March 24, 1936. J. B. DECKER 2,034,976

PYROTECHNIC DEVICE

Filed March 13, 1934

FIG. 1.

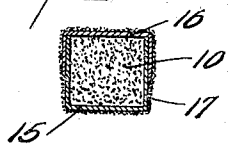


FIG. 2.

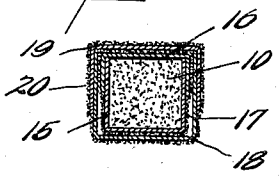


FIG. 3.

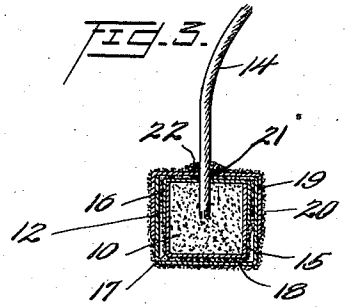
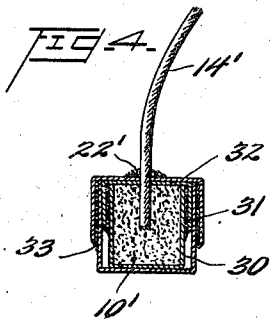


FIG. 4.



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PYROTECHNIC DEVICE

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9 Claims. (Cl. 102—25)

This invention relates to pyrotechnic devices and particularly to such pyrotechnic devices as are adapted to explode with a loud report. It is most generally concerned with those pyrotechnics known in the trade as salutes, shooting crackers or the like, and with toy torpedoes.

It is a general object of the present invention to provide a novel and improved explosive pyrotechnic of the type producing a loud report.

More particularly it is an object of the invention to provide, in an explosive type pyrotechnic, a simple and effective outer covering, casing, enclosure, shell or the like, for containing the explosive, which shall have a maximum of resistance to the bursting forces of the expanding gases resulting from the explosion of the enclosed explosive and shall at the same time have a minimum of weight and be largely blown into bits, so that there are no heavy fragments to be thrown with considerable velocity and inflict injury to those nearby.

An important feature of the invention comprises the arrangement of an enclosing casing or shell which is laminated throughout every one of its portions.

A further feature of the invention resides in the provision of a casing or shell for explosive pyrotechnics comprising alternate layers of fibrous material and sealing compound.

A still further feature of the invention comprises a shell or casing for explosive type pyrotechnics comprising a series of fully enclosing capsules each surrounding the one within it and in which at least one of the capsules is completely sealed.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawing and following specification wherein are disclosed several exemplary embodiments of the invention, with the understanding, however, that various changes and modifications may be made in the drawing without departing from the spirit of the invention as set forth in the appended claims.

In said drawing:

Figure 1 is a central section through a single sealed capsule and its enclosed explosive composition;

Figure 2 is a view similar to Figure 1 showing a second sealed capsule arranged about the first;

Figure 3 is a view similar to Figure 1 showing a fuse inserted and sealed; and

Figure 4 is a view similar to Figure 3 but showing a different sealing arrangement.

In recent years there has been a trend away from the earlier conventional form of large firecracker, cannon cracker or salute which comprised a relatively thin elongated pasteboard tube filled with explosive, having sealed ends and a fuse projecting from one end. Such firecrackers commonly had a length to diameter ratio of from 5 to 8.

Similarly there have been changes evolved in the shape and construction of toy torpedoes of the type adapted to be thrown to cause a sufficient impact to explode the compositioned contained therein. Originally these comprised a cap of the paper type enclosed in a bag of paper with a mass of gravel on top of the cap and the paper bag having a twist opposite the cap to form a guiding tail or feather to insure striking on the cap. These torpedoes were superseded almost completely by the so-called globe torpedo and the safety or tube type of torpedo. These torpedoes were very effective and had good acceptance by the trade and by the consumers, but it was later discovered that each of them by virtue of their hard enclosing casings or end plugs, which were sometimes almost a quarter of an inch thick in places and quite solid and brittle, had its disadvantages because these elements of considerable weight were broken sometimes in only a few fragments which were projected with great velocity, sometimes causing serious injury to bystanders or to the user.

The advent of this type of torpedo was closely followed by the introduction of similarly shaped salutes constructed in substantially the same manner and therefore subject to the same disadvantages.

The present invention contemplates the retention of the same general form as the modern torpedo and salute, an improvement in construction, a simplification in the manufacture and the complete elimination of the dangerous features.

Referring to the drawing, Figure 3 shows a completed salute of the type of the present invention that will be seen to comprise generally the mass 10 of a suitable explosive material which may be of any of the compositions now used for the purpose, a casing or shell 12 and a fuse 14 extending from the interior to the exterior of the casing and permitting the ignition of the explosive composition in the well-known manner.

If a torpedo is to be made instead of a salute, the explosive composition is varied accordingly as is well known and a detonating agent enclosed with the same, preferably a quantity of gravel, and the fuse is omitted. The subsequent

description will be directed entirely to the salute for the sake of simplicity, but it will be understood that similar constructional features will apply to the torpedo, subject only to the limitations mentioned herein.

In Figure 1 is shown one stage in the construction of the salute. The explosive composition **10** is in place in a paper or pasteboard cup **15** made from any suitable material by stamping or pressing into a cup like form with substantially straight sides, flat bottom and open top. The appropriate quantity of erplosive material is filled into this cup and a similarly constructed cup **16** of slightly greater diameter telescoped thereover in the inverted position so that it cooperates with the first cup to form a totally enclosing capsule. The friction of the two cups holds them sufficiently firmly together until other fastening means are employed although, if desired, an adhesive may be used.

As shown in Figure 1, a sealing composition **17** is then placed completely around the capsule. This composition may be selected from among a large group of satisfactory materials, for instance it may be glue, gum, heavy paint, casein, stearic acid, sodium silicate or other compositions, or any mixture of two or more of these ingredients or any of these ingredients with suitable fillers, absorbents, coloring materials or the like. The applicant prefers to use a mixture of a water solution of sodium silicate with a suitable coloring and filling material such, for instance, as red oxide of iron. Such a material dries or at least sets quite rapidly and it can be applied by spraying, dipping, rolling or tumbling the capsules in a quantity of it or by brushing. It is important that this covering have at least moisture proofing properties if it is not absolutely waterproof and it should completely enclose the capsule.

After the coating is sufficiently dry, the sealed inner capsule, as shown in Figure 1, is then inserted into a second capsule of substantially identical construction comprising the bottom cup **18** of pressed paper, the telescoping upper cup **19** of pressed paper and the sealing coating **20**, all clearly shown in Figures 2 and 3. It is desirable, but not essential, that the sealed inner capsule fit snugly within the second paper capsule so as to prevent rattling. It is also desirable that the sealing composition **20** completely envelops the outer capsule. This composition may or may not be similar to that used on the inner capsule. Preferably the one on the outer capsule is of a desirable color, whereas this feature is of secondary importance in connection with the inner capsule.

A hole is punched or drilled in the wall of the finished casing preferably on one of the flat surfaces as shown at **21** in Figure 3 and a fuse **14** inserted through this hole and secured in position by a dab of glue or like material **22**. It is desirable that this material seal the opening around the fuse through at least one capsule to prevent the entrance of moisture.

The advantages of the construction will be readily apparent, for it will be seen that the capsules, being of paper or like material and but thinly coated with a sealing composition and not stuck to each other, will be blown into small bits by the force of the explosion. Even if they were only blown into two parts each, the capsules are of such light material that they would not be projected to a sufficient distance to cause any damage. The construction is extremely simple and requires no expensive machinery, or parts not already available in any fireworks plant making torpedoes. All coatings are thin and hence dry rapidly without the use of especially prepared drying rooms, ovens or the like which are expensive, time consuming and sometimes dangerous.

In Figure 4 a construction is illustrated in which the explosive composition **10'** is placed in an inner capsule **30** composed of telescoping paper cups which, instead of being completely enveloped in a sealer, are merely stuck together on their overlapping portions as at **31** by a suitable composition such as previously described. The outer capsule **32** likewise has its parts joined together by an adhesive **33** where they overlap and the fuse **14'** is inserted and sealed in position as in the previous case by a dab of adhesive **22'**.

It will be obvious that a combination of Figures 3 and 4 is possible by having the inner capsule parts merely fastened together by an internal adhesive and then having the outer capsule completely covered with the sealing compound. This sealing compound on the outer capsule is important since it imparts a desirable color to the product, somewhat smooths off the exterior by filleting the edges and waterproofs the whole device. Of course, it is possible to seal the inner capsule without sealing the outer capsule with a complete covering, but this is not so desirable.

The important feature of the invention is, of course, the laminated shell or cover in which the parts of the shell are not secured together, so that they do not fly in large heavy particles. An important feature too is the provision of alternate layers of fibrous material and a sealing compound insuring a strong, explosive resistant casing and one which is practically moisture proof and not subject to damage while handling.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a pyrotechnic of the salute type, in combination, a sealed paper-like inner capsule, explosive material therein, a similar sealed outer capsule closely fitting and substantially engaging all about the inner capsule but not adhering thereto, and a fuse passing through both capsules and secured to one of them.

2. In a firecracker or salute, in combination, a quantity of explosive composition, a capsule therefor comprising telescoped cups of heavy paper, a second capsule closely fitting the first and of the same construction, a fuse extending from the composition through both capsules, and means maintaining the outer capsule parts against separation.

3. A pyrotechnic toy comprising a quantity of suitable explosive composition and a completely enveloping casing therefor, said casing being formed in all parts thereof of complete alternate layers of heavy fibrous material and sealing compound each extending peripherally about the composition, no sealing layer being secured to more than one complete fibrous layer.

4. In a pyrotechnic toy, in combination, a capsule formed of two telescoped paper cups totally enclosing a quantity of explosive composition, a coating of sealing and moisture-proofing material covering the whole external surface of said capsule and securing the parts thereof together, a second similar capsule totally enclosing the first, in contact with but not secured to the sealing covering thereof and a complete coating of

sealing and water-proofing material on said second capsule.

5. A pyrotechnic toy comprising a quantity of suitable explosive composition, a covering of thin tenacious material enclosing the explosive, a second similar covering over the first, and a thin, completely enclosing, seamless casing about one of said coverings.

6. A pyrotechnic toy comprising a quantity of explosive composition, a fully enclosing casing therefor completely laminated entirely of thin paper-like material, sealing layers alternated with the laminations with each sealing layer secured to but one lamina, and means to ignite the explosive composition.

7. A pyrotechnic toy comprising a quantity of suitable explosive composition, a completely enveloping casing therefor, said casing being formed in all parts thereof of complete alternate layers of heavy flexible fibrous material and sealing compound, each layer of compound adhering to but one layer of the fibrous material and means to ignite the explosive composition.

8. In a pyrotechnic toy, in combination, a capsule totally enclosing a quantity of explosive composition, a coating of tenacious sealing and moisture-proofing material covering the whole external surface of said capsule, a second capsule totally enclosing the first and fitting the same so closely as to reinforce it, a complete coating of sealing and water-proofing material on said second capsule, each coating adhering only to its capsule and means to ignite the explosive composition.

9. A pyrotechnic toy comprising a quantity of suitable explosive composition, a covering of thin tenacious material enclosing the explosive, a second similar covering over the first, a thin, completely enclosing, seamless casing about one of said coverings, and means to ignite the explosive composition.

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