UNITED STATES PATENT OFFICE.

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MINERAL COLOR.

SPECIFICATION forming part of Letters Patent No. 512,226, dated January 2, 1894.

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To all whom it may concern:

Be it known that we, JOSEPH SACHS, a subject of the Grand Duke of Baden, and ARMAND MÜLLER-JACOBS, a citizen of the Republic of Switzerland, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Mineral Colors; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to mineral colors for decorating purposes, and its novelty consists in the several successive steps of the process employed in their manufacture, and the novel product resulting therefrom.

A substitute for bronze powders and similar metallic materials possessing durability and a suitable luster and capable of being used in the manufacture of wall paper, the finishing of artistically printed matter, and for similar purposes, has long been sought. Bronze powders are costly and very heavy, they are quickly affected by impurities in the atmosphere to which they may be exposed in use, and can only be made in a limited number of colors. Many substitutes have been tried in vain to replace in whole or in part these expensive materials. We have, however, after much experiment, discovered a process and invented a product which seems to fulfill the desired requirements of cheapness, lightness, luster, and durability; and the object of our invention is to produce a mineral powder dyed any suitable or desirable color and possessing the properties of lightness, luster, and durability at least as compared with the ground metallic powders heretofore employed.

It is requisite that a mineral substance should be employed as the basis for such a material because minerals alone seem to possess the necessary luster and durability. Mica in a finely divided state, seems to more nearly fulfill the necessary conditions than any other cheap mineral known to us; but it is obvious that minerals of a micaceous character, such as lepidolite and jefferisite or minerals possessing similar physical properties, such as talc, actinolite, and some varieties of quartz, feldspar, and other minerals mainly composed of silica or silicates, may be employed in like manner with good results. It is also necessary that the mineral after having been finely ground should be dyed or colored in such a manner as to permanently fix the color and at the same time not to destroy the surface luster of the mineral base or render its particles dull or opaque. After many experiments, it was ascertained that organic colors could alone be employed with success and that those of the aniline series were in many respects the best. They can be obtained in many shades and are reasonable in price. A factor in determining their use moreover was their solubility in water, other solvents which might have been employed being costly to obtain and in several cases dangerous to use.

Many attempts have heretofore been made to dye mica and similar mineral substances but they have not been successful. It is true that color has been imparted to a mass consisting largely of ground mineral material and that such color has been mechanically retained in its relation to the mass by the use of the adhesive properties of albumen, casein and similar products. But such a process does not dye the mass of mineral. It colors it merely and resembles rather the process of painting whereby a mass of opaque pigment is caused to adhere to the surface of the object treated. Our process which we believe to be essentially new is properly dyeing and does not alter the surface of the mineral or its physical properties. Minerals of the kind we have referred to are quite insoluble in water and it is impossible to color them commercially by simply bringing them into contact with solutions of coloring matter containing adhesive material.

It is known that certain vegetable fibers have affinities for some colors which they readily absorb and retain and have antipathies for others which are not so absorbed, for instance methylviolet and magenta do not combine with cotton though silk and wool readily retain them. If however the cotton fibers be treated with albumen and some similar materials a marked change takes place in their nature and thereafter they readily receive and retain the colors which they previously repelled. This treatment of fiber is technically called "animalizing." Now we

have discovered that some minerals may similarly be animalized or made to receive colors as a dye in an entirely novel manner and with good commercial results.

We are well aware that insoluble colors or pigments have been "fixed" in place when applied to mineral surfaces by the use of the adhesive qualities of coagulated albumen, but this is as purely a mechanical process as the retention of plums in a pudding and bears no relation to our process which is a chemical one and resembles the animalizing of vegetable fiber. So far as known to us we are the first to discover and apply this principle to the dyeing of mineral substances and thus attain a result which has long been sought.

In the practical manufacture of our mineral colors, we proceed as follows:—The mica or similar mineral matter, is first reduced to a finely divided state by any of the well known methods, such as grinding. It is then introduced into a bath of egg albumen or similar albumen and the mixture is thoroughly stirred to bring the particles into contact closely. The mineral is then filtered and allowed to dry and the mass when dried is subjected to the action of a suitable coagulating agent as acetic acid, phenol or the like or it may preferably be introduced into a steam bath by placing it in a suitable closed vessel capable of agitation and provided with means for introducing, controlling and discharging steam under pressure. The steam should be kept at a pressure of from one and one half to two atmospheres and maintained thereat for about one half hour or until the coagulation of the albumen is complete. After this has been accomplished the animalized mineral is introduced into an aqueous solution of the coloring matter chosen, preferably one of the basic aniline series and of a strength suitable to produce the tint desired and which must in particular instances be determined by experiment. After vigorous agitation in the color bath it is allowed to settle, and is then filtered and the precipitate removed and dried in any suitable manner. It will be found upon an examination of the mineral so treated that it has been really dyed, and this is proven by the facts that the color cannot be removed by mechanical means, such as rubbing, it does not render the colored particles opaque to light, and they have lost none of their original luster or brilliancy, whereas if the color had only been painted upon the mineral its particles would have become opaque and much of its luster and brilliancy would have disappeared. The treatment with albumen may proceed simultaneously or even in some cases follow the color bath with good results, but these processes will be made the subject of other and further applications for Letters Patent. After the dyed mineral has been prepared it may profitably be mixed mechanically with a large proportion of ground metallic powder such as bronze powder, brocade, bisulphide of tin, &c., and indeed its use alone is hardly contemplated at first, in order that those using it may gradually become accustomed to its superior lightness and other novel properties. When mixed with ground metallic powders the portions of the mica which remain undyed reflect the luster of the metallic powders in such a manner that the luster of the entire mass is equal to or greater than a similar volume of the metallic powder alone. When mixed with bronze powder, we prefer to use the dyed mineral in the proportion of twenty per cent. or less of the entire mass.

Having described our invention, what we claim as new is—

1. The process of coloring mineral substances which consists: first, in subjecting the same to the action of albumen; second, in coagulating the albumen; and, third, in subjecting the same thereafter to the action of an organic dye dissolved in water.

2. The process of treating mineral substances which consists: first, in subjecting them to the action of an animalizing mordant whereby they become receptive to soluble colors; and second, in subjecting them thereafter to the action of such a color in solution.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH SACHS.
ARMAND MÜLLER-JACOBS.

Witnesses:
JAMES P. DOWNS,
WM. RAIMOND BAIRD.