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PIGMENT

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In the manufacture of aluminum, quantities of dross accumulate. This dross consists of aluminum oxide in admixture with some normally unrecoverable aluminum and varying amounts of impurities including silicon, aluminum nitride, etc. Dross is also obtained from alloys of aluminum and such dross contains various impurities such as copper, zinc, manganese, magnesium, arsenic and silicon.

This invention is based upon the discovery that the said dross will form a valuable pigment which may be mixed with a liquid vehicle to provide a paint instead of requiring grinding of the pigment in the vehicle as is common with other paint pigments.

The pigment may be made as a dry pigment, or as a paste of varying solid content.

Aluminum dross as obtained from the smelters is in large irregular shaped chunks and this is reduced to small sized particles by crushing, grinding or hammering by any known process as a feed material for further processing. The feed material so obtained is mixed to a slurry with a relatively thick liquid and disintegrated in this slurry form to the desired degree of fineness. The slurry containing the disintegrated and fine particle pigment can then be concentrated by filtration or evaporation, or by other suitable method to increase its non-volatile content and in some cases it may be advisable to eliminate all traces of the grinding liquid to produce a dry pigment in powder form. Conversely it is possible to add more of the liquid or any other liquid compatible with it, to the slurry and thus reduce the amount of non-volatile content in the finished product.

It is possible to adjust the metal content of the finished pigment by first disintegrating the charge in a suitable liquid for a short period of time in order to preferentially disintegrate the harder, more brittle oxide content. In other words, the action of the mill will first be apparent on the harder, more brittle aluminum oxide content, so that this is the first component of the dross which is reduced to extreme fineness, the metal portion remaining in relatively large particles. By removing by filtration or other suitable means the fine aluminum oxide particles and retaining the relatively coarser metal particles, the metal content of the mill charge can be controlled within certain practical limits, say from 10 to 70% metal.

The heavy liquid we prefer to use is one that will be compatible with most paint or varnish vehicles, but we have found that ordinary min-

eral spirits, coal tar solvents, etc. will not give the desired grinding properties or easily dispersible characteristics of the finished pigment, although in some instances we may and have reduced the material in water to which a thickening agent such as water soluble gums, bentonite clay or other substance has been added. Where mineral spirits or coal tar solvents have been used we find that such thickening agents as aluminum naphthenate up to 5% by weight of the liquid, provides us the desired consistency for proper processing. We wish to call particular attention to the fact that we do not add a material to the liquid which during processing forms a thick creamy mass or slurry, but that the liquid we employ is thick at the start of the disintegration process.

We prefer to use a steel ball mill for producing our pigment, although other types of disintegration apparatus could be used, such as rod mills, pebble mills and stamp mills, etc.

As an example:

Dross is first reduced to about 10 mesh size and 320 pounds placed in a steel ball mill, 32 gallons of mineral spirits, which has previously been thickened with 3% of aluminum naphthenate is then added, and the mill put in motion, so as to give a cascading action of the steel balls for 24 hours.

Samples from the mill are then taken to determine whether the pigment is of the proper fineness, approximately 1% on a 325 screen, and if this degree of fineness has not been reached, the mill is continued in action to produce the fineness desired.

About 300 pounds of thinner, i. e., mineral spirits is then added to the mill and the mill revolved for a minute or so to produce a thin liquid easily drawn from the mill carrying the pigment particles in suspension. This thin liquid can be screened, if desired, to remove oversized or non-disintegrated pieces which may have lodged in crevices of the mill and the resultant mass can be adjusted to the desired non-volatile content, to about 60%, by evaporation of the excess liquid. We prefer to use a vacuum heated dryer for this latter operation, but the same result could be obtained by ordinary filtering methods. When first removed from the evaporator at 60% non-volatile, the pigment is of a rather thin character, and flows easily, but when allowed to set and cool, a gel formation takes place from the aluminum naphthenate which gives the finished product more of a jelly-like character.

In practice, 2 pounds of this product which will contain approximately 1.2 pounds of solid pigment, can be mixed with a gallon of suitable vehicle, such as linseed oil, varnish, etc., and complete dispersion of the pigment obtained by simple stirring and mixing to provide a paint which on chart coverage, will give complete opacity when applied at the rate of at least 1,000 square feet per gallon, and in most instances, 2000 square feet per gallon.

The dried paint film so obtained is of a bluish gray color, but other colors and tints may be obtained by the use of various types of additional pigments. However, it should be clearly understood that no other pigment is necessary to produce a good usable paint.

It should be understood that our pigment cannot be regarded as a filler or inert ingredient to a paint already sufficiently pigmented with other materials. Our pigment, when used in proper vehicle, gives a smooth appearance of exceptional coverage and opacity, and strong tinting strength, also it is a pigment not affected by extremely high heats. It is very resistant to weather and mechanical abrasion, and resistant to the corroding effects usually found in industry. It is, of course, possible to include during the manufacture of this pigment, any of a wide group of other materials which, because of their action, change properties of our pigment, or augment its properties. As an example, blue lead, zinc chromate, or other rust inhibitor may be disintegrated with

the pigment during its manufacture; or chrome yellow, ochre, or other tinting pigment may be dispersed in our pigment during disintegration to give some other desired shade.

5 A valuable property of the pigment is that after its application on any surface in suitable vehicle, and upon drying, it can be rubbed or buffed to give a lustrous metallic effect. This is one of the most important properties of the pigment.

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

1. A pigment consisting of finely divided aluminum dross containing in predominant proportion 15 aluminum oxide and metallic aluminum, the aluminum oxide exceeding 50% of the total ingredients.

2. A pigment consisting of finely divided aluminum dross containing in predominant proportion 20 aluminum oxide and metallic aluminum, the aluminum oxide being in excess of the metallic aluminum.

3. A pigment consisting of finely divided dross 25 from aluminum alloyed with a plurality of metals from the group of copper, zinc, manganese, arsenic and silicon, containing in predominant proportion aluminum oxide and metallic aluminum, the aluminum oxide being in excess of the metallic aluminum, aluminium nitride and the plural- 30 ity of compounds from the said metallic group.

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