Nov. 10, 1942. E. VAN DER PYL 2,301,721

FLOOR PRODUCT

Filed Aug. 1, 1939

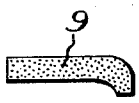


FIG. 1

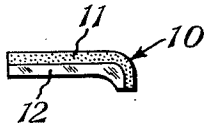


FIG. 2

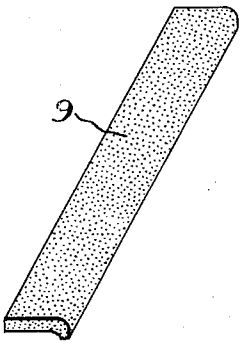


FIG. 3

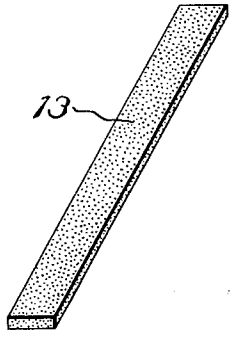


FIG. 4

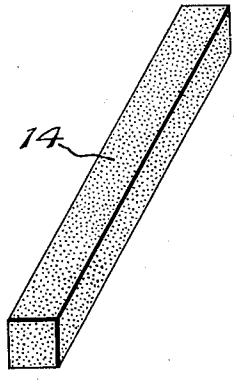


FIG. 5

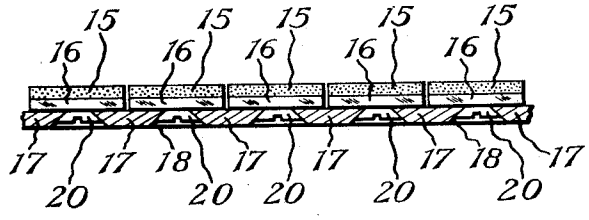


FIG. 6

Inventor

EDWARD VAN DER PYL

By George C. Sommerich

Attorney

Patented Nov. 10, 1942 2,301,721

UNITED STATES PATENT OFFICE

2,301,721

FLOOR PRODUCT

Edward Van der Pyl, Holden, Mass., assignor to Norton Company, Worcester, Mass., a corporation of Massachusetts

Application August 1, 1939, Serial No. 287,697

3 Claims. (Cl. 94—5)

The invention relates to non-slip floor products, particularly for use on stairs.

One object of the invention is to provide a superior metal bonded floor product of anti-slip qualities. Another object of the invention is to provide a composition for a metal floor product producing a piece which is highly resistant to wear and also sufficiently ductile so that it will not fracture even under abusive conditions. Another object of the invention is to provide a practical method for the manufacture of such a floor product. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts, and in the several steps and relation and order of each of said steps to one or more of the others thereof, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing illustrating several possible embodiments of the mechanical features of this invention:

Figure 1 is an end view of a stair nosing;

Figure 2 is an end view of a stair nosing with a non-abrasive backing;

Figure 3 is a perspective view of the stair nosing of Figure 1;

Figures 4 and 5 are perspective views of floor products in rectangular parallelopipedal shape, the product of Figure 4 being rectangular in cross section and the product of Figure 5 being square in cross section;

Figure 6 is a view partly in end elevation and partly in cross section, of a composite structure consisting of a sheet metal backing plate and rectangular abrasive members having integral backings of non-abrasive metal.

I provide a quantity of abrasive. While any suitable abrasive may be used, such as sand, flint, garnet, crushed glass, or the like, I prefer the electric furnace abrasives or emery. Emery is a natural variety of alumina and is sufficiently hard to make a good practical floor product. Electric furnace silicon carbide can also be used, but the preferred abrasive is electric furnace fused alumina which is sufficiently hard and at the same time tougher and stronger than silicon carbide or any of the other abrasives mentioned.

I provide a quantity of metal bond in powdered form, the chief ingredient of which is preferably copper. My preferred bond formula is: copper 76% by weight, nickel 20% by weight, and tin 4% by weight. I provide these as separate powders and mix them together.

I make a mixture of the abrasive and bond, 50% of each by volume. I then place this in a mold the shape of the floor product to be formed. The mixture of powders and abrasive is then pressed in the mold by means of a hydraulic press, thereby producing a solid integral body which can be readily handled. This, however, is not the final product. I place the pressed product in a sintering furnace and heat to a temperature below the melting point of copper, preferably of the order of 800° C. for 5 hours. This heating sinters the mixture of copper, nickel and tin and produces a homogeneous integral article.

The amount of tin selected is below that at which the product would be brittle or friable. The nickel adds toughness to the product. I prefer the non-ferrous metals because of the possibility of rusting. For many practical considerations, copper is the preferred basic ingredient of the bond. The copper all alone is not tough enough, wherefore the nickel was added, and the tin makes it just a little harder. But so far as the method is concerned, I may use any other metal powders. Figures 1 and 3 illustrate a stair nosing 9 entirely formed of abrasive bonded with metal according to the invention and which may be secured in any suitable or known manner to the front part of stairway steps.

If desired, a composite article may be made in which the lower part is metal without any abrasive and the upper part is metal plus abrasive, this being done simply by the manner of filling the mold. In Figure 2, a stair nosing 10 is illustrated consisting of metal bonded abrasive 11 integrally secured to a metal backing 12.

The product is useful as a nosing for stair treads, for example on stairways of ships where non-slip qualities are important and where the stairs are subjected to rough treatment from time to time. Figure 4 illustrates a flat rectangular piece 13 which may be cemented or otherwise secured to a stair or floor, while Figure 5 illustrates a parallelopipedal metal bonded abrasive piece 14 which can readily be inserted in slots provided, as well known, in metal stairways for this purpose. An article made in accordance with the invention is extremely strong as well as durable and it is not at all brittle but will bend to a considerable extent. The floor product is also useful in any place where a metal floor is used, oil is bound to be present, and it is desired to reduce the danger of accidents to persons by

slipping. For example, the floor product is useful for the floors of gun turrets for battleships, in electric lighting plants, around turbines and furnaces, in machine shops, around automatic screw machines etc.

The method of manufacture permits wide variation in the proportions of ingredients without any mechanical difficulties. Furthermore, the abrasive may be concentrated where desired, simply by selectively filling the mold. As the molding is carried on without the use of heat, the production can be at a high rate and a small amount of mold equipment will suffice. The articles as removed from the mold can be readily handled so the furnace runs can be postponed until a great number of articles are ready for sintering. Thereby the method is economical and practical.

Further with regard to the proportions of metals used, somewhere just above 15% of tin produces a brittle copper alloy and so far as certain features of the invention are concerned, I desire to avoid this. Therefore, tin is preferably less than 15%. The copper should predominate but in order that the bond shall be tough, the nickel should be present in a substantial amount, say in greater amount than the tin.

One advantage of making the article in two sections, as shown in Fig. 6, one part 15 including abrasive and the other part 16 including no abrasive, is that the lower portion 16 including no abrasive can readily be machined and can, for example, be drilled and tapped. For instance, thereby a large floor can be laid by providing metal tiles 15, 16 according to the invention as herein described, providing a large sheet of steel 17 with holes 18 through it, drilling and tapping holes in the non-abrasive portion 16 of the tiles, and thereby attaching them with screws 20 to the sheet metal. A similar procedure may be adopted with the nosing 10 of Figure 2.

It will thus be seen that there has been provided by this invention a method and an article in which the various objects hereinabove set forth together with many thoroughly practical advantages are successfully achieved. As various possible embodiments might be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinbefore set forth is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A floor product consisting of abrasive grains bonded with a sintered metal bond formed from metal powder and consisting of copper approximately 76%, nickel approximately 20%, and tin approximately 4%, the abrasive grains being well distributed throughout the metal bond forming a homogeneous aggregate.

2. A floor product consisting of abrasive grains bonded with a sintered copper-nickel-tin bond formed from metal powder in which copper predominates, tin is below the quantity at which friableness is imparted, and nickel is present in a substantial amount, i. e. in greater percentage than the tin, the abrasive grains being well distributed throughout the metal bond forming a homogeneous aggregate.

3. A floor product having a top portion consisting of abrasive grains and a sintered bond formed from powdered metal consisting of copper, nickel, tin in which copper predominates, tin is below the quantity at which friableness is imparted, and nickel is present in a substantial amount, i. e. in greater percentage than the tin, and a bottom portion consisting of a copper, nickel, tin alloy, these metals being present in substantially the same proportions as they are present in the said bond, the two portions being integrally united and the product being a unitary piece, the abrasive grains being well distributed throughout the metal bond forming a homogeneous aggregate.

EDWARD VAN DER PYL.