

## UNITED STATES PATENT OFFICE

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## METALLIC THERMOPLASTIC MATERIAL

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3 Claims. (Cl. 106—193)

1 This invention relates to cellulose-acetate-butyrate mixed with a powdered metal which have the appearance and some of the properties of metals.

In accordance with the invention it is possible to provide products which are relatively soft and thermoplastic and which have most of the advantageous properties of regular plastic materials yet which have some of the physical properties and much of the appearance of metals.

The products of the invention, accordingly may readily be formed by simple treatment processes for plastics to then form easily for flow into desired shapes and structures. The products of the invention may readily be used as both metals and plastics for structural or ornamental purposes or for purposes which are both structural and ornamental.

Being cheaper to handle and fabricate than the metals, the new products have many and obvious advantages over these materials and having some of the temperature resistance and flame resistance of the metals, the new products have many advantages over the hitherto known plastic materials. Compared with both or either of their predecessor materials they lend a greatly improved as well as a very attractive appearance and increased ornamental and structural value which will greatly satisfy the user wherever the products of the invention are used for any of the many and widely varied uses for which these products can be highly recommended.

In addition to the above advantages, the product and methods of the invention are relatively inexpensive. They may be practiced using relatively inexpensive raw materials, relatively unskilled labor and cheap and economical standard machines which are readily available and need but little adaptation to conform them to the new processes and products.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and to the appended claims in which the various novel features of the invention are more particularly set forth.

In accordance with a preferred form of the invention a new and novel plastic product of the thermoplastic variety is formed by incorporating a critical percentage of finely and evenly divided metal powder into the structure of a plastic product, distributing the metallic particles evenly and without agglomeration throughout. It has been found that metal-like appearance cannot be provided in a plastic unless at least ten percent of its

2 weight is comprised of the finely divided metallic powder. On the other hand, the use of more than twenty percent by weight of the metallic powder results in a thoroughly weakened product which has lost nearly all advantageous plastic properties without gaining enough of the properties of the metal to compensate for this loss.

The results of this invention are plastic products of good metal-like appearance having some increased strength properties, increased flame resistance yet great ductility at low temperatures. Significant electrical resistance and good thermal insulation value are also obtained with all thermoplastic base materials where the metallic powder is finely and uniformly divided and present in amounts between eight and twenty percent of the total weight.

While as has been mentioned above, all thermoplastic materials may be used as the plastic base of the combination, best results are obtained where cellulose acetate or one of the similar products is used. Thus cellulose acetate crotonate, cellulose acetate butyrate, cellulose acetate propionate, cellulose acetate stearate, and cellulose acetate nitrate will serve to full satisfaction. The metal powders may be any of a wide variety of materials but among the preferred ones will be found gold, silver, copper, and aluminum.

Merely in order to illustrate the preferred forms of the invention and in no way to limit its scope, several preferred examples of compositions in accordance with the invention follow:

## Example I

|                            | Percent by weight |
|----------------------------|-------------------|
| Cellulose acetate butyrate | 90                |
| Copper powder              | 10                |

The raw materials in powder form are loaded into a hopper which is agitated to advance small quantities into a heating cylinder as they are required. The granules are softened in the cylinder by heat and pressure as they progress slowly to the outlet end. The plastic mass of the molding material is then forced under high pressure through an orifice into a closed and tightly locked mold. The temperature of the mold is maintained below the melting point of the material and is hardened to shape by cooling.

## Example II

|                                       | Percent by weight |
|---------------------------------------|-------------------|
| Cellulose acetate butyrate propionate | 87                |
| Copper powder                         | 5                 |
| Silver powder                         | 8                 |

Example III

|                         | Percent by weight |
|-------------------------|-------------------|
| Cellulose acetate ----- | 85                |
| Copper powder -----     | 9                 |
| Gold powder -----       | 4                 |
| Silver powder -----     | 2                 |

This again was mixed and prepared in a manner similar to that used in Example I.

In each case, the resulting plastic merely looks like a metal but is for decorative use only and does not have the full physical characteristics of metal and will not conduct electricity. Some of the more advantageous physical properties of the mixture are: (1) it is more resistant to burning than a pure plastic would be and as such can be used in ash trays and (2) that it is as flexible as plastic and as such can be used in eye-glass frames, furniture covering, cigarette cases, compacts, earrings, watch bands, lamp shades, etc.

While I have described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise examples herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. A thermoplastic material having the appearance and some of the properties of metal, consisting of 90 per cent by weight of cellulose acetate butyrate having dispersed therein 10 per cent by weight of finely divided metallic powder.

2. A thermoplastic material having the appearance and some of the properties of metal, consisting of 90 per cent by weight of cellulose acetate butyrate having dispersed therein 10 per cent by weight of finely divided metallic powder, said powder being copper.

3. A thermoplastic material having the appearance and some of the properties of metal, consisting of 90 per cent by weight of cellulose acetate butyrate having uniformly dispersed therein 10 per cent by weight of finely divided copper.

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