106. COMPOSITIONS, COATING OR PLASTIC.
93

Cement
Asbestos
Sawdust
Sand

1302452

UNITED STATES PATENT OFFICE.

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STRUCTURAL COMPOSITION.

1,302,452. Specification of Letters Patent. Patented Apr. 29, 1919.

No Drawing. Application filed June 26, 1918. Serial No. 242,010.

To all whom it may concern:

Be it known that we, EDGAR R. TAYLOR and ISIDOR FLEXNER, citizens of the United States, and residents of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Structural Compositions, of which the following description is a specification.

This invention relates to a composition of matter adapted for use in constructing buildings and for similar purposes. Our invention provides an auto-solidifying composition which may be used either in monolithic construction or in the form of previously prepared blocks and which has many of the desirable characteristics of stone or concrete combined with others not characteristic of these materials. In particular we provide a material which is of substantial strength, of compact homogeneous nature, substantially fire-proof, considerably lighter than concrete as hitherto known, and of such a texture that, while it is not friable, nails or similar fastenings may be driven therein and will be gripped against withdrawal in the same manner as they are gripped by wood.

Nailable.

In preparing material according to our invention we utilize an auto-solidifying vehicle, such as Portland cement or the like, to which we may add a small amount of sand for strengthening purposes. With this vehicle we combine a filler in proper proportions, which filler in itself embodies in properly balanced amounts a fibrous and preferably incombustible binder such as asbestos and a light, soft filler for which we have used sawdust. The material is mixed and laid or poured in the same manner as concrete.

As an example of suitable compositions within the scope of our invention, we may mention the following specific formulas, the parts being by weight:—

Cement	96	parts
Mineral fiber	24	"
Sawdust	6	"
Silica (sand)	8	"

with which we have combined in suitable proportions calcium chlorid and magnesia. This composition was particularly designed for use as a flooring to which a wooden floor was secured by nailing. Another formula which we have successfully used, in this case for a sloping roof, the composition being somewhat harder, was as follows:—

Cement	141	parts
Mineral fiber	50	"
Sawdust	12	"
Sand	16	"

The specific gravity of material prepared in this manner is about half that of ordinary concrete to which it is in some other respects similar. It is dense, compact, and of substantial transverse strength. At the same time, nails or like metallic fastening devices can be driven therein in the ordinary manner. Actual tests conducted under the supervision of the Canadian Department of Public Works have shown that not only could a nail be easily driven into the composition but that it was gripped thereby so that the resistance to withdrawal was greater than that of pine or spruce and comparable to hemlock. The material is thus sharply distinguished from compositions of a friable nature in which under certain circumstances a metallic instrument might penetrate, but wherein such instrument would simply chip away an opening for itself in which it would rest loosely and from which it could be comparatively readily withdrawn. Our material is, on the contrary, not friable and in the tests referred to a cylinder 8"x16" showed a compression strength of substantially 1800 lbs. per square inch.

It is not necessary to use silica in our composition although somewhat greater strength is obtained thereby. In any event, it would be used in moderate amount, as in the examples given, as distinguished from its use with cement in the manufacture of concrete. If the sand is omitted a somewhat greater amount of cement could be used. In any event, the proportions will vary somewhat in accordance with the particular characteristics of the materials. We have ascertained, however, that disregarding the sand the proportion of the filling material to the cement should not be greater than 60% and not less than 25%. From about a third to a half of filler gives most

satisfactory results. For example, in the instances given above the proportion is about 1 to 3 for floorings and about 1 to 2 for the sloping roof. If the upper limit is exceeded the material becomes too hard to receive nails, and if the lower limit is exceeded it lacks strength. The proportion of materials in the filler, however, is also important as an excessive amount of sawdust or the like would make a crumbly material, whereas if only asbestos were used the material would be too hard. The proportion of asbestos to sawdust should preferably be about 4 to 1, and a proportion of 3 to 1 would certainly be an upper limit and the lower limit would be 6 to 1. Preferably, however, we maintain closely the proportions of 4 to 1.

A composition such as described is superior in many ways to the building materials now in use. It is cheaper in cost than good timber and, since it may be applied in a plastic state, easier to build in forms. It is soundproof, incombustible and permanent, whereas wood is resonant, inflammable and subject to decay. In connection with other plastics it might be used as a substitute for lumber as a nail course or in place of screeds, as it will join autogenously to cement or concrete and can be nailed to as readily as can wood. However, this property together with its low weight, elasticity and ample strength adapt it for original use to the exclusion of the building plastics heretofore known. Its specific gravity is substantially half that of concrete and it may therefore be used either in molded blocks or in monolithic construction without requiring such a strong supporting frame as the use of concrete would make necessary. Furthermore, coverings and devices of all kinds can be secured directly to it by simple means and without special treatment or construction of the material itself.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is: —

1. A structural composition comprising a vehicle of cement and a filler in quantity not greater than sixty or less than twenty-five per cent. of the cement and including incombustible fibers and particles of wood, the former in quantity from three to six times the latter, the whole constituting an auto-solidifying material which when set is of substantial transverse strength, non-friable and penetrable by but not fissile under metallic fastenings and adapted to grip such fastenings to resist withdrawal thereof.

2. The composition as defined in claim 1 with the addition of a moderate amount of sand.

3. A structural composition comprising a vehicle of cement and a filler in quantity not greater than sixty or less than twenty-five per cent. of the cement and including incombustible fibers and particles of wood in the proportion of substantially four to one, the whole constituting an auto-solidifying material which when set is of substantial transverse strength, non-friable and penetrable by but not fissile under metallic fastenings and adapted to grip such fastenings to resist withdrawal thereof.

4. A structural composition comprising a vehicle of cement and a filler in quantity about forty per cent. of the cement and including incombustible fibers and particles of wood in the proportion of substantially four to one, the whole constituting an auto-solidifying material which when set is of substantial transverse strength, non-friable and penetrable by but not fissile under metallic fastenings and adapted to grip such fastenings to resist withdrawal thereof.

In testimony whereof, we have signed our names to this specification.

EDGAR R. TAYLOR.
ISIDOR FLEXNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."