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PAINTING AND SIMILAR COMPOSITION

Edwin C. Clayton and Lawrence L. Heffner, Baltimore, Md., assignors to Wm. E. Hooper & Sons Company, Baltimore, Md., a corporation of Maryland

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The present application is in part a continuation of our co-pending application No. 36,657, filed August 17, 1935.

The invention relates to a composition for the preservation and protection of metal and cellulose, as wood, and fabrics of vegetable fiber by weather-proofing, fire-proofing, and protecting from corrosion, decay, and/or mildew, being particularly adapted in the preferred form for application by brushing, spraying, or dipping, and being therefore primarily classed as a paint or painting composition. It is important, however, that it contains no combustible or easily burnable oils or gums in the inflammable form in which they are ordinarily regarded as essential ingredients of a weather-proof protective coating or paint.

It is characteristic of this product that it depends for drying on the evaporation of a volatile solvent, the body of the painting or impregnating composition; i. e., the solids therein, being composed entirely of flame and fire-extinguishing and fire-resisting substances and inert non-burnable materials.

While the primary object in the application of the painting or protective composition of the invention is to protect the objects or substances to which it is applied from the action of the elements, including the action of fire, water, mildew, sunlight, oxidation, corrosion, and decay in general, it may be produced in various attractive colors or shades. And it is also true that while the painting composition of the invention, when applied by brushing, spraying, or dipping, merely adheres to and coats the surfaces of non-porous materials such as metal or wood which has been previously painted, it possesses a high degree of penetration and penetrates deeply into porous materials such as raw or untreated wood which may be in the form of shingles, weather boards, and the like; and when applied to raw cotton or other untreated vegetable fabrics in sufficient quantities, whether by brushing, spraying, or dipping, it gives substantially complete impregnation, the penetration being to some degree dependent upon the liquidity of the product; i. e., the amount of solvent it contains which, with the other ingredients, is variable in conformance with the purpose for which it is to be used.

Brushing, dipping, and spraying have been referred to as the most frequent methods of application, but the term "dipping" is intended to include passing the fabric in the form of a web through the liquid of proper consistency contained in a tank adapted to this purpose. In

treating porous or absorbent substances, penetration is important, but the coating of non-porous substances such as metals and previously-coated wood is of great advantage in the way of increasing the resistive qualities of practically all metals as well as wood and fabric to the action of the weather, slow oxidation, burning, corrosion and, in case of vegetable substances, destruction by decay and mildew, the complete or almost complete absence of oils, gums, and the like in inflammable or easily combustible form being an important feature.

The body; i. e., the solids as distinguished from the solvent, of the painting or impregnating composition of the invention in the most approved form comprises a substantial proportion of a highly-chlorinated hydro-carbon, which is substantially 60% chlorinated, a higher degree of chlorination being regarded as not detrimental though it is difficult to achieve and increases the expense, and somewhat less chlorination than 60% gives satisfactory results in some instances. This highly-chlorinated material, is preferably chlorinated paraffin and/or chlorinated rubber or equivalent highly-chlorinated hydro-carbon which decomposes at the low combustion temperatures of wood or other cellulose fibers, giving off chlorine gases which prevent flaming or continuous combustion of the material treated. The chlorinated hydro-carbons which are usable also have water-proofing and weather-proofing properties to a high degree when combined with the other ingredients to be described. The term "hydro-carbon" is used to identify the various organic substances which are subject to chlorination and are otherwise adapted to the purposes in hand.

Another important ingredient is a finely divided insoluble borate in solid form which is preferably zinc borate which seems to be most satisfactory as a protection against mildew, decay, and corrosion. Magnesium borate, manganese borate, and manganous borate and equivalent insoluble fusible metal salts are also usable, all of these materials being referred to herein as metal borates, being insoluble or substantially insoluble in water and thus contributing to the water-proof properties of the materials. The property of fusing at the low combustion temperatures mentioned causes them to form in the vicinity of a highly heated area of the treated or painted object or substance a substantially fire-proof coating which prevents spread of fire by creeping in or on the surface of wood or other cellulose

material and prevents destruction of metals to which the material is applied as a coating.

In addition to the fusible material, borate or the like, which is suspended in the chlorinated hydro-carbon body in finely-divided solid form, being insoluble not only in water but in the volatile solvent contained in the composition to be described, the composition contains a pigment and filler both of which inert materials in solid finely-divided form are insoluble in water and in the said solvent and, like the borate, held in or on the object or substance treated by suspension in the chlorinated material and plasticizer.

The painting composition also contains in the preferred form a small amount of tri-cresyl phosphate or an equivalent non-combustible hydro-carbon plasticizer and a volatile solvent of the chlorinated material and phosphate; which solvent, in the painting composition for coating metal and other non-absorbent materials such as previously-coated wood or fabric, would ordinarily be less in proportion to the other ingredients than in a composition used for treating the absorbent materials.

A painting composition formula which has been found satisfactory for the general purposes above outlined contains chlorinated neutral oil or paraffin of 60% chlorine content, 25%; chlorinated rubber of preferably 60% to 68% chlorine, 10%; tri-cresyl phosphate (5%); zinc borate (15%); pigment and filler (25%); and solvent (20%). The proportions of the above formula may be varied and equivalent ingredients may be substituted as suggested and explained herein.

A formula which has been found satisfactory in the treatment of porous materials contains approximately 27% of 60% or more highly chlorinated paraffin—a greater or less degree of chlorination and the substitution of other equivalent chlorinated materials in greater or less proportion being contemplated; 8.6% of tri-cresyl phosphate or its equivalent, such materials being referred to in this connection as plasticizers; 45% or any suitable percentage of volatile solvent which may be carbon tetra-chloride or varnish-makers' and painters' naphtha or any of the known volatile solvents of the chlorinated materials and plasticizer; 5% of zinc borate for which the equivalents named or other equivalents may be substituted; and 15% of pigment and filler, yellow oxide of iron, red oxide of iron, medium chrome yellow, and titanium oxide being satisfactory for this purpose. As a highly volatile solvent is used which evaporates in drying, inflammability is not objectionable in the solvent.

Among the plasticizers which have been found satisfactory are tri-phenyl phosphate, tri-cresyl phosphate or other aromatic phosphate, or chlorinated diphenyl, all those available being preferably non-combustible or non-inflammable and having water-proofing properties, and being highly plastic. These materials may be described as of low inflammability.

There are various organic materials which are available in highly-chlorinated form for the purposes in hand in addition to the chlorinated paraffin and chlorinated rubber—all of these chlorinated materials which are satisfactory for this purpose being solid or nearly so at normal room temperatures, having water-proofing properties to a high degree, and being decomposable at the low combustion temperatures of wood or similar fibers, releasing substantially all their chlorine content. These materials include chlorinated vinyl resin, chlorinated straw-colored petroleum

oil obtained in the separation of paraffin, and chlorinated vegetable oils including tung oil, castor oil, soya bean oil, and even various fish oils likewise chlorinated. High chlorination has the advantage that the chlorine given off at combustion temperatures smothers the flame and, with the powdered borate and other solids which arrest creeping of the fire, prevents burning.

It is a known fact that these highly-chlorinated materials have not been available for the purposes in hand because they have been found to deteriorate by the action of sun and moisture and by the action of weather conditions in general, releasing the chlorine content or a large portion of it which deprives it of its fire-extinguishing properties, and the chlorine thus released attacks various materials including cellulose fibers and certain metals which it may be desired to preserve. Cellulose materials treated with highly-chlorinated organic compounds have been found to be attacked by chlorine discharges by weathering—a difficulty which is overcome by this invention.

An important feature of the present invention is the discovery that these chlorinated materials when combined with the inert, finely-divided solid materials used, comprising a mixture of the inert insoluble metal pigments and the water-insoluble metal borate and filler, are protected from decomposition by the weather and retain practically their full efficiency for a period of several years, as shown by the test of actual use and also by tests with special weathering apparatus designed to give by exposure in this apparatus for a short period the effect of a long period of weathering in a warm, moist climate. In connection with their contribution to the water-proof and weather-resisting properties of the painting composition, it is important that these solid materials are water-insoluble. They are all essentially inorganic materials and insoluble in the volatile solvent used.

Regarding the pigments, it is found that various pigments are available, examples of which have already been given. As a filler, china clay or Barytes may be used, other fillers being known.

It is of interest that the pigment to a considerable degree supplements the borate, the proportions of borate being capable of more or less reduction as the quantity of pigment is increased and vice versa.

The painting composition of the invention is known to have in addition to other functions already pointed out an important use in place of copper and similar paints in the treatment of the bottoms of boats, in which connection it has a highly-permanent preservative effect, excluding the water from the wood and causing the wood to resist and to be practically immune for a considerable period to the action of mildew and decay and to attack by insects, worms, etc., the exclusion of the Terredo worm being important; and even when the wood has been previously painted it has good penetration. It is preferred, however, that any previous coating of paint be removed before the present painting composition is applied. Preservation of raw wood in this way is generally effective from six months to a year.

While two specific formulas have been given which are known to be effective, the proportions in which the materials are combined are capable of considerable variation in these respective formulas, and to some degree beyond them both by increase and decrease of the quantities of the respective materials in these painting compositions. The first formula given is best adapted

to coating metal and coating and impregnating wood, and the second is better adapted to the treatment of raw fabrics of vegetable fibers.

In view of what has been ascertained in the use of the composition in these and other proportions to date, it is known that useful and fairly satisfactory results can be obtained within the limits of the following proportions, though the statement is not intended to specifically exclude further variations. The chlorinated organic compound is solid or semi-solid at normal temperatures and possesses water-proofing properties to a high degree, having approximately 60% chlorine content, though it may contain more or slightly less chlorine according to the quality of material obtainable and the use to which the composition is to be applied, the chlorinated material being adapted to give up its chlorine content at the combustion temperatures defined. The use of this material in proportions from 20% to 55% by weight of the solids in the composition, is regarded as feasible.

The borates or equivalent materials used are essentially water-insoluble or substantially so, being fusible at combustion temperatures of cellulose, the metal borates named being regarded as satisfactory. These may with satisfactory results comprise from 5% to 20% by weight of the solids in the composition, and other equivalent fusible metal salts may be used.

The pigment, which in combination with the borate protects the chlorinated material from decomposition and also combines with the borate in the protection of the material from burning, may be more or less supplemented by an inert filler, the filler and pigment being found effective in proportions from 15% to 35% by weight of the solids.

The plasticizer, which is a hydro-carbon plastic that tends to resist combustion, several having been named, is helpful in treating fabrics, giving them great pliability. In this and in the treatment of wood and metal it contributes to an important extent to the adhesive and penetrating properties of the painting composition. The plasticizer may comprise from 5% to 15% of the composition, its omission being contemplated in some instances.

The solvent may be any sufficiently volatile solvent of the plasticizer and the chlorinated material to be easily eliminated by evaporation, thus avoiding any tendency to combustion after the painting composition has dried.

The proportions of the solvent may be varied, giving a thinner or thicker liquid, with an obvious change of the other proportions relatively to the solvent.

The proportions of the highly chlorinated organic material and borate, or the equivalent, have been stated in their preferred ratio, and not positively limited; variations above or below the amounts of these constituents stated being regarded as within the intent of the disclosure, though lacking to a greater or less extent in some of the advantages incident to the preferred formula.

The materials selected in accordance with the foregoing disclosure are mixed in accordance with the principles which have become well-known in the manufacture of paints and similar compositions.

In accordance with our present practice the materials are thoroughly and uniformly mixed, mixing in a grinding mill or paint mill being the method employed in the practice of the invention

up to the present time, and it is applicants' purpose to exclude from the scope of the invention as protected by the claims any chlorinated hydro-carbons which do not resist the tendency to deterioration by action of the elements, particularly sun heat, light, and moisture, when these materials are combined and protected in the manner described, and which do not in this combination have water-proofing properties or do not retain their chlorine content and give it off at the combustion temperatures of the materials treated. The materials named are preferred to chlorinated naphthalene which has proved less satisfactory for this purpose.

The invention is believed to have solved an important problem in the waterproofing of wood, fabric, and metal and the preservation of the same from the action of the weather, mildew, decay, corrosion, and particularly from fire, the application being accomplished by a single coating and/or impregnating process which effects an important saving; and the materials employed are relatively cheap, giving a product which is available wherever the protection described is desirable. Also, the composition of the invention is believed to be the first of this nature for this purpose in which a highly-chlorinated hydro-carbon is combined for the purposes stated and adapted to accomplish these purposes with water-insoluble borates, which are also insoluble in the solvents of the chlorinated material, the same being therefore in finely-divided solid form and affixed to or deposited in the materials treated by the chlorinated hydro-carbon with or without the plasticizer. Another feature of novelty is the use in connection with such a composition of a pigment and filler to protect the highly-chlorinated material from dechlorination by weather; i. e., moisture, sun, and natural sun heat and light, the inert pigment being combined with the borate and preferably including an inert insoluble filler which also contributes to this result.

The plasticizer, as already pointed out, assists in the suspension and retention of the particles in the chlorinated material and contributes to the adhesiveness and quality of penetration of the product. While it is used in the preferred composition, it may be omitted for some purposes without complete loss of the useful result, having particular advantages in the treatment of raw fabrics by painting or otherwise in that it causes them to retain their full flexibility. In the treatment of raw fabrics and in the treatment of shingles the materials are impregnated rather than coated due to the permeability of the composition, and the appearance of the materials thus treated is changed mainly as to shade or color, the fibers and natural surface appearance and contour being retained.

The preservative properties of the painting composition, as shown by numerous tests, are such that fabric and wood treated in this way have considerably greater strength of the fibers immediately after treatment and for a long period thereafter than have the untreated materials, which is not only an important advantage of the product but shows that the chlorine content is fully retained and not discharged by the action of the weather for a considerable period amounting as a rule to one or two years, as the discharge of chlorine under these circumstances; i. e., when highly chlorinated compounds are applied without proper protection, is generally known to cause rapid deterioration of the fibers.

We have thus described a painting or impregnating composition of a preservative nature having fire and water-proofing properties and thus adapted to exclude air and water and prevent deterioration by corrosion, oxidation, and mildew, and capable of producing these results in an efficient manner by a single application whereby non-porous substances are coated and porous substances impregnated and coated by a single application by brushing, spraying, or dipping. While the terms of the description are specific and in detail in order that the manner of compounding, applying, and using the invention may be fully understood, the proportions and ingredients and the manner of compounding and applying are subject to variation, the specific terms being used in a descriptive rather than in a limiting sense, and the scope of the invention being defined in the claims.

What we claim as new and desire to secure by Letters Patent is:

1. A painting composition containing the following ingredients in approximately the proportions stated substantially 27% of approximately 60% chlorinated organic material selected from the group consisting of chlorinated paraffine; chlorinated rubber; chlorinated vinyl-resin; chlorinated neutral oil; chlorinated straw-colored petroleum oil; chlorinated tung oil; chlorinated castor oil; chlorinated soya-bean oil and chlorinated fish oil, approximately 8% plasticizer, 45% solvent, 5% of a salt in finely divided solid form, and of the group consisting of zinc borate, magnesium borate, manganous borate and manganese borate, 15% pigment and filler.

2. A painting composition, the solids of which comprise 20% to 55% of approximately 60% chlorinated organic material having water-proofing properties to a high degree, which organic material is solid or semi-solid at normal room temperatures and is decomposable at combustion temperatures of wood fibers and the like, the same being of the group consisting of chlorinated paraffine; chlorinated rubber; chlorinated vinyl-resin; chlorinated neutral oil; chlorinated straw-colored petroleum oil; chlorinated tung oil; chlorinated castor oil; chlorinated soya-bean oil, and chlorinated fish oils, such decomposition releasing its chlorine; the composition also comprising 10% to 20% of a salt the same being in finely divided form, and of the group consisting of zinc borate, magnesium borate, manganous borate and manganese borate; 15% to 35% inert pigment and filler; 5% to 15% of plasticizer; and 20% to 50% volatile solvent of the chlorinated material and plasticizer, the salt being insoluble in said solvent and fusible at said combustion temperatures.

3. A painting composition comprising major proportions of approximately 60% chlorinated organic material of the group consisting of chlorinated paraffin; chlorinated rubber; chlorinated neutral oil; chlorinated straw-colored petroleum oil; chlorinated castor oil; chlorinated soya-bean oil; chlorinated fish oil and chlorinated vinyl resin, the same having water-proofing properties to a high degree and being adapted to give off chlorine sufficient to resist flaming at the com-

bustion temperatures of cellulose materials and being solid or semi-solid at normal room temperatures, relatively small proportions, the minimum being approximately 5 per cent. of a salt which is in solid finely divided form and of the group consisting of manganous borate, zinc borate, magnesium borate, and manganese borate, an inert water-insoluble pigment and filler, and a volatile solvent which is evaporated in drying, the latter being in sufficient quantities to make the composition at normal temperatures suitable for application by brushing, spraying, or dipping, the pigment, filler, and salt being insoluble in the solvent and the salt being fusible at said combustion temperatures and the proportions in which it is present being sufficient to permit it to form, when fused in the highly heated areas, a protective coating, which coating resists the creeping of the fire.

4. A painting composition comprising substantially 27% of approximately 60% chlorinated organic compound selected from the group consisting of chlorinated paraffine; chlorinated rubber; chlorinated vinyl-resin; chlorinated neutral oil; chlorinated straw-colored petroleum oil; chlorinated tung oil; chlorinated castor oil; chlorinated soya-bean oil; and chlorinated fish oil; a solvent of the chlorinated material which is released by evaporation at normal temperatures, and approximately 5 to 20% of a salt, the same being in solid finely divided form, and selected from the group consisting of zinc borate, magnesium borate, manganous borate and manganese borate, a pigment, and filler, the solvent being in sufficient proportions to make the composition capable of application by brushing, dipping or spraying.

5. A painting composition comprising approximately 20 to 55% of approximately 60% highly chlorinated organic material, having water proofing properties to a high degree, which organic material is solid, or semi-solid at normal room temperatures, and is decomposable at combustion temperatures of wood fibres and the like, releasing its chlorine in quantities sufficient to resist flaming, the chlorinated material being selected from the group consisting of chlorinated paraffine; chlorinated rubber; chlorinated vinyl-resin; chlorinated neutral oil; chlorinated straw-colored petroleum oil; chlorinated tung oil; chlorinated castor oil; chlorinated soya-bean oil and chlorinated fish oils; approximately 5 to 20% of a salt, the same being a solid in finely divided form and selected from the group consisting of zinc borate, manganous borate, magnesium borate and manganese borate, inert pigment and filler, and a volatile solvent of the chlorinated material, which is adapted to evaporate at atmospheric temperatures and pressures, the salt being insoluble in said solvent and fusible at said combustion temperatures, forming a coating which resists creeping of the fire, the solvent being in sufficient quantities so that the product is adapted for application by brushing or spraying or dipping.

EDWIN C. CLAYTON.
LAWRENCE L. HEFFNER.