

June 15, 1937.

P. E. PIHL ET AL

2,083,665

AMMUNITION AND ORDNANCE DEVICE

Filed Oct. 6, 1933

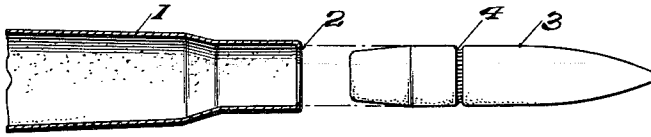


Fig. 1.

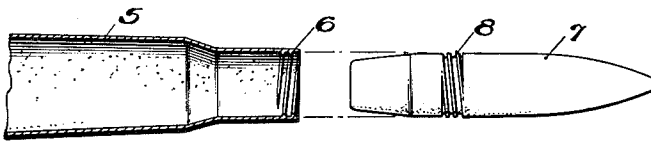


Fig. 2.

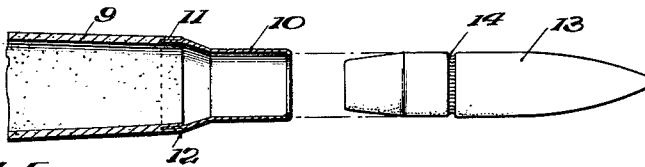


Fig. 3.

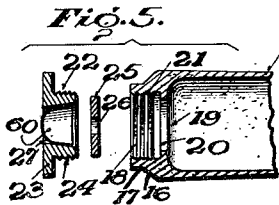


Fig. 5.

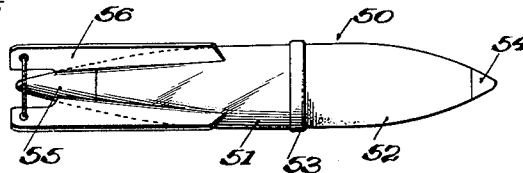


Fig. 4.

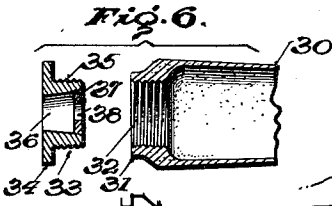


Fig. 6.

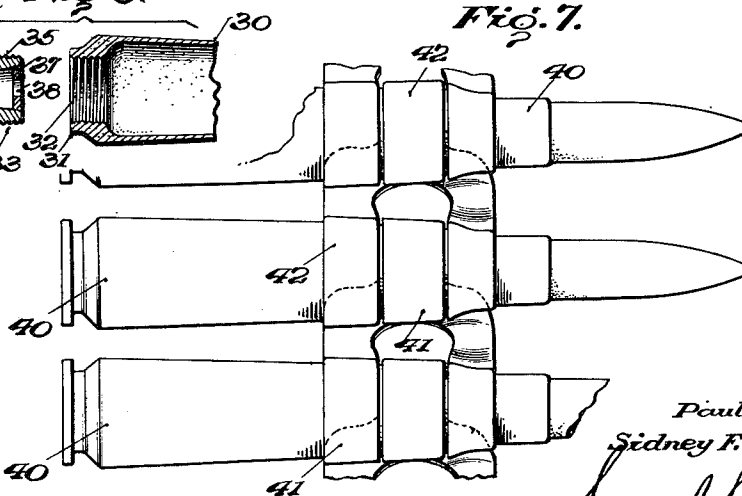


Fig. 7.

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2,083,665

AMMUNITION AND ORDNANCE DEVICE

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Application October 6, 1933, Serial No. 692,522

2 Claims. (CL 102—16)

This invention relates to ammunition and other ordnance devices and, more particularly, to the forming of equipment of this type in a novel manner.

5 It has heretofore been proposed to form cartridge cases of various materials such as pyrox-
iline and celluloid, such constructions being chief-
ly for the purpose of providing a shell which
will be consumed when the shell or cartridge is
10 fired, whereby the step of ejecting the shell may
be eliminated. In cases where the purpose has
been to provide a non-combustible shell of ma-
terials such as outlined above, no practical result
capable of commercial utilization has been
15 achieved, due chiefly to the fact that the mate-
rials employed have failed to withstand the
stresses set up by the explosion taking place
therein on firing.

The importance of the problem of providing a
20 cartridge casing, shell or pyrotechnic device
formed of a suitable material results chiefly from
the inherent and developed disadvantages of the
materials most commonly used. As is well known,
nearly all of such devices or equipment are made
25 of brass and it has been found as a matter of
experience that the use of this material presents
very serious disadvantages. Among these may be
mentioned the following:

Ammunition of the machine-gun or rifle type
30 is usually mounted in clips, the several shells be-
ing held together by metallic clips whereby the
shells may be fed into the firing chamber. If
brass cartridges are employed, it has been found
that the same corrode when placed tightly in a
35 metallic clip and, due to such corrosion, attach
themselves so tightly to the metallic clip that
it is often impossible to remove them, thus provid-
ing one of the chief causes of jamming. This
prevalent tendency of the cartridges and clips to
40 adhere together necessitates that the cartridges
be clipped together at as short a time as possible
before firing in order that when the cartridges are
used they will be loosely or movably held by the
clip. This condition places a very heavy load on
45 the loading facilities in the event that a large
amount of ammunition is to be employed within
a short space of time. In order to obviate the
described difficulties it is proposed to form the
cartridges of a material which will not attach to
50 the clips by corrosion, and the present invention
solves this problem in a novel and efficacious
manner.

Another disadvantage inherent in the use of
brass cartridges or other similar equipment as out-
55 lined above resides in the excessive weight of such

equipment when formed of brass. This factor
limits the amount of ammunition or other equip-
ment which may be carried and thereby serious-
ly limits the battle efficiency of any military unit.
The use of a suitable cartridge formed of a lighter
material would therefore allow such a unit to
carry more ammunition, thereby giving that unit
a fire superiority over an enemy using brass car-
tridges. The present invention contemplates the
10 provision of ammunition or similar equipment
which will provide this desirable reduction in
weight.

A further disadvantage found in the use of
brass or other metallic cartridges is the difficulty
of marking such cartridges in order to distinguish
15 various types of ammunition or other ordnance
devices, such as tracer, dummy and ammunition,
or in order to plainly mark different types or col-
ors of flares etc. By the present invention, ord-
nance equipment may be formed easily of vary-
20 ing colors, whereby different types may be easily
distinguished.

A further consideration in the use of brass
ordnance equipment resides in the supply of the
metals needed to make that alloy. Inasmuch as
25 practically all ordnance equipment of the type
under discussion is now made from brass, it is
apparent that a shortage of the component ma-
terials thereof would constitute a very serious
question in time of war. By means of the present
30 invention, ammunition formed from materials
which may be easily manufactured is provided,
whereby a constant supply of ammunition is as-
sured. It will further be obvious that by the use
of ammunition formed according to the present
35 invention, strategic war materials such as brass
may be conserved.

An object of the invention is to provide ord-
nance equipment formed from a urea-formalde-
hyde condensate.
40

Another object is to provide ordnance equip-
ment formed from a material which will not cor-
rode when in contact with metals.

A further object is to provide novel means for
45 constructing a cartridge shell.

A still further object of the invention is to pro-
vide ordnance equipment formed of a material
which will provide advantages in weight and
other qualities of such equipment over equip-
50 ment formed from present materials.

Other objects and features of novelty will be
apparent to those skilled in the art from the fol-
lowing description and drawing, it being express-
ly understood, however, that the invention is in
55

no way limited by such description and drawing or otherwise than by the appended claims.

Referring to the drawing in which similar reference numerals refer to like parts:

5 Fig. 1 is an exploded view showing a cartridge formed according to the present invention, and illustrating one method of attaching the projectile to the shell;

10 Fig. 2 is a view similar to Fig. 1 and showing another method of attaching the projectile to the shell;

Fig. 3 is a view similar to Fig. 1 and illustrating still another method of attaching the projectile to the shell;

15 Fig. 4 is a view showing a type of ordnance device which may be made according to the present invention;

Fig. 5 is an exploded view showing one method of constructing the breech end of a cartridge 20 formed according to the present invention;

Fig. 6 is an exploded view showing a second breech-end construction of a shell formed according to the present invention;

25 Fig. 7 is a view showing a group of cartridges formed according to the invention and attached together by a clip.

In the present invention we contemplate the formation of ordnance material of various types such as cartridge shells of all types, shotgun shells, artillery shells, cases for non-fragmenting grenades, bombs, signal lights, flares, pyrotechnic devices, etc., from a plastic material which is light in weight, easily manufactured and molded, and which will not corrode when brought 35 into close contact with metallic substances. The material which we employ is a synthetic resin of the urea type, which is a urea-formaldehyde condensate. The method of production of the new material forms no part of the present invention, and it will suffice to say that the raw material described may be easily and cheaply manufactured and may be easily molded into the desired forms. By making the ordnance devices mentioned hereinbefore of this material we have 40 been enabled to provide such ordnance equipment free from the very serious disadvantages enumerated.

The present invention provides means for attaching a projectile, such as a bullet, to a cartridge shell formed of the material described 50 hereinbefore. One method of providing such attachment is illustrated in Fig. 1, wherein is disclosed a cartridge shell 1 formed of the synthetic resin described, and such shell is provided at the open, or projectile-receiving, end thereof 55 with an annular, inturred flange 2 which may be molded integrally with the shell. The projectile 3 is provided in the usual manner with an annular serrated band 4 which may be cut or pressed into the metal forming the projectile. In the 60 process of manufacture, the projectile may be cooled to a sufficiently low temperature to cause a contraction of the same sufficient to allow it to be inserted within the cartridge shell 1, the flange 2 being received within the annular depression 4. When the temperature of the projectile is allowed to assume normal conditions it will be obvious that it will be held rigidly in place within the cartridge shell, any relative 65 movement between the two members being prevented by the co-operating engagement between flange 2 and depression 4.

70 A second method of attaching the projectile to a cartridge shell formed according to the present invention is illustrated in Fig. 2 wherein is

disclosed the cartridge shell 5, formed of the synthetic resin described hereinbefore. In the present instance the internal wall of the shell adjacent its open, or projectile-receiving, end is provided with a helical, male thread 6. The projectile 7 is provided with a helical, female thread 8. It will be obvious that the two members may be joined by simply screwing the threaded portion of the projectile into the end of the shell, whereby a rigid connection between these two 10 members is provided.

A further method of attaching together a projectile and a shell formed according to the present invention is illustrated in Fig. 3. According to this modification of the invention the cartridge shell 9 is formed throughout the greater part thereof, of synthetic resin as described hereinbefore. The open, or cartridge-receiving end of the shell is, however, formed of metal and comprises a generally-cylindrical body 10 having an annular flange 11 extending therefrom and providing a shoulder 12. As is clearly illustrated, the synthetic resin material of the shell 12 is molded around the flange 11 in such manner that the flange is completely embedded in such material, the shoulder 12 providing means for insuring that the outer surfaces of the shell 9 and the inset 10 are perfectly flush. The projectile 13 15 may be formed with the usual serrated band 14 and the outer, annular end of the metallic insert 10 may be crimped into the band 14 in the usual manner to provide an attachment between the two members. The flange is shown on the outer end of member 10 merely for the purpose of illustrating how the metal of member 10 is crimped 20 into the band 14.

The above-described modifications of the invention are all based on the assumption that the cartridge shall be loaded in the usual manner, i. e. from the open, or projectile-receiving, end 40 and the projectile then inserted into that end. However, the present invention also contemplates that the projectile may be fastened to the cartridge shell during the molding of the shell, such as by placing the projectile in the mold and casting the shell around it, joining the two members 45 by a flange and groove arrangement, or by other suitable means. In the event that such a method is performed, means must be provided for loading the shell with powder, etc. The present invention provides means for effecting this necessary operation, and such means contemplate that the shell is to be loaded through the breech, or cap end of the shell, after the open or projectile-receiving end of the shell has been closed by the 50 projectile.

One construction whereby such breech-end loading may be effected is disclosed in Fig. 5 of the drawing, wherein is illustrated a cartridge shell 15 formed of the synthetic resin material hereinbefore described, and into the open end of which (not shown) the projectile has been inserted. The breech end of the shell is extended as at 16 to form a reduced annular extension 17 which is coaxial with the cartridge shell. Such 60 annular extension is formed with an opening 18 extending laterally therethrough, and such opening communicates with the interior of the cartridge shell through an opening 19 defined by an annular flange 20 formed integrally with the cartridge shell. The opening 18 is internally screw-threaded as at 21. A cap 22 having an enlarged flange 23 and a reduced portion 24 is provided and the reduced portion 23 is externally screw-threaded to co-operate with the threads 75

21. A washer 25 is also provided and is of such dimensions that it may be received on the flange 20. A reduced opening 26 is provided in the washer and is adapted to align with the larger opening 19. The cap 22 is provided internally with an axially-extending opening 27 having a smaller aperture at the outer end of the cap than at the inner end. In assembling the cartridge according to Fig. 5 the powder etc., may be loaded there-into through the opening 19; the washer 25 may next be placed in the opening 18 and resting on the flange 20. A percussion cap 60 may now be placed on the washer 25 and such percussion cap is adapted to be received into the opening 27 in cap 22 when such cap is screwed into place and, due to the shape of the opening 27, the percussion cap will be held rigidly in place and one portion thereof will be exposed through the smaller, rearward opening in cap 22 as is required for firing purposes.

According to the construction disclosed in Fig. 6, the cartridge shell 30 is formed with the rearwardly-extending, reduced annular extension 31, the same having a threaded opening 32 extending therethrough and communicating with the interior chamber of the cartridge shell. A cap 33 is provided, the same having an enlarged flange 34 and an externally-threaded reduced portion 35 which is adapted to be threaded into the opening 32 in the shell. The cap 32 is also provided with an axial opening 36 extending entirely therethrough and having a smaller diameter at the rear end of the cap than at the front end. Adjacent the enlarged front end of the opening 36, the same is internally screw-threaded for a short distance to receive corresponding threads formed on the periphery of a washer 37 having a reduced opening 38 therein. Due to the described construction, a percussion cap may be placed in the opening 36 with one portion thereof being exposed through the small end of the opening for firing purposes, and such percussion cap may be held in place in the opening by screwing the washer 37 into position as clearly disclosed in Fig. 6. This assembly may then be attached to the cartridge shell by screwing the reduced portion 35 of the cap into the opening 32 after the powder, etc., has been introduced into the cartridge shell therethrough.

It will be noted that the constructions disclosed in Figs. 5 and 6 each provide a flange (23, 34) and a reduced portion (16, 31) as is usual in all ammunition in order to provide means on the shell for engagement by ejecting devices or carrying clips.

The usual and preferred method of attaching cartridges together in a clip for machine-gun

firing purposes is illustrated in Fig. 7, wherein is disclosed the cartridges 40 which may be formed from the synthetic resin material described hereinbefore. Such cartridge may be connected together by means of the clips 41, 42 in the usual manner. As stated hereinbefore, the clipping together of metallic cartridges in this manner presents several serious disadvantages, chief of which is the corrosion of the metallic cartridges where the same come into contact with the metallic clip members, whereby the cartridges and clips become attached, thereby presenting serious difficulties in handling and insertion into a rifle or gun. Such difficulties and disadvantages are entirely obviated by the use of cartridges formed from the material described herein, as no corrosion can possibly take place between cartridges so formed and clip members made of any desired material.

The present invention contemplates the use of the synthetic resin material described hereinbefore for the making of such ordnance equipment as bombs. Referring to Fig. 7 of the drawing it will be seen that a bomb 50 is illustrated therein, the casing or shell of which may be formed from the synthetic resin material described herein or, if desired, parts of such casing or shell may be formed of such material while other parts may be of metal. In the structure disclosed in Fig. 7 the bomb may be formed of two sections 51, 52 which are preferably made from the synthetic resin material described, and which may be joined together by a clamping ring 53. A metallic nose 54 and a metallic tail member 55 may also be attached to the body of the bomb by any suitable means, while the fins 56 may be formed of any suitable material, including the synthetic resin described herein.

While several embodiments of our invention have been described and illustrated, it will be apparent to those skilled in the art, other modifications may be made without in any way departing from the spirit of the invention, for the limits of which reference must be had to the appended claims.

What is claimed is:

1. A cartridge shell formed of a synthetic resin material and having a metallic projectile receiving member embedded in said material.

2. A cartridge shell comprising a portion formed of a synthetic resin material, and a projectile receiving portion formed of metal and having a portion embedded in said synthetic resin material.

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