METHOD OF MAKING SOLID THERMITE PELLETS

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3 Claims. (Cl. 264—3)

ABSTRACT OF THE DISCLOSURE

A method of producing solid thermite pellets without the use of additives which comprises: mixing thermite powder with Bullseye pistol powder in the presence of a small amount of water, and cold pressing the mixture in a die, whereafter pellets of any desired size are yielded having a sufficient degree of initial strength. An additional step of curing the resultant pellets under water may be performed for a further strengthening thereof. Also, the pellets may be alternatively formed without the use of Bullseye pistol powder if initiation with a torch is employed.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to a method of producing thermite in solid form without the use of additives. More particularly the invention relates to a method of mixing thermite powder with a sensitizing agent such as Bullseye pistol powder together with water for facilitating compaction of the mixture in a die.

Prior art techniques for producing thermite in solid form have generally utilized additives to facilitate solidification thereof. The additives generally used are at times deleterious to the chemical performance of the solid thermite for its intended purpose, and additionally are disadvantageous from the standpoint that the addition of additives adds weight to, and decreases the volumetric efficiency of, the compacted pellet, briquette or the like as well as the package in which it is contained for use.

Prior art warheads utilized for the intended purposes of this invention use reactive fragments in foundry materials. The thermite powder is fabricated by pouring it into a wax boat. It is initiated by utilization of magnesium ribbon or the like. In the past the production of solid form thermite has been unsuccessfully attempted by utilization of additives as binders thereof.

It is a feature of the instant invention to produce a fragmentable or a friable foundry material of thermite which is adapted for usage in the warhead in projectile or missile applications for producing vapor like blast effects on, and inside of, a target after penetration thereof.

An object resides in the provision of an improved warhead for use in applications against a light target at practical fragment velocities by the advantageous utilization of the self-contained chemical energy of the reaction upon ignition of the thermite to promote a more efficient kinetic energy transfer from fragments to target by virtue of the fragmentary brittle nature of the material of the propelled fragments.

Other objects and advantages of the instant invention will become apparent from the following description taken in connection with the appended claims.

The thermite powder ([Fe₃O₄] or [Fe₂O₃]+aluminum) is mixed with a sensitizing agent such for example as Bullseye pistol powder in the presence of a mixture with water. The mixture is cold pressed in a die and after a short period, depending upon the pellet size desired, the solid pellet is removed from the die. The pellet so formed has a certain degree of initial strength. It may however be further strengthened by curing under water for a period of several days. The pellet is pressed into an encapsulating cup to form a projectile. The formation of the pellet of the instant character the water forms coordination bonds between the oxide coatings on the aluminum particles which result in a matrix of a character providing improved mechanical strength over prior art solid pellets. Additional bonds may be formed, if desired, with the iron oxide and the water. The controls for the additional bonds are determined by the amount of water used in mixing the Bullseye powder with the thermite powder, the amount of cold pressure utilized, and the amount of time the mixture remains in the die. Also, ammonia has been found to be a suitable component as an alternative to water which forms a coordination bonded matrix.

The instant invention provides the only known method of producing thermite in solid form without the use of additives, deleterious to chemical performance and to economy of weight and volume. The instant invention increases the physical strength characteristics of the pellet to an extent where it is advantageously adapted for use in light weight projectile and missile warhead application against light weight targets, through the combined effect of shattering and the chemical reaction occurring upon ignition. Additionally the pellet casting technique provides for a convenient prefabricated thermite form in the desired size and shape, for utilization in such warhead applications.

It is additionally to be understood that the thermite may be used, if desired, without the inclusion of a sensitizer, by providing means for initiation with a torch type flame.

In warhead applications of the solid thermite pellet of the instant invention, upon impacting a target above a critical velocity (approximately 3,000 feet per second) the thermite is initiated, producing a shower of molten iron particles, resulting in extensive damage to a light target. The damage is occasioned by virtue of the large number of small particles producing a plurality of fractures and as aforementioned by promoting more efficient transfer of projectile kinetic energy to the target. Additionally the chemical energy released produces blast-like and thermal damage.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A method of producing solid thermite pellets, without the use of additives, for warhead applications comprising:

- forming a mixture consisting essentially of a quantity of thermite powder with a sensitizing agent in the presence of a small amount of water which forms coordination bonds between the oxide coatings on the aluminum particles of the thermite thereby resulting in a matrix of improved mechanical strength; introducing the mixture into a die;
- curing the mixture so as to form solid thermite pellets which, upon impact with a target, are initiated, thereby emitting a shower of molten iron particles and a chemical energy release on the target; and
- curing the formed solid thermite pellets under an amount of water for a period of several days to thereby further strengthen the pellets.

2. A method in accordance with claim 1 wherein the sensitizing agent is Bullseye pistol powder.
3. A method of producing solid thermite pellets, without the use of additives, for warhead applications, comprising forming a mixture consisting essentially of a small amount of water which forms coordination bonds between the oxide coatings on the aluminum particles of the thermite thereby resulting in a matrix of improved mechanical strength; introducing the mixture into a die; cold pressing the mixture so as to form solid thermite pellets which, when initiated by a torch-type flame, emits a shower of molten iron particles and a chemical energy release on the target; and curing the formed solid thermite pellets under an amount of water for a period of several days to thereby further strengthen the pellets.

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