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UNITED STATES PATENT OFFICE.

LEONARD WALDO, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO AMERICAN MAGNESIUM CORPORATION, A CORPORATION OF NEW YORK.

FLASH OR FLARE PRODUCT.

1,320,514.

Specification of Letters Patent.

Patented Nov. 4, 1919.

No Drawing.

Application filed December 22, 1916. Serial No. 138,361.

To all whom it may concern:

Be it known that I, LEONARD WALDO, a citizen of the United States, and resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Flash or Flare Products, of which the following is a specification.

This invention relates to flash or flare products for signaling and other purposes, having reference more especially to flash or flare powders composed of magnesium, or other combustible metal, either with or without the addition of an oxygen yielding material.

It has been proposed to mix or combine the powder with fibrous material, such as asbestos, or corded unspun wool impregnated with vegetable oil, for the purpose of separating the metallic particles and thus enabling the more thorough contact of oxygen therewith in order to promote combustion. Such admixture of the powder with fibrous material serves to separate the particles to some extent, but there is absent that thorough interstitial formation requisite and necessary to insure the efficient exposure of the particles to the chemical action of the oxygen. Moreover the intermixed fibers debase the powder in such a manner as to retard its combustion, and reduce the brilliancy and force of the flash or flare.

The object of my invention is to accomplish the requisite interstitial formation of agglomerated ignitable metallic particles without the addition of fibrous or other foreign substance; and to that end I reduce magnesium, or other combustible metal, to thin shaving-like particles of irregular curvature which are promiscuously intermixed either with or without the addition of a suitable oxidizing agent, as will be hereinafter described and claimed.

In accordance with the principle of my invention I reduce magnesium, or similar combustible metal, to shaving-like or filamentous form and promiscuously intermix the attenuated particles, which are of irregular curvature, so as to produce therein a multiplicity of interstices that permit and insure the free distribution of oxygen throughout and in intimate association with the individual particles. The thinness of these metallic particles, when they are heated in the presence of the freely distributed oxygen, promotes their quick ignition and

combustion whether the oxygen be furnished from the air or by any well-known oxidizing salt ordinarily used as an ingredient of flash powder or torch mixtures; such, for example, as peroxid of manganese, or perchlorate or chlorate of potassium.

An excellent flash or flare product embodying my invention consists of equal parts of filamentous magnesium and peroxid of manganese.

In the production of the shaving-like or filamentous particles they are severally sensibly curved thereby insuring adequate gaps or spaces between the opposed surfaces of the agglomerated material, and the individual particles are preferably not greater than $1/50$ of an inch in thickness, nor $1/30$ of an inch in width, nor $1/3$ of an inch in length. The characteristic material being readily ignitable and combustible is peculiarly suitable for use as or in the preparation of a flash or flare product as above mentioned.

In my experiments I have discovered that the shaving-like or filamentous material above described can be economically produced by lightly pressing a body of magnesium, or similar combustible metal, against a carborundum wheel running at high speed, approximately 4,200 feet per minute; the periphery of the wheel rapidly tearing the attenuated particles from the impinging surface of the metal.

I claim—

1. A pyrotechnic composition comprising, as an essential component thereof, particles of crooked, shaving-like structure composed of a light, readily combustible and easily ignitable metal.

2. A pyrotechnic composition comprising, as an essential component thereof, particles of crooked, shaving-like structure composed of a light, readily combustible and easily ignitable metal, such particles having a maximum size not materially greater than $1/50$ inch in thickness, $1/30$ inch in width, and $1/3$ inch in length.

3. A pyrotechnic composition comprising, as an essential component thereof, particles of crooked, shaving-like structure of metallic magnesium.

4. A pyrotechnic composition comprising, as an essential component thereof, particles of crooked, shaving-like structure of metallic magnesium, such particles having a maxi-

mum size not materially greater than $1/50$ inch in thickness, $1/30$ inch in width, and $1/3$ inch in length.

- 5 5. A pyrotechnic composition comprising, as an essential component thereof, particles of crooked, shaving-like structure, composed of a light, readily combustible and easily ignitable metal together with a solid oxidizing agent.
- 10 6. A pyrotechnic composition comprising, as an essential component thereof, particles

of crooked, shaving-like structure of metallic magnesium, such particles having a maximum size not materially greater than $1/50$ inch in thickness, $1/30$ inch in width, and $1/3$ inch in length, together with a solid oxidizing agent. 15

Signed at New York, in the county and State of New York, this 21st day of December, A. D. 1916.

LEONARD WALDO.