

UNITED STATES PATENT OFFICE.

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PROCESS OF MANUFACTURING A FIBROUS COMPOSITION.

1,166,166.

Specification of Letters Patent.

Patented Dec. 28, 1915.

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To all whom it may concern:

Be it known that I, JAMES C. WOODLEY, a citizen of the United States, residing in Evanston, Illinois, and whose post-office address is care of Barrett Manufacturing Company, No. 17 Battery Place, New York city, New York, have invented certain new and useful Improvements in the Process of Manufacturing a Fibrous Composition, of which the following is a specification.

In my Patent No. 1,156,122 of October 12, 1915, I have described a composition of matter adapted for use in roofing sheets and in various other articles of manufacture and have described processes of producing said composition and process broadly. The present application is a division of the application for the aforesaid patent relating to a process of manufacture of such compositions.

The product comprises disintegrated fibrous material and a gummy binder, specifically disintegrated paper fiber and a bituminous binder, the fibrous material varying in proportion from five to fifty per cent. of the total weight and being preferably about twenty per cent. thereof.

According to the present invention the product is obtained by superficially coating a fibrous mass with a gummy material and then passing it one or more times through foraminous plates so as to effect a kneading and mixing operation which disintegrates the coated mass without destroying its fibrous condition. The composition thus produced may then be compressed into the form of any of the desired articles of manufacture.

The process will be specifically described as applied to the manufacture of roofing sheets.

To a suitable residuum oil I add a bituminous material such as gilsonite, asphalt, grahamite, elaterite or other hard asphalt. The material is heated to a temperature of approximately 400° in order to reduce the bituminous ingredient to a liquid condition and effect its thorough mixture with the oil. The proportions may vary within a considerable range but should be such that when cooled the material is semi-solid and gummy. For example, a residuum oil having a melting point of 100° to 120° F. and grahamite may be mixed in the ratio of eighty-eight parts of oil to twelve parts of grahamite by

weight. Or I may take a softer asphalt and temper the same in known manner to produce a product of the same consistency at ordinary temperatures. Generally speaking, the binder may be a natural or artificial asphalt or natural or artificial pitch of the desired consistency or a combination of roofing or flux oil or other soft asphalts with harder natural asphalts such as gilsonite, or with harder distilled asphalts or pitches, or may be any equivalent material or combination of materials.

To the hot liquid binding material is added a quantity of fibrous material such, for example, as waste paper, which may be advantageously in the form of paper shavings or strips such as the cuttings from a printing shop, although other fibrous materials are suitable for the purpose. The paper is preferably moist or wet and its addition to the binder quickly cools the latter to a gummy condition. The mixture of fibrous material and the gummy binder is then worked in a kneading and mixing machine. The paper waste may be added to the liquid bituminous binder and thoroughly mixed therewith in order to effect a coating of the paper with the solution as far as is practicable, and then removed from the liquid and allowed to drain and cool. For some purposes the amount of asphalt which adheres to the paper is such as to be in excess of that required and under such circumstances the liquid composition may be otherwise applied as by spraying upon the paper in order to secure a thinner coating, the hardness of the finished product varying with the relative proportions of paper and asphalt and the consistency of the asphalt.

The coated paper having been allowed to cool to a semi-solid consistency is forced under great pressure through one or more perforated plates (or repeatedly through the same plate) from which it emerges as a mass of apparently fibrous asphalt in which it is practically impossible to distinguish particles of the fibrous material, the paper having been so intimately incorporated with the asphalt by the peculiar action which results from the forcing of the mass through the foraminous plates as to have practically lost its identity and become broken down into its individual component fibers. This peculiar result is believed to be explainable as follows: If, as is well known, a sheet of paper, for instance,

be cemented between two layers of elastic material and such material be then stretched so as to be extended in all its parts, the interposed paper not being elastic will be disintegrated not by breaking at a few points but at an infinite number of points so as to maintain its relation to the elastic material to which it is cemented. Where, as in the present case, the paper strips are covered on both sides with the gummy bituminous composition and the latter is forced through the perforations in an attenuated condition the paper is entirely disintegrated and is merged with the asphaltum in a homogeneous fibrous mass rather than in the form of fibrous particles of appreciable size within the asphalt but distinct therefrom.

The bituminous mixture need not be liquid when the paper is added, and in fact it is preferably in a soft semi-solid condition. It may be allowed to cool down to this condition. Or if it is liquid originally, the condition of the paper, which is moist or wet, quickly cools it to a gummy consistency. Instead of using paper I may employ various other aggregated fibrous materials, such as felt, cloth, straw or the like. Also the fibrous material may be in a partially or a completely disintegrated or separated condition before applying it to the asphalt. Such a disintegrated material for example, is paper pulp, beaten rag stock, cooked straw, cotton or wool fiber, or the like, disintegrated in beating or Jordan engines or pulping machinery or carding or similar machines. Or a mineral fiber such as asbestos may be employed. Or a mixture of two or more kinds of fiber may be employed.

Less disintegrating action will be required if the fibrous material is in a previously disintegrated or partly disintegrated condition, but even in such cases the fibrous material when first introduced into the binder will be in bunches, wads, or twisted or tangled masses and a certain amount of disintegrating will be required to separate the fibers from each other to such extent as is necessary to have the fibers distributed substantially uniformly throughout the composition and also to permit them to be coated uniformly with the binder, and in some cases saturated or partly saturated by the binder or a portion of the same.

The mixing and kneading process serves to separate the elementary fibers from contact with each other and to thoroughly coat them and distribute them so as to produce the homogeneous product desired; whereas without the kneading or pulling operation which is a characteristic of my process such fibers would simply be cemented together in balls or comparatively large aggregations throughout the mass, into which the binding material would fail to enter perfectly and which would not produce a homogeneous

product. Also if the fibrous material were only roughly separated in the beginning it would be finely disintegrated as well as coated and homogeneously distributed by my process. The bituminous binder is closely adherent to and has greater extensibility than the fibrous material, and the operations above described cause a repeated extending of the binder so that the fibers are coated with the binder and distributed and interlaced throughout.

The process is facilitated by moistening or wetting the fibrous material beforehand, or by adding water to the mixture; in which case the water will not combine to any material extent with the gummy material, but will soften the fibrous material. I prefer to keep the amount of water present as low as possible. A practicable proportion of moisture is 50% of the fibrous material. The wetting of the fibrous material produces a better product by weakening the cohesion of the elementary fibers to each other, and by softening the size on the surface in the case of certain kinds of paper. Where the material has not been moistened the fibers do not separate so easily, but are individually broken to a greater extent than where the material is moistened, and the product is not so strong.

In some cases it may be practicable to introduce the fibrous material, such as paper, to the asphalt in a solid condition, and by gently heating the mass without reducing to a liquid condition and forcing the paper and gummy asphalt mixture through the plates, to simultaneously effect the coating and disintegration of the paper.

In either case the composition as it emerges from the foraminous plate is gummy but not especially tacky or sticky at ordinary temperatures. In order to form the same into shape for different purposes it will be warmed and will then develop cohering qualities adapting it to be formed under pressure and to retain the shape imparted thereto.

If roofing sheets are to be made the quantities of paper and of asphaltum entering into the mass will have been so proportioned as to obtain a tough product of considerable resiliency and such proportions may advantageously be up to about equal quantities by weight of paper and asphaltum. Certain fibrous materials of commerce contain non-fibrous matters. When such materials are used they may be used in such quantities that their fibrous content will run up to about equal weight with that of the asphaltum. This pasty product coming from the foraminous plate is warmed and may then be passed between forming rollers which may revolve in a body of cold water and the resultant sheet be led into and through cold water in order to chill the same. The sheet

may then be led between other pressing rolls by which it is compacted to a high degree of density and may be then passed between smoothing rolls in order to impart a surface finish, or where desired, the sheet after passing through the pressing rolls and the smoothing rolls may be led through a bath of hot asphalt or have a surface coat of asphalt applied thereto in any suitable manner and rolled down to give a smooth finish after which it may be subjected to soap-stoning to impart a final surface finish.

What I claim is—

1. The process of producing a substantially homogeneous fibrous gummy mass which consists in superficially coating a fibrous mass with a gummy material and forcing the same through a foraminous plate to disintegrate the coated mass without destroying its fibrous condition.

2. The process of producing a substantially homogeneous fibrous gummy mass which consists in forcing through a foraminous plate a mass of paper in intimate adhering contact with a gummy asphaltic binder to disintegrate the coated mass without destroying its fibrous condition.

3. The process of producing a substantially homogeneous fibrous gummy mass which consists in adding a fibrous mass to a gummy mass and forcing the same through

a foraminous plate to disintegrate it and produce a coated mass without destroying its fibrous condition.

4. The herein described process which consists in superficially coating paper with a hot asphalt, allowing the coated material to cool, and then forcing the same through a foraminous plate to disintegrate the coated fiber and produce a homogeneous pasty product.

5. The herein described process which consists in dipping paper into a bath of molten asphalt, allowing the coated paper to drain and cool, and forcing the coated paper through a series of perforated plates to disintegrate the fiber and produce a homogeneous pasty product.

6. The herein described process which consists in dipping paper into a bath of molten asphalt, allowing the coated paper to drain and cool, and forcing the coated paper through perforated plates to disintegrate the fiber and produce a homogeneous pasty product.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES C. WOODLEY.

Witnesses:

D. ANTHONY USINA,
LULU STUBENVOLL.