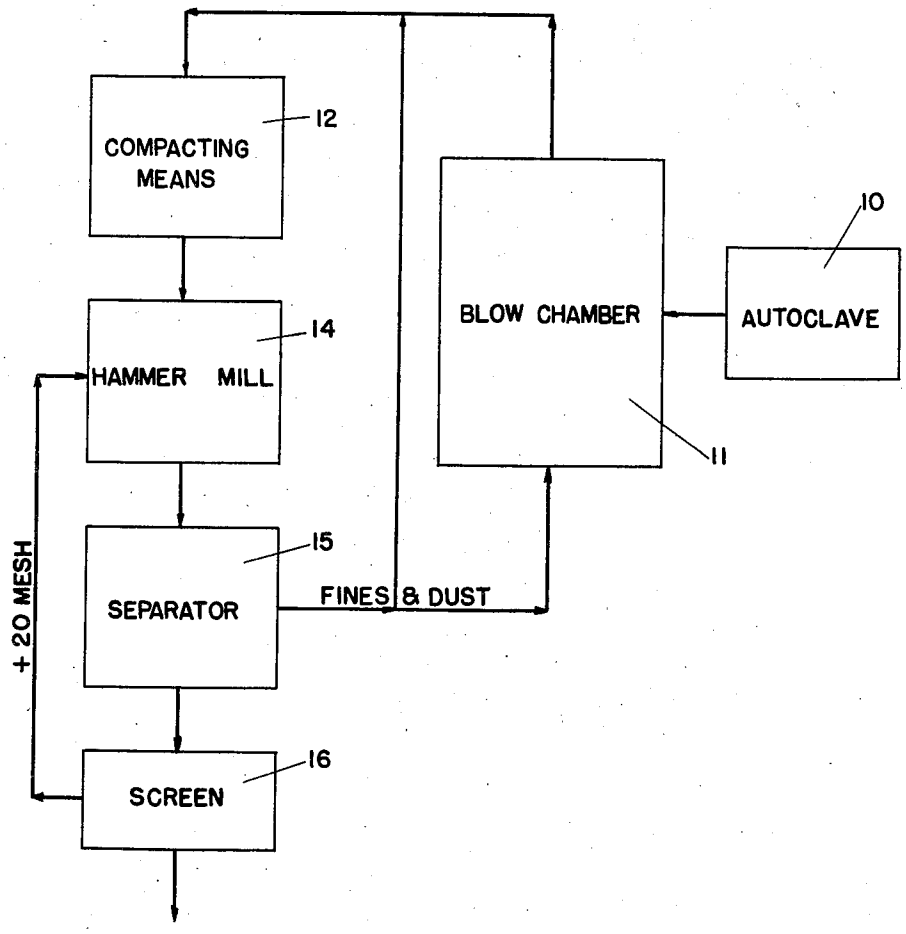
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DRY SIZE AND METHOD OF MAKING

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DRY SIZE AND METHOD OF MAKING

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This invention relates to improvements in dry sizes, and more particularly to dry rosin size having a high apparent density and to a method of making the size.

Dry size compositions, for example, dry rosin sizes used in the paper making industry, have the advantage over paste sizes (containing usually about 30% moisture), in that they can be shipped at lower freight costs because of their lower moisture content. Also, dry sizes can be shipped in paper bags, weighing about 2 pounds for every 100 pounds of size; while paste size must be shipped in drums, weighing about 28 pounds for every 100 pounds of size. This saving in freight is very desirable and is often a considerable item, particularly if the paper mills and chemical plant, where the size is produced, are a long distance apart.

Such dry sizes usually are prepared by mixing the ingredients in liquid or paste form and then spraying the liquid or paste into a current of hot air or gas adapted to effect flash evaporation and produce particles of dry size. These particles are very porous or fluffy and only about 4 to 12 pounds of size occupy a cubic foot. This bulk may be decreased to about 15 pounds per cubic foot by forcing the size particles into bags or containers by means of a plunger or ramrod which shatters the particles into smaller ones that can then be packed closer together.

The foregoing method of packing dry size has several disadvantages. The bulk is only decreased to about 15 pounds per cubic foot and this rather light material having a low apparent density requires bags of considerable size, which increase the cost of packaging. In decreasing the bulk by ramming the size into the bags, a number of bags are broken, involving a direct money loss as well as a loss of time. The reduction in the size of the particles also causes a large amount of dust to be made, and this dust is disagreeable both at the chemical plant and the paper mill.

An object of the present invention is to provide a dry size which overcomes the foregoing difficulties and disadvantages.

Another object is to provide a dry rosin size which has a high apparent density, is substantially free from dust, is free flowing to facilitate packing, and is readily dissolved.

A further object is to provide a simple inexpensive method of producing dry sizes having the foregoing advantageous characteristics.

Other and further objects will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

These objects, generally, may be accomplished by producing dry size in a blow chamber in the customary manner, passing the size particles through a roll crusher adapted to form flakes and thereby increase the apparent density of the size, and crushing and compacting the flakes into smaller particles of still higher density adapted to further reduce the bulk of the size. Instead of forming flakes, briquettes, pellets, wafers, or the like may be produced by suitable devices and these are then ground or crushed to form granular particles. The size particles are then passed through a separator which removes dust and fines and returns them to the blow chamber or to the briquette forming devices. The particles are then screened to remove particles larger than a predetermined mesh and these are returned to the crushing device. The resulting screened product is at least twice as dense as the blown size, is free from dust or fines, is granular and free flowing, and is readily dissolved.

The product produced by this process may be, for example, a granulated dry rosin size, although the process may be employed to increase the apparent density of any bulky dry size. By rosin size, as referred to hereinafter and in the claims, is meant the reaction product of gum or wood rosin or resin, or other materials having primarily an abietic, pimaric, sapinic, or other rosin acid content, and an alkali such as caustic soda, soda ash, or any suitable alkali hydroxide. To this reaction product may or may not be added additional materials such as anti-oxidants, wax, casein, etc.

The term density is used herein to mean the apparent density of the size. In other words, an increase in density would be a reduction in the bulk of the size. Thus, a high density size is one of low bulk.

Referring more particularly to the drawing, there is shown a flow sheet illustrating a process or method of making, for example, a high density dry rosin size. In carrying out the process, alkali solution and rosin are reacted in an autoclave 10 and the reaction mixture is sprayed into a blow chamber 11, in the customary manner. The dry size produced, may contain between 90 and 99% solids and the balance moisture, and usually has a density of about 8 to 15 pounds per cubic foot.

This bulky size is then passed through suitable means 12 for compacting the size particles by applying pressure thereon. If the size has a solids content of about 90 to 93%, this may be accomplished by passing the particles through a number of pairs of rolls, for example, four, in a roll crusher. The rolls apply pressure to shape the size particles into flakes having a density of about at least 25 pounds per cubic foot. The

flaking operation serves to more than double the density of the dry size, whereby the bulk is greatly reduced. By compacting the size while containing a small amount of moisture, for example, 7 to 10%, flakes are readily formed without creating fines or dust which generally result when size, practically free from moisture, is crushed. Size having such a moisture content can be readily compacted without caking on or adhering to the rollers.

If the size produced in the blow chamber has a solids content of about 93 to 99% or higher, it is desirable to slightly humidify the size to reduce the solids content to 90 to 93% so that the roll crushers are adapted to form flakes therefrom.

Alternately, where the size is blown with 93 to 99% solids content, or higher, the compacting means 12 employed preferably is a briquetting machine. A briquetting machine, for example, of the Komarek-Greaves roller type adapted to exert 10,000 pounds per square inch, or more, has been found suitable for forming briquettes or the like from size which may be even practically bone dry. The specific gravity of the briquetted size may vary between 50 and 70 pounds per cubic foot, depending upon the pressure exerted by the machine.

The briquettes or the like, or flakes, are then passed through a hammer mill 14, preferably having its hammers set about 3/8 of an inch from the breaker plate and provided with a screen or cage having 3/32 of an inch perforations through which the material is forced. The hammer mill serves to break the flakes or briquettes or the like into small granular particles, and at the same time, when flakes are ground, serves to further compact the particles to increase the apparent density of the size.

The size delivered by the hammer mill is then passed through a separator 15 which removes the dust and fines. The dust and fines may be mixed with freshly blown size coming from the blow chamber or may be passed through the blow chamber and then passed through the system again. The separator preferably is of the roller mill aero-separator type, although any suitable separating device may be utilized.

The size particles from which dust and fines have been removed are then delivered to a screening device 16. Preferably, this device is provided with a screen designed to permit all particles of between about minus twenty (—20) mesh and about plus eighty (+80) mesh to pass therethrough and reject all particles of about plus twenty (+20) mesh. The larger particles which are rejected are returned to the hammer mill 14, where they are reduced to finer particles, and are passed through the separator again and then to the screen.

The particles which pass through the screen are collected as the finished product. This product has an apparent density of about 35 to 45 pounds per cubic foot, a solubility of about 90 to 120 seconds, and a dry matter content of about 91 to 99%, but preferably 93 to 99%. The product is granular, non-coalescing, and free flowing and can be readily packed into containers by automatic machinery without bag breakage and at a small labor cost. Due to the increase in density or the reduction in bulk, smaller containers hold a given weight of size or containers of a given volume will hold a greater weight of size. As a result, fewer containers are required, thus decreasing the packaging costs. The reduction in bulk also enables the size to be stored in a smaller storage space. The size prepared in accordance with the invention is free from dust and fines which is very beneficial, because the absence of dust improves working conditions, both at the chemical plant and the paper mill. Also, the lack of dust in the product minimizes the danger of spontaneous combustion. By firmly compacting the blown size particles into granules, they lose their fluffy character and have a smaller exposed surface area, whereby they are less susceptible to oxidation by air coming in contact therewith.

It will be understood that the details and examples hereinbefore set forth are illustrative only and that the invention as broadly described and claimed is in no way limited thereby.

What I claim and desire to protect by Letters Patent is:

1. A method of making a high density dry size which comprises spray drying liquid or paste size in a blow chamber to provide a size having a moisture content of between about 1 and 10%, compacting the size particles to a density greater than about 20 pounds per cubic foot, reducing the size of the compacted particles, separating dust and fines from the reduced particles, returning dust and fines to the blow chamber, collecting particles of a size between about minus 20 and about plus 80 mesh, and returning particles greater than said size for further reduction.

2. A method of making a high density dry size which comprises compressing a dry saponified rosin size having an apparent density between about 8 and about 15 pounds per cubic foot and a moisture content between about 1 and about 10 per cent to form compacted particles having an apparent density greater than about 20 pounds per cubic foot, and thereafter comminuting said particles to form granular particles of predetermined size and having an apparent density of about 35 pounds per cubic foot.

3. A dry size having an apparent density greater than about 20 pounds per cubic foot comprising essentially saponified rosin, said size consisting essentially of particles of a size between about —20 and about +80 mesh and substantially free from dust.

4. A dry size having an apparent density between about 20 and about 45 pounds per cubic foot comprising essentially, spray dried, compacted, and subsequently crushed, saponified rosin, said size consisting essentially of particles of a size between about —20 and about +80 mesh and substantially free from dust.

5. A dry size having an apparent density of about 35 pounds per cubic foot comprising essentially saponified rosin, said size consisting essentially of particles of a size between about —20 and about +80 mesh and substantially free from dust.

6. A dry size having an apparent density of between about 30 and about 45 pounds per cubic foot comprising essentially saponified rosin, said size consisting essentially of particles of a size between about —20 and about +80 mesh substantially free from dust and having a moisture content between about 1% and about 7% and a solubility of about 90 to 120 seconds.

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