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PLASTIC COMPOSITION COMPRISING MINERAL POWDER, WOOD DUST, AND ADHESIVE

Raymond I. Billington and Ralph J. Nelson,
Saugus, Mass.

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This invention relates to a plastic composition adapted to be applied for example in the general manner of putty but adapted to adhere more firmly and to attain a much greater permanent strength and having further advantages. The composition is useful in many applications and its properties will be explained in connection with its use in pattern making.

As is well known in pattern making and foundry practice, fillets are applied at all reentrant angles of patterns. For instance, if a pattern is of L-shaped cross section, the pattern can most easily be made by joining two flat strips to make an L-shaped section and then making a fillet in the interior corner of the L. Customarily such fillets are made by applying putty to the corner or by securing in place in the corner a strip of preformed wax having an outer facing of cloth.

Putty is subject to the disadvantage among others of weakness and tendency to crumble, and the further disadvantages of being slow to dry and not adhering to any metal parts of the pattern. In addition, putty does not provide a suitable surface to receive a coating of lacquer. Preformed wax strips having cloth facings are subject to the disadvantage among others that when painted with lacquer the cloth shrinks and pulls away from the body of the wax, no longer providing the desired rounded contour at the corner of the pattern.

Our new plastic composition possesses marked advantages over the older fillet materials. It is easily applied and adheres readily to wood or metal. It can be compounded to harden to the hardness of wood, or greater hardness, but its volume is not substantially affected by the hardening. When hard it may be sanded and smoothed to the same finish as the wood of the pattern and it may be satisfactorily painted with the same paint, for instance lacquer, with which the remainder of the pattern is painted. The sand used in the moulding operation does not stick to fillets made of the new composition, which has the advantage of producing smoother castings. The increased strength of the composition is an advantage both in preventing breakage of the fillet during use in handling of the pattern, and also in reinforcing the remainder of the pattern. The composition is moisture resisting and heat resisting.

The solid constituents of the composition are mineral powder and wood dust (which is finely divided wood), preferably in the proportions of from approximately 1½ to approximately 2¼ parts of mineral powder to 1 part of wood dust, thoroughly mixed.

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The mineral constituent may comprise such powdered materials as whiting, plaster of Paris, alum, magnesia, marble dust, zinc oxide and French chalk. The mineral constituent preferably comprises a mixture containing whiting and plaster of Paris in substantial proportions. The relative proportions of whiting and plaster of Paris can be varied widely. We prefer that the whiting be present in the ratio of approximately 1⅝ parts to ½ part of plaster of Paris. Whiting appears to contribute to the sticking capacity of the plastic composition and plaster of Paris adds to the smoothness with which the plastic can be spread by a tool.

As indicated above, there can be a substantial variation in proportions of mineral powder and wood dust. One function of the mineral powder appears to be the prevention of shrinkage during hardening, and to secure most nearly complete prevention of shrinkage it is best to have at least 2 parts of mineral powder to 1 part of wood dust. However, the mineral content can be reduced to 1½ parts if a slight amount of shrinking is permissible in use of the mixture, and for other uses the mineral content may be reduced still further. It is preferred not to increase the mineral powder to more than about 2¼ parts because as the mineral powder content is raised higher than about 2¼ parts, the composition loses some of its strength.

A typical preferred proportioning of the solid constituents is thus:

	Parts
Whiting	1⅝
Plaster of Paris	½
Wood dust	1

The wood dust, which can be the dust of whatever variety of wood it is desired that the plastic composition should match, can be collected easily by means of a fabric sieve, such as a burlap bag, attached to the discharge end of the dust pipe of a disk type power sander.

The mineral and wood dust, thoroughly mixed, are bound together into a plastic composition of about the consistency of putty, by a binder which yields this consistency and contains an adhesive and suitable volatile organic solvent, resinous adhesives being preferred. Useful results can be secured for many purposes where strength but not a high degree of hardness is required by employing a binder consisting of a viscous solution of rosin in ether or acetone. For greater hard-

ness it is preferred to employ as the binder a solution containing a synthetic resin, plasticizer, and preferably also nitrocellulose, as well as volatile solvent. Suitable binders are available in the field of the heavy bodied lacquers known as brushing lacquers containing synthetic resins. Thus a preferred composition of the binder is

5 to 8% nitrocellulose (5 to 6 seconds)
3 to 6% plasticizers, such as dibutyl phthalate, tricresyl phosphate, or heavy body castor oil
7 to 10% maleic resin, which is a resin used in lacquer manufacture, consisting of a combination of rosin and maleic acid with glycerine.
24 to 28% acetates, such as ethyl, butyl or amyl
12 to 15% alcohols, such as ethyl or isopropyl
37 to 42% naphthas

The addition of slight amounts of rosin to the above binder will tend to increase resiliency of the hardened composition.

While nitrocellulose is a useful and preferred ingredient in the binder, one should avoid any such predominance of the nitrocellulose as would cause a skin of nitrocellulose to form on the outer surface of a fillet or the like before the underlying plastic composition has suitably hardened.

The liquid binder is added to the mixture of mineral powder and wood dust until the desired plastic consistency is secured and the product then tightly sealed in a container to avoid premature hardening. Thus sealed, the composition has good keeping qualities.

The plastic composition can readily be formed into a fillet by smoothing it into the corner of the pattern. No further ingredients need be added at the time of use. No water need be applied to the composition to render it suitable for use, which is a marked advantage in pattern-making because of the harmful effect of water upon wooden patterns. The composition forms an integral part of the wood or metal pattern and exhibits no objectionable shrinkage. The fillet is strong and well able to withstand the rough handling which patterns may receive in the foundry. It may be finished to a very smooth finish, and forms an excellent base for a lacquer coating.

The composition is also well adapted for use in repairing or building up an article to which it is applied, for instance in building up a portion of a pattern to a larger size, filling in depressions or pits in the surface of a pattern or the like, or filling up a joint between two members, in all of which uses the plastic composition strongly adheres to the material to which it is applied, whether wood, metal, glass, brick, paper, a painted surface or porcelain.

While for ordinary use it is satisfactory to mix the wood dust and mineral constituents and then apply the viscous binder to this mixture and seal the whole in a container, there are conditions when it may be advantageous to supply the wood dust separately from the mineral and binder ingredients. The mineral or minerals and the viscous binder may be supplied in one container and the wood dust may be supplied in a separate container or be furnished by the user of the composition. In this case it is advantageous to mix with the wood dust a small amount of castor oil, for example 2 tablespoons of castor oil per pound of wood dust, and allow these to stand well mixed for some time before use so that the castor oil is thoroughly absorbed by the wood dust. Then a short time before use, the wood dust and other ingredients are mixed. This procedure still further reduces shrinkage, and results in there being no more than an almost imperceptible amount of shrinkage, and is useful where relatively large bodies of the plastic are to be used, and it is required that the shrinkage of such large bodies be exceedingly small.

We claim:

1. A plastic composition consisting essentially of mineral powder, wood dust, an adhesive and volatile organic solvent for the adhesive, the major constituents of the mineral powder being plaster of Paris and whiting, the whiting being present in larger quantity than the plaster of Paris, the mineral powder and wood dust being in the proportion of from 1½ to approximately 2¼ parts of mineral powder to one part of wood dust, and the composition being of putty-like consistency at normal temperature and adapted to harden upon exposure to air.

2. A plastic composition consisting essentially of mineral powder, wood dust, an adhesive and volatile organic solvent for the adhesive, the mineral powder including substantial proportions of both plaster of Paris and whiting, the quantity of the plaster of Paris and whiting being from 1½ to approximately 2¼ times the quantity of wood dust, and the composition being of putty-like consistency at normal temperature and adapted to harden upon exposure to air.

3. A plastic composition consisting essentially of mineral powder, wood dust, an adhesive and volatile organic solvent for the adhesive, the major constituents of the mineral powder being plaster of Paris and whiting, the quantity of the plaster of Paris and whiting being from 1½ to approximately 2¼ times the quantity of wood dust, and the composition being of putty-like consistency at normal temperature and adapted to harden upon exposure to air.

4. A plastic composition consisting substantially of mineral powder, wood dust, an adhesive and volatile organic solvent for the adhesive, the major constituents of the mineral powder being plaster of Paris and whiting, the whiting being present in larger quantity than the plaster of Paris, the mineral powder and wood dust being in the proportion of from 1½ to approximately 2¼ parts of mineral powder to one part of wood dust, and the composition being of putty-like consistency at normal temperature and adapted to harden upon exposure to air.

5. A plastic composition consisting substantially of mineral powder, wood dust, an adhesive and volatile organic solvent for the adhesive, the mineral powder including substantial proportions of both plaster of Paris and whiting, the quantity of the plaster of Paris and whiting being from 1½ to approximately 2¼ times the quantity of wood dust, and the composition being of putty-like consistency at normal temperature and adapted to harden upon exposure to air.

6. A plastic composition consisting substantially of mineral powder, wood dust, an adhesive and volatile organic solvent for the adhesive, the major constituents of the mineral powder being plaster of Paris and whiting, the quantity of the plaster of Paris and whiting being from 1½ to approximately 2¼ times the quantity of wood dust, and the composition being of putty-like consistency at normal temperature and adapted to harden upon exposure to air.

7. A foundry pattern which includes a built-up addition, said addition consisting essentially of mineral powder and wood dust adhesively bonded together and to the main body of the pattern, the mineral powder and wood dust being

in the ratio of from 1½ to approximately 2¼ parts of mineral powder to 1 part of wood dust, and the mineral powder including plaster of Paris to the extent of approximately one-half the quantity of wood dust.

3. A foundry pattern which includes a built-up addition, said addition consisting essentially of mineral powder and wood dust adhesively bonded together and to the main body of the pattern, the mineral powder and wood dust being in the ratio of 1½ to approximately 2¼ parts of mineral powder to 1 part of wood dust, and the mineral powder consisting substantially of whiting and plaster of Paris, the plaster of Paris being present to the extent of approximately one-half the quantity of wood dust, and the whiting being present in greater quantity than the plaster of Paris.

RAYMOND I. BILLINGTON.
RALPH J. NELSON.

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