Jan. 18, 1927. 1,614,684

A. PACZ

METALLIC ARTICLE

Filed Feb. 15, 1926

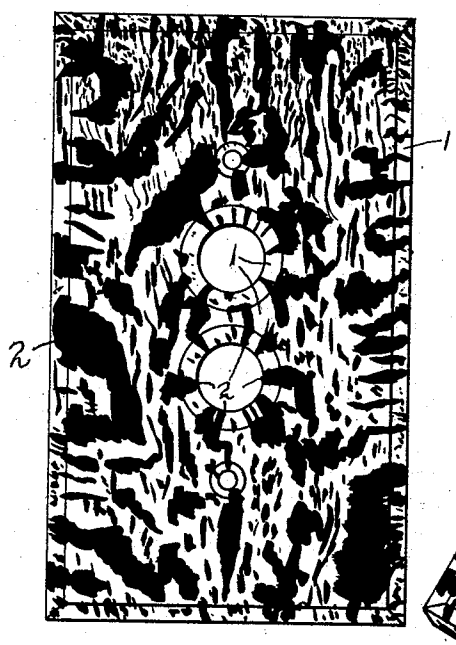


Fig. 1

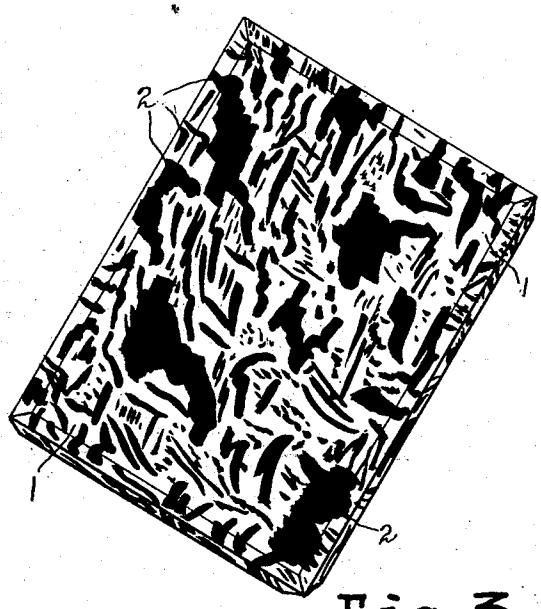


Fig. 3

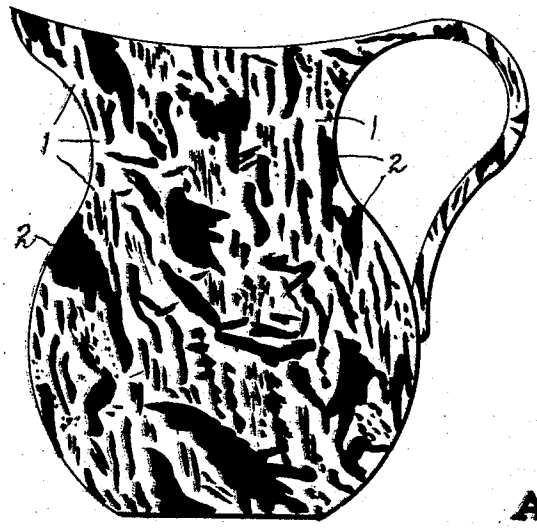


Fig. 2

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UNITED STATES PATENT OFFICE.

ALADAR PACZ, OF EAST CLEVELAND, OHIO.

METALLIC ARTICLE.

Application filed February 15, 1926. Serial No. 88,303.

This invention relates to articles of manufacture which consist at least in part of aluminum and has for its object the provision of such an article with a surface which is artistic in appearance, permanent in character, and protective in effect. It is a well known fact that aluminum articles as heretofore made have been characterized by the possession of a plain and unembellished metallic surface rather susceptible to tarnish and corrosion and not capable of protection by coatings of metal, paint, varnish, enamel and the like since the same adhere only very weakly, if at all; the article of the present invention is characterized by the possession of a surface coating which is both artistic in itself, highly resistant to corrosion, abrasion, or removal, and also capable of constituting a firm basis for paint or the like.

In the drawings accompanying and forming a part of this application I have illustrated three diverse forms of metallic articles symbolic of the numerous range of articles which fall within my invention. Fig. 1 illustrates a wall plate for an electric switch; Fig. 2 a pitcher, and Fig. 3 a cigaret case. Each is characterized by the possession of portions 1—1 where the naked metal is visible interspersed with irregular spots which range from dark gray to dead black. The mode of producing these articles is described and claimed in my application filed February 10, 1926, Serial No. 87,463, namely: the article is first made from metallic aluminum or a suitable alloy thereof in the usual manner after which it is immersed for a suitable length of time in a hot aqueous solution containing, (1) a soluble fluo-silicate; (2) a salt of a non-ferrous, iron-group metal, and (3) an alkali salt. The three ingredients I preferably employ are sodium fluo-silicate, nickel sulphate, and ammonium nitrate, the third named ingredient being preponderant. Suitable concentrations are sodium fluo-silicate .15%, nickel sulphate .3%, ammonium nitrate 1%. It will be understood that I do not limit myself to this process or to this composition or to these ingredients or to these proportions, but merely instance the same as examples of a treatment which operates successfully to produce the articles described. For example I am aware that other soluble fluorine salts can be employed, that other salts of nickel or cobalt can be employed such as the nitrate, chloride, etc., and that the alkali salt may possess a base of potash or soda as well as of ammonia and that other acid radicals than the nitrate can be employed therewith.

As a result of the treatment described, dark colored spots of various shapes and sizes are produced on the surfaces of the articles. In the absence of using any stencil or other shielding means this mottled appearance is produced over the entire surface of the article, although it is generally less on the lower face and is reduced on interiors, re-entrant angles, or between closely opposed surfaces. It is very difficult to secure a complete covering of the article with this deposit, but in the case of most articles the mottled appearance is preferable, and where protection is the main desideratum it is often possible to secure a comparatively complete coverage of the exposed portions. Some portion of the article appears always to retain its original metallic surface, although in general the more concentrated the solution or the higher the temperature the smaller are the spots and the finer grained the design, and also the more rapidly the process is performed. Variations in the relative quantities of the ingredients also affect the size of the grain and the manner of its distribution. Thus an increase in the amount of the fluo-silicate produces a finer grain and a decrease tends to coarsen the same. An increase in the amount of the iron-group metal produces a much similar change in the grain. The effect of the alkali salt appears more especially to influence the strength or depth of the colorization which becomes faint with low concentrations and darker and blacker with greater strengths.

The resulting coating is unaffected by any ordinary degree of heating and is highly resistant to abrasion, even that of a steel brush, the unmodified aluminum surface yielding rather than the modified or coated portion. The articles after receiving treatment hereinbefore described are taken from the bath, rinsed with water and allowed to dry, whereupon they are complete within the purview of my present invention. However, they can, if desired, be subjected to further treatment, for example the subjection to the action of water soluble molybdenum salts or other substances to color the remaining

metallic portions; or the entire surface can be covered with paint, lacquer, etc. The coloring of the unmodified metal can also be controlled to some extent by allowing other ingredients with the aluminum. For example, the addition to the aluminum of a small quantity, for example 5% to 15% of silicon, produces a gray tone, and by suitably controlling the treatment by concentration temperature, time, etc., as above indicated an effect can be produced much like that of marble, and articles made therefrom are valuable not only for the manufacture of hardware, utensils, etc., but also of building materials, pilasters, panels, pillars, and the like. These articles can also be made from alloys of aluminum with other metals such as magnesium, zinc, copper and the like; for example the duralumin parts of air craft containing my present invention exhibit the long-sought resistivity to corrosion and the hitherto absent ability to hold a coat of paint, and the same is true as to die-casting alloys which generally consist essentially of aluminum and zinc. Accordingly by the word "aluminum" as used in my claims I mean to designate not only pure aluminum but also alloys wherein aluminum is preponderant.

While I do not limit myself to any expression of theory and while it is generally impossible, or at least extremely difficult, to make any chemical analysis of the composition of the surface deposit, it is my belief that the surface of the aluminum is etched and the etched portion coated with a deposit which consists essentially of an oxide of the iron-group metal employed, that is nickel or cobalt; however, it is not impossible that it consists at least in part or in some cases of metallic nickel or cobalt in a very fine state of sub-division. It will be understood that articles of manufacture containing my invention may be made of any size or applied to any use whatever, and that my invention is not avoided by securing a plurality of articles together to produce a larger structure, nor by covering such articles from sight, or by so performing the process as to obtain an unbroken coating on any part of the device.

Having thus described my invention what I claim is:

1. As an article of manufacture, a metallic article consisting at least predominantly of aluminum, the surface of which is etched irregularly and the etched portions coated with an adherent colored deposit.

2. An aluminum article having an integral surface layer containing essentially an oxide compound of non-ferrous, iron-group metal which layer is harder and more permanent than the metal of which the article is made.

3. An aluminum article having a hard and permanent coating of oxidized non-ferrous iron-group metal adherent to at least a part of its surface.

In testimony whereof I hereunto affix my signature.

ALADAR PACZ.