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METHOD OF PRODUCING ALUMINUM
BRONZE POWDER AND LUBRICANTS
THEREFORFurman C. Arthur, Oakmont, Pa., assignor to
Aluminum Company of America, Pittsburgh,
Pa., a Corporation of PennsylvaniaNo Drawing. Application May 13, 1932. Serial
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7 Claims. (Cl. 134—76.)

This invention relates to methods of producing aluminum bronze powder of maximum brilliance and to the product obtained thereby. The invention is particularly directed to the provision of certain improved lubricants for use in the production of aluminum bronze powder.

A desirable property of aluminum bronze powder is brilliance; the quality and grade of the powder is often measured by this property. It is, therefore, desirable to produce aluminum bronze powder of maximum brilliance. It is likewise desirable, in most cases, that the powder have good leafing power as well as maximum brilliance. The obtainment of an aluminum bronze powder possessing both of these properties has presented, heretofore, perplexing problems. Brilliance without good leafing power and good leafing power without brilliance are, comparatively speaking, readily obtained in aluminum bronze powder, but the combination of maximum brilliance and good leafing power is not commonly encountered. The property of brilliance herein referred to is the brilliance of a mass of powder or the collective brilliance of the powder particles in a paint film. It does not denote the brilliance of a single particle or flake of aluminum bronze powder. "Leafing" is the propensity of the aluminum bronze powder flakes or particles, when stirred in a vehicle such as oil or varnish, to come into the surface layer of a coating of the vehicle and there remain to form a metallic film.

There are more or less standard processes of preparing aluminum bronze powder. Usually these processes comprise two major operations, viz., the reduction of the aluminum metal to a powder of desired form and dimensions and the polishing of the powder thus produced. The reduction of the aluminum metal to powder comprises working the aluminum stock to break the metal up into the small thin flake-like particles known as bronze powder; stamping operations are the prevalent method of performing this working operation. The polishing of the resultant powder is usually accomplished by well known operations such as placing the powder in a cylindrical drum or similar mechanism in which revolve polishing brushes or members. During both metal working and polishing operations it is customary to use a lubricant on the metal. Particularly is the lubricant necessary in the polishing operation to impart to the powder particles, the ability to leaf. Brilliance, as well as leafing power, is to a large extent governed by the types of lubricants used in the

above-mentioned operations and I have determined that many of the lubricants heretofore used in these operations are unsuited to the production of an aluminum bronze powder of high brilliance.

My invention is predicated upon my discovery that certain lubricants and lubricating compositions not heretofore used may be utilized to produce an aluminum bronze powder of great brilliance which has, in most cases, a good leafing power. Tallow and stearic acid are known lubricants commonly used in the production of aluminum bronze powder. The powder obtained is of ordinary brilliance but has good leafing power. I have discovered that by using both stearic acid and ricinoleic acid as lubricants, especially in the polishing operation, it is possible to produce a comparatively brilliant powder, and that the use of ricinoleic acid does not under proper conditions materially decrease the leafing power of the powder thus produced. I have likewise discovered that ricinoleic acid, when used alone as a lubricant, will enable the production of a very brilliant powder which, although of lessened leafing power, is very useful in the decorative arts. The ricinoleic acid herein referred to may be pure or it may be the more usual (and preferred) commercial product which also contains other fatty acids of castor oil. Likewise the stearic acid herein referred to may be pure or may be the commercial product which contains, inter alia, amounts of palmitic and oleic acids. When, therefore, ricinoleic acid or stearic acid are referred to in this specification and the appended claims, the commercial product as well as the pure acid is, in each case, comprehended.

In the production of aluminum bronze powder the lubricants may be introduced into the operations in various ways. Preferably, in most cases, both stearic acid and ricinoleic acid are used. They may be used in different proportions. Good results are obtained, for instance, when the ricinoleic acid constitutes 1 to 99 per cent by weight of the total amount of lubricant used. The best combination of brilliance and leafing power is obtained, however, when the ricinoleic acid does not exceed 60 per cent of the total lubricant and I prefer to use the lubricant in the total proportions of 40 to 80 per cent stearic acid and 60 to 20 per cent ricinoleic acid. The powder produced by the use of a lubricant containing more than about 60 per cent ricinoleic acid does not leaf as well but is of great brilliance. This is particularly true where stearic acid is not

used and the lubricant is entirely ricinoleic acid. The proportions above given are not, however, exclusive, since the use of even small amounts of ricinoleic acid is very efficacious in increasing the
 5 brilliance of the powder. The lubricants, it will be understood, are mixed with, or placed upon, the metal which is to be reduced to powder, or the powder which is to be polished. The lubricants are usually added in small amounts at various
 10 stages in the process and in total amounts of 1 to 3 per cent by weight of the metal or powder being treated, although these proportions are merely illustrative, the proper amount being readily determined in any case by experiment.
 15 The lubricants may be added simultaneously or the addition of one may precede the addition of the other. I have found it preferable in the polishing operation, to first add stearic acid to the metal and subsequently add the ricinoleic acid, although there appears to be
 20 no reason why this should be so and, in fact, good results are obtained regardless of the order of addition. One method of adding these lubricants to the metal is to first form an actual mixture, of desired proportions, of the stearic acid and the ricinoleic acid. This mixture may be
 25 produced by first melting the stearic acid and then mixing into the melt the desired quantity of ricinoleic acid. The result, on cooling, is a solid or viscous mass which may be finely divided and added in this form to the metal.

In the practice of my invention the lubricant may be added in any or all of the metal working and polishing operations by which the aluminum
 35 bronze powder is produced. Excellent results are obtained if ordinary lubricants are added throughout the process and the ricinoleic acid, or both ricinoleic acid and stearic acid, are only added in the final polishing operations. Ricinoleic acid being used alone, it will be understood,
 40 where very high brilliance is necessary and a lessened leafing power can be overlooked.

In order to fully illustrate my invention I will described it with reference to a characteristic
 45 process of producing aluminum bronze powder. In this process the starting material or aluminum stock is in the form of small pieces which have, preferably, been obtained by cutting up wrought aluminum, such as rolled aluminum
 50 sheet. This stock is first passed through a stamping operation in which the metal is stamped into thin flakes of characteristic appearance and commonly known as "shrode". This "shrode" is then submitted to a second stamping operation in
 55 which it is further broken up and stamped out into the thin characteristic flakes of aluminum bronze powder. The powder thus produced is

classified as by screening and is then submitted to the well known polishing operation where its
 brilliance and leafing power are developed. It is then packaged and, after aging, is ready for use.

The product produced by the practice of my invention is an aluminum bronze powder of unusual
 80 brilliance as compared with the powder heretofore commonly produced. Each particle or flake of the powder is covered and enveloped with a thin, smooth layer containing ricinoleic acid
 85 or a mixture containing ricinoleic acid and stearic acid, depending upon the lubricating agents used. When both ricinoleic acid and stearic acid are used as lubricants the leafing power of the powder compares favorably with that of less brilliant
 90 powders, and this is particularly true where the ricinoleic acid does not exceed 60 per cent of the total amount of lubricant employed.

It will be understood that the particular processes described herein are illustrative in nature
 95 and that the scope of the invention is not limited thereby except as defined in the appended claims. Having thus described my invention, I claim:

1. An aluminum bronze powder lubricant containing stearic acid and ricinoleic acid. 100

2. The method of making aluminum bronze powder comprising working aluminum to reduce the same to a thin flake-like particle form and
 105 lubricating the metal during processing with stearic acid and ricinoleic acid.

3. The method of making aluminum bronze powder comprising working aluminum to reduce the same to a thin flake-like particle form and
 110 lubricating the metal during processing with ricinoleic acid.

4. Bronze powder consisting of thin flake-like particles of aluminum enveloped with a thin, smooth film containing stearic acid and ricinoleic acid and characterized by high brilliance and
 115 good leafing power.

5. Bronze powder consisting of thin flake-like particles of aluminum enveloped with a thin, smooth film containing ricinoleic acid.

6. In a method of making aluminum bronze powder comprising the reduction of aluminum
 120 metal to powder of desired form and dimensions and the final polishing of the powder, the step comprising lubricating the powder during polishing with ricinoleic acid.

7. In a method of making aluminum bronze
 125 powder comprising the reduction of aluminum metal to powder of desired form and dimensions and the final polishing of the powder, the step comprising lubricating the powder during polishing with stearic acid and ricinoleic acid. 130

FURMAN C. ARTHUR.

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