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UNITED STATES PATENT OFFICE.

FREDERICK JAMES COMMIN, OF LONDON, ENGLAND.

PRODUCTION OF PLASTIC MATERIALS AND THE PRODUCT.

No Drawing. Application filed May 24, 1921. Serial No. 472,284.

To all whom it may concern:

Be it known that I, FREDERICK JAMES COMMIN, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in the Production of Plastic Materials and the Product (for which I have filed applications in England May 20, 1920, December 17, 1920, and April 29, 1921, and have been granted English Patent No 167,613), of which the following is a specification.

This invention relates to improvements in the manufacture of plastic composite material, suitable for roofing and other purposes, from cellulose and/or other fibres with the addition of pitch.

Heretofore I propose to manufacture composite material by applying pitch in a powdered form to unfinished paper from a paper making machine, or with an agglutinating agent to finish paper, or by adding the powdered pitch to the paper making materials, and superimposing and compounding the paper sheets together. I also proposed to make the sheets fire resisting by treating them with alum and to protect the fibre against the destructive effects of heat during the process of manufacture with suitable protecting chemicals. I have found in practice however, that the material so produced is unsatisfactory; the high temperature necessary to cause the pitch to flow, detrimentally affects the strength of the fibre, while also, the distribution of the pitch throughout the mass is patchy.

The object of the present invention is to produce from fibrous material and pitch, a composite material having the pitch uniformly distributed throughout the mass.

I have discovered that this object is attainable by using a deflocculated pitch with pulped fibre, substantially as hereinafter described.

The pitch, in a very finely divided state is uniformly distributed on the fibre, in a manner hitherto impossible or extremely difficult to obtain, and the resulting composite material is rendered homogeneous throughout.

While deflocculated pitch made from ordinary solidified pitch may be used it is preferred to prepare the deflocculated pitch from pitch in the form of solidified froth produced by discharging molten pitch into hot water for instance as hereinafter described.

The deflocculated pitch is obtained by grinding pitch preferably produced as aforesaid, in the presence of a solution of a peptising agent, for instance a solution of sodium rosinate, in water, or casein dissolved in a dilute solution of alkali, a satisfactory product being obtained by treating coarsely ground pitch in a ball mill with an equal weight of water containing sodium rosinate serving as the peptising agent, until the desired degree of division is obtained, the amount of peptising agent being approximately 2% of the weight of the pitch.

When the pitch is ground in the presence of these substances, the fine particles produced are prevented from adhering together again or are deflocculated and the resulting product can be readily dispersed in water. The fine particles only deposit very slowly or not at all and are in a semi-colloidal state.

In the manufacture of the composite material according to the invention, the deflocculated pitch suspended in a semi-colloidal state in about an equal quantity by weight of a solution of a peptising agent is added to well beaten pulp in a large percentage of water and thoroughly mixed together. The effect of the mixing of the peptised pitch with the fibre is that the fibre absorbs the fine particles of pitch and withdraws it from its state of semi-solution in the water, which can be drained away substantially free from pitch and the resulting mixture can be brought into a condition in which it will readily felt on a paper making or similar machine, and may be subsequently moulded into any thickness of sheet or blocks.

It is preferred to prepare the deflocculated pitch from pitch resembling solidified froth. This is obtained by dropping molten pitch into hot water, for instance pitch issuing from a still is discharged directly into hot water so that it is not exposed to the cooling action of the air. It is thereby solidified in a highly porous vesicular condition, its bulk being enormously increased. This is due to the large volume of steam evolved which blows the pitch into a froth like structure. Pitch treated in this manner has a cellular structure in which the walls

of the cells are extremely thin and disintegrate under very slight pressure and do not deform, but fracture under slowly applied strain. Moreover the very slight pressure required for disintegration does not result in the generation of sufficient heat to cause re-welding of the mass. The temperature of the water varies according to the melting point of the pitch employed, for example with pitch having a melting point of 100° C. (K. & S.) the temperature of the water should be about 60° C.

In one mode of carrying out the invention four parts by dry weight of deflocculated pitch suspended in about an equal quantity, by weight, of a solution of a peptising agent are added to one part, by dry weight, of well beaten fibre in a volume of water, so that the water forms about 98% of the whole, the whole is then well mixed. If the peptising agent present in the peptising solution is sodium rosinate, an equivalent amount of aluminium sulphate may be added to the mixture. The effect of this addition has been found to promote the rapid filtration of the mixture while felting, as well as to bind the pitch and fibres firmly together.

The sodium rosinate need not necessarily be that used as the pitch peptising agent, but may be added separately, or other substances which will produce the same result may be used.

The mixture is then felted in a machine of the paper making type, for instance a machine used for making millboard, boxboard, asbestos-cement-sheeting or other similar material, and formed into sheets; these may be freed of moisture by air drying, in a fixed or travelling oven, or on rollers heated to a suitable temperature.

The manufacture is completed by cutting the sheets approximately to the shape required in the finished article, raising them to a sufficient temperature (50° C. to 70° C.) superimposing a sufficient number of sheets to give the desired thickness, and then subjecting to hydraulic or other heavy pressure, the rollers or moulds employed being maintained at a temperature of 100° C., or thereabouts.

With some classes of pitch the preliminary heating of the felted sheets may be omitted.

The temperature of the moulds or rollers employed will also vary with the different classes of pitch used in the composition.

To increase the strength of the finished material the sheets may be superimposed one on the other with the main lines of fibre as laid by the machine crossed so as to form a series of plies.

By this method, roofing, walling boards, doors, skirtings, floors, ceilings, boxes, cisterns, railway carriage and motor car bodies and a multitude of other articles of utility can be produced.

Any suitable fibrous material may be employed such as cotton, linen, hemp, jute, esparto, wood cellulose, agalite, asbestos, lignified straw, hair, wool, waste paper and the like.

The material may be made fire resisting by the addition of clay, chalk, silica, cement, magnesite or the like.

I claim:

1. A process of producing a material suitable for use in manufactures, consisting in grinding pitch in the presence of a solution of a peptising agent, to bring it into an extremely finely divided and deflocculated condition, thoroughly incorporating said extremely finely divided and deflocculated pitch with fibrous material in the form of slurry, and felting the resultant product.

2. A process of producing a material suitable for use in manufactures, consisting in grinding pitch in the presence of a solution of a peptising agent to bring it into an extremely finely divided and deflocculated condition, thoroughly incorporating said extremely finely divided and deflocculated pitch with fibrous material in the form of a slurry, and conditioning the resultant product so as to permit of it being successfully felted into sheets, by adding a substance which will promote a rapid filtration of the material.

3. A process of producing a material suitable for use in manufactures, consisting in grinding pitch in the presence of a solution of a peptising agent, to bring it into an extremely finely divided and deflocculated condition, thoroughly incorporating said extremely finely divided and deflocculated pitch with fibrous material in the form of a slurry, and conditioning the resultant product so as to permit of it being successfully felted into sheets, by adding sodium rosinate and aluminum sulphate thereto.

4. In a process for manufacturing composite material from pitch and fibrous material, adding to a slurry of the fibrous material a pitch ground to an extremely finely divided and deflocculated condition in a peptising solution containing sodium rosinate substantially as and for the purpose hereinbefore set forth.

5. A process for manufacturing composite material from pitch and fibrous material, consisting in mixing together extremely finely divided and deflocculated peptised pitch and fibrous pulp, conditioning the product to permit it to be readily felted into sheets, and felting same on a machine of the paper making type.

6. In a process of producing a material suitable for use in manufactures consisting in thoroughly incorporating with fibrous pulp, pitch which has been brought into

an extremely finely divided and deflocculated condition by grinding it in a solution of a peptising agent, a preliminary step in the process, consisting prior to the grinding operations, in treating the pitch in a molten condition with hot water to bring it into a vesicular state resembling solidified froth, for the purpose of facilitating grinding operations.

7. A process for manufacturing composite material from pitch and fibrous material, consisting in mixing together extremely finely divided and deflocculated peptised pitch and fibrous pulp, conditioning the product by adding sodium rosinate and aluminum sulphate thereto, and felting the product.

8. In a process for manufacturing composite material from pitch and fibrous material, consisting in adding to a slurry of the fibrous material a pitch ground to an extremely finely divided and deflocculated condition, in a peptising solution containing sodium rosinate, and felting the product.

9. A pitch pulp construction, composed of deflocculated peptised pitch, fibrous material, and a binding agent.

In testimony whereof I have signed my name to this specification.

FREDERICK JAMES COMMIN.