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PROCESS FOR AGGLOMERATING COFFEE

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ABSTRACT OF THE DISCLOSURE

It has been discovered that the uniformity, strength and appearance of fused coffee agglomerates can be improved by preconditioning the coffee powder prior to agglomeration. In the pretreatment, the coffee powder is chilled to below 60° F. and the moisture content of the powder is increased by wetting the surface of the powder prior to agglomerating the powder.

This invention involves an improvement of the fusion-agglomeration process for coffee described in co-pending application Ser. No. 528,770, filed Feb. 21, 1966, in the names of Billy Kan and Saul N. Katz and, more particularly, relates to preconditioning the coffee for that process.

In the Kan et al. patent application, a process is described for forming a strong coffee agglomerate by raising the temperature of the wet coffee agglomerates above the fusion point of the coffee thereby, in effect, forming melted or fused agglomerates as distinguished from merely a solution of dry dissolved coffee solids. However, in order to produce fused coffee agglomerates for commerce, it has been found that conventional agglomerating apparatus and techniques do not assure an efficient and reliable system due to certain variables in the initial dry soluble coffee powder. As a result, weak coffee agglomerates are sometimes formed (when fusion of the coffee does not occur), dense agglomerates (when excessive fusion occurs) and, in general, uniformity of product appearance is difficult to control. It has, therefore, now been found necessary to pretreat the dried coffee powder prior to agglomeration of the coffee regardless of the technique used for fusion-agglomeration.

It is a principal object of this invention to produce fused coffee agglomerates of uniform product appearance in an efficient and reproducible manner.

Another object of this invention is to improve the strength of coffee agglomerates.

Still another object of this invention is to change the particle appearance of instant coffee and provide a more granular-appearing soluble coffee.

Still another object of this invention is to avoid flavor degradation of the soluble coffee during agglomeration.

These and other objects and advantages of the present invention will be apparent from the description of the invention which follows.

This invention is founded on the discovery that the production of strong coffee agglomerates will be made more feasible by chilling the soluble coffee powder to below 60° F. prior to the agglomeration step, said agglomeration step comprising wetting the surfaces of the chilled coffee powder with a hot moistening fluid which condenses on said surfaces, contacting said surfaces to form wet coffee agglomerates, heating said wet agglomerates while sufficient moisture is present to an elevated temperature which fuses said agglomerates without degrading the essential coffee flavor of the coffee, and then chilling the agglomerates to below 80° F. to avoid caking of formed agglomerates.

Fusion, as used in this invention, means the melting, welding, cementing, or coalescing of the surfaces of the various coffee particles at the points of contact of these particles by raising the temperature of the coffee to above its thermoplastic point while sufficient moisture is present during said fusion in order to lower the thermoplastic point of the coffee to the point where the coffee is not degraded due to the application of heat. At moisture levels of above 10% fusion of coffee can occur at temperatures as low as 130° F. while at moisture levels of 3% the fusion point will not be reached until temperatures of 270° F. are reached.

Moisture addition during the fusion agglomeration is usually in the range of between 0.5 to 3% moisture, thus giving a total moisture content of between 3% and 6% depending on the initial moisture content of the coffee. However, the actual surface moisture at the bonding point is somewhere above 4%, say 5 to 15%.

By chilling the soluble powder to below 60° F. and, preferably, to between 20° and 40° F., it has been found that the agglomeration step which is conducted in the presence of hot, humid air, hot water spray, or steam promotes maximum condensation of water on the surfaces of the cold coffee particles thereby giving maximum wetting action to the powder surfaces and enabling the coffee to be raised to above its fusion point at these surface portions at more moderate temperature than would be necessary if the coffee were not uniformly wet in this manner.

In order to assure an efficient commercial operation in which reproducible and uniform results of agglomeration can be achieved, it has been found preferable to adjust the moisture content of the initial coffee powder to between 3 to 4%, preferably between 3.0% and 3.5% and to reduce the particle size of the coffee powder to a fine grind wherein essentially all the particles are less than 100 microns and preferably of a size between 5 and 50 microns.

When using steam as the moistening and agglomerating fluid, it is contemplated that the 3 variables of powder moisture, power size and powder temperature can be varied and controlled to provide the desired density, strength and color of the ultimate coffee agglomerate. In regard to initial powder moisture prior to agglomeration, moistures higher than 4% tend to produce a strong, very dense coffee agglomerate of a dark color whereas moisture contents of less than 3% tend to produce a less dense agglomerate of lighter color which is weak. In regard to the particle size of the dried powder, it has been found that particle sizes of above 100 microns tend to produce weak coffee agglomerates whereas fine grinding of the powder to below 100 microns tends to produce denser coffee agglomerates of greater strength. Finally, in regard to the temperature of the dried powder prior to being contacted with the moistening fluid, it has been found that product temperaures in the area of room temperature or above tend to produce agglomerates which are weak, lighter in color and less dense whereas chilling of the extract to below 60° F. tends to produce a better wetting action which in turn gives darker agglomerates. This last variable is believed essential to obtaining good strong coffee agglomerates and by altering the size and moisture content of the powder while keeping the chilling step constant, strong coffee agglomerates of different properties can be obtained.

The powder, once preconditioned according to this invention, is then agglomerated in a manner which accomplishes at least some fusion of the coffee particles. This can be done by various techniques including contact with jets of steam which wet the coffee powder, causes agglomerates to be formed in a turbulent zone of contact and then the wet agglomerates are dried at an elevated temper-