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BIRD SHOT

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This invention relates to new and useful improvements in metallic shot and the method of making it.

More particularly the invention relates to shot formed of an alloy containing a large proportion of lead and which novel shot is adapted to more readily disintegrate or decompose in the presence of moisture.

For many years enormous quantities of lead shot have been fired each hunting season at small game. The shot, dropping to the earth, accumulates from year to year, particularly adjacent duck passes, and is swallowed by wild fowl with resultant lead poisoning. This poisoning is one of the factors tending toward the extinction of certain species of wild life. Lead poisoning in various species of wild ducks and other water fowl has long been the subject matter of research, and it has been proved that lead poisoning in water fowl has its origin in the large quantity of expended shot that from year to year is deposited in the water and mud adjacent shooting points and blinds in marshes, shallow bays and lakes. The action of water or moisture upon lead shot is so slow as to be inappreciable and leads to the conclusion that shot pellets last for many years. Many birds find and swallow these leaden pellets while searching for food in the same manner that they swallow gravel, seeds or other small hard objects. These leaden pellets pass to the gizzard along with other small hard objects such as gravel, which are necessary for the proper grinding or trituration of food. The shot accumulates in the gizzard of the fowl day by day and being only slowly ground away by attrition induces lead poisoning of the fowl.

One phase of this novel invention is directed to the production of lead shot which are comparatively readily decomposable in the presence of moisture. That is, the novel shot may be so made that, missing the bird at which they are fired, they drop to the lake or moist ground and decomposition immediately starts; or, if quickly picked up by a bird, the moisture in the bird's gizzard combined with its natural grinding action quickly disintegrates the pellet and it quickly passes outwardly through the bird's intestines without appreciably affecting the bird.

In accordance with the teaching of this novel invention, such a shot may be produced by means of a lead alloy. A lead shot which is comparatively readily disintegratable in ordinary water is formed by treating lead in its molten or powdered states with other metals which are anodic to it in the electromotive force series of metals. A shot formed of such a lead

alloy may disintegrate by electrolytic or galvanic action in an electrolyte of natural waters within a period of less than two months. Thus, such a shot can be produced by an alloy containing not less than 90% of lead by weight with not more than 10% of magnesium, barium, zinc, lithium, sodium, potassium, or calcium. Such an alloy of lead shot is decomposable in water to produce a relatively soft residue of flakes or powder which wild fowl will not eat.

Preferably the alloy metal is one having a relatively high specific gravity or, if the alloy metal has a low specific gravity, a smaller amount must be effective because the resultant alloy shot must have the ballistic properties and substantially the trajectory of lead shot.

As an example of the invention, a commercially inexpensive novel alloy shot may be composed of approximately ninety-six per centum (96%) by weight of lead and approximately four per centum (4%) by weight of magnesium. Another example of a practical shot is an alloy comprising approximately ninety per centum (90%) by weight of lead with approximately ten per centum (10%) by weight of either magnesium, zinc, lithium, sodium, barium, potassium or calcium. The above proportions are in no sense critical but can be varied over wide limits depending upon the rate of disintegration desired. For example the amount of lead in the shot may constitute anywhere from 90% to 99% of the total weight of the shot, as desired. Preferably the amount of lead should range from 96% to 99% of the total weight of the shot. Reduced percentages of lead cause reduction in specific gravity or density of the shot which is undesirable from the ballistic standpoint, whereas if higher percentages of lead are used the rate of disintegration is correspondingly reduced.

In the case of such alloy shot the electrolytic or galvanic action in the presence of moisture forms hydrogen and hydroxyl ions thus accelerating its decomposition. An advantage inherent in shot made in accordance with this invention is the reaction in the gizzard of birds, such for example, as wild ducks. X-ray photographs of a duck fed several lead-magnesium alloy shot, for example, conclusively show that the combination of the gizzard-grinding action and the moisture immediately starts the decomposition of the shot. Within a few minutes after ingestion of the novel shot by the bird the reduction of the shot by the trituration processes of the gizzard commenced and particles began their course through the intestinal tract and within a few

hours the shot material was evacuated. The bird remained well thereafter. It is believed that one of the advantages of the alloy of magnesium and lead is the fact that magnesium compounds are formed which exert a laxative effect.

While such alloy shot is advantageous in the preservation of wild-life, there is another step which may be taken, that is, to coat the shot. The advantage of coating the novel alloy shot resides in the fact that when a bird is struck by one of the novel shot fired at it, the shot will become embedded in the moist flesh of the bird. Hence, if the bird is not eaten by the hunter reasonably soon thereafter but is placed in storage and subsequently eaten, it may be found that the moisture of the bird's flesh has provided the necessary electrolyte to start the reduction of the alloy shot to powder or flaky form with the result that some may be eaten by the hunter instead of prompt removal from the mouth of the hard lead shot as is common.

Therefore, the invention further comprehends the coating of the novel alloy shot. Such coating is preferably one that is relatively impervious to moisture so that when fired and embedded in the bird's flesh it will remain in its initial hard state, yet, may be comparatively quickly worn through by the grinding action of the bird's gizzard to permit access of moisture to the alloy shot whereby it may be quickly disintegrated and evacuated.

Such coating or covering may consist of a thin layer of a metal such as copper or cadmium or a non-metallic coating such as lanolin which is a fatty substance extracted from wool and is commonly used as a basis for ointments. This substance has as one of its characteristics the property of being rather tenaciously adherent to other materials. The metallic coating of the novel shot prevents the moist flesh of the bird (when the shot is embedded therein) from decomposing the shot and the same phenomena is true of the adherent lanolin but when the coated novel shot are ingested by the bird, the natural grinding action of the gizzard quickly wears off the metallic or non-metallic coating or layer and causes prompt access of gizzard moisture to the alloy shot and decomposition thereof proceeds.

It is to be understood that the novel alloy shot need not only be composed of lead with a single substance which is anodic to lead in the electromotive force series of the elements but may also be composed of lead and two or more of such anodic substances. In cases of the use of more than one alloying substance, it is deemed preferable to employ approximately ninety per centum (90%) by weight of lead and approximately ten per centum (10%) by weight of the alloying substances. Furthermore, in such cases, better results seem to be secured by using two to four per centum by weight of magnesium with the balance of the ten per centum of alloying material of the other alloying substances. Thus, for example, if it be desired to make the specific gravity of the completed shot greater, one may use more zinc proportionately to the magnesium.

Thus, the process or method of forming these novel shot is to employ lead as the major por-

tion thereof and next preferably reduce the lead to a molten state and then add the selected alloying materials which are anodic to the lead in the electromotive force series. This alloy mass is then inexpensively formed into shot by the old shot-tower dropping process long well-known in the shot-forming art. As a further step in this method, the alloy shot thus formed and cooled may then be treated with a very thin layer of copper, cadmium or other metal frequently used in the coating of shot or with a non-metallic layer of lanolin or substances of similar characteristics by dipping or immersing the formed alloy shot in such substance preferably in a viscous or liquid state.

It is to be understood that the construction of the novel shot as an article of manufacture and the method or process of forming it as disclosed herein is illustrative but not restrictive and that they may be modified within the meaning and scope of the claims which follow.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is:

We claim as our invention:

1. A shot consisting of an alloy of approximately ninety per centum by weight of lead and approximately ten per centum by weight of a material adapted to accelerate the decomposition of such alloy shot in the presence of moisture.
2. An alloy shot consisting of approximately ninety per centum by weight of lead alloyed with magnesium having approximately two to four per centum by weight and approximately eight to six per centum by weight of other substances to form an alloy shot which will dissociate water to form hydrogen and hydroxyl ions upon submergence in electrolytes and thereby accelerate the disintegration of the alloy shot.
3. A shot comprising an alloy of lead with metals which are anodic to lead in the electromotive series of metals, including magnesium in an amount not substantially less than one percent by weight.
4. A shot comprising an alloy of lead with a metal which is anodic to lead in the electromotive series of metals, said metal being present in a quantity not substantially less than two percent.
5. A shot composed only of lead and magnesium, the amount of magnesium not being substantially less than two percent.
6. A metallic shot comprising an alloy of approximately 96% by weight of lead and approximately 4% by weight of magnesium.
7. A shot comprising an alloy of lead and magnesium, the magnesium being in an amount not substantially less than 1% by weight.
8. A shot comprising an alloy of lead and magnesium, the magnesium being in an amount not substantially less than 1% by weight, and a covering relatively impervious to moisture but adapted to be removed by trituration action of the gizzard of a fowl and proof against rapid disintegration when imbedded in the flesh of a fowl.

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