge container divided at the zone of its largest diameter and an explosive charge filling the other end of the elongated explosive charge container with a fused explosive.

5. The hereinbefore described method which consists in filling the space between an explosive charge filling one end of an elongated explosive charge container and surrounding a booster casing located at the end of such explosive charge container and an explosive charge filling the other end of the explosive charge container with a fused explosive, so that homogeneous explosive material is present in that portion of the elongated explosive charge container adjacent to the booster charge.

6. The hereinbefore described method which consists in filling the space between an explosive charge filling one end of an elongated explosive charge container divided at the zone of its largest diameter and surrounding a booster casing located at the end of such explosive charge container and an explosive charge filling the other end of the explosive charge container with a fused explosive, so that homogeneous explosive material is present in that portion of the elongated explosive charge container adjacent to the booster charge.

7. The hereinbefore described method which consists in pouring into a projectile divided at the zone of its largest diameter and provided at at least one end with a booster casing a fused explosive to unite separate homogeneous explosive charges filling the ends of the projectile.

8. The hereinbefore described method which consists in pouring into a projectile divided at the zone of its largest diameter and provided at at least one end with a booster casing fused explosive to fill the ends of such projectile with fused explosive and surround the booster casing with homogeneous explosive material and thereafter pouring into the projectile a fused explosive to unite the fused explosive in the ends of the projectile.

9. The hereinbefore described method which consists in packing into a projectile divided at the zone of its largest diameter and provided at at least one end with a booster casing explosive to separately fill the ends of such projectile with explosive and to surround the booster casing with homogeneous explosive material and thereafter pouring into the projectile a fused explosive to unite the explosive charges in the ends of the projectile.

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