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PROCESS FOR PRODUCING A CONCENTRATED COFFEE EXTRACT

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This invention relates to improvements in the production of concentrated coffee extracts.

Dried powder extracts of roasted coffee are substantially lacking in a fragrant aroma such as is present in fresh ground roasted coffee. One procedure which may be employed in attempting to aromatize such powders and the brews of cup coffee prepared therefrom is to distribute throughout the extract oil which has been expressed from roasted coffee, thereby enhancing the extract with the fragrance of the coffee-like aromatic compounds contained in the coffee oil. The residue of coffee material remaining after this coffee oil expressing operation contains considerable water soluble coffee solids in an acceptable condition for providing good cup coffee flavor. Accordingly, it would be economically advantageous if this residue or "coffee meal," as it is referred to hereinafter, could be percolated together with roasted coffee in the production of a concentrated extract which when dried can be marketed as a soluble coffee powder.

However, in the process of expressing the coffee oil, the roasted coffee is subdivided and compressed with the result that a considerable proportion of the coffee meal produced is composed of very fine particles. For example, the coffee meal issuing from a screw or auger type press, i.e., one wherein the screw has flights traveling within a complementary perforated cage or screen concurrent to the feed of coffee to subdivide the coffee and press oil therefrom, has in the order of 50% coffee particles of a size passing a #50 U.S. standard mesh screen.

It is virtually impossible to percolate such expeller cake by itself because of the low porosity of a bed of coffee meal. In handling the coffee meal prior to and during loading a percolation column with other ground roasted coffee, the coffee meal powders or separates freeing the fines, and, together with the fines normally present in the ground coffee, severely reduces the porosity of a coffee bed when it becomes wetted, thus calling for high water pressures to be applied in percolation. Moreover, the fines agglomerated in the coffee meal readily dissociate from their agglomerated condition during percolation thereby further reducing the porosity of a bed of coffee in the percolation chamber. The shifting of fines from a coffee grind alleviates to some extent the high back pressures resulting when coffee meal is employed but not to the degree which assures complete freedom from pressure drop difficulties. For the coffee meal fines distributed in the bed in a column significantly increase the pump pressure required to maintain a desirable velocity for the aqueous solvent in the extraction zone producing a "ram action" which compresses the bed leading to progressively higher back pressures as percolation proceeds. The consequence in many cases, depending upon the quantity of coffee meal percolated, is cessation of percolation before all of the desired solids are extracted from both the coffee meal and the ground coffee.

It is an object of this invention to provide a process whereby coffee meal containing substantial quantities of fine material can have readily extracted therefrom together with other roasted coffee substantially all of the water soluble coffee solids therein without such pressure drop problems and in a condition free of fines and sediments.

It has now been discovered that much of the aforementioned difficulty in percolation of roasted coffee together with substantial quantities of coffee meal fines can be avoided by forming and compressing the coffee meal into pellets having a size substantially larger than the particles of ground coffee and distributing the pellets throughout a column of ground roasted coffee. The coffee meal has blended therewith fines sifted from ground roasted coffee and this blend is pelletized, the pellets being in turn blended with the coarser ground coffee particles and this latter mixture being loaded in a percolation column. Alternatively, the coffee meal can be pelletized separately from ground coffee fines, the latter also being pelletized and the two types of pellets being blended with the coarser ground roasted coffee. Pelletizing is achieved by shaping the fine materials under pressure and preferably by also employing a bonding agent such as moist coffee extract in which case the pressures necessarily employed in pelletizing are lessened as will be explained hereinafter.

Pelletizing immobilizes the fine coffee meal particles in the dry state prior to extraction and positions them in the form of separate masses at spaced points distributed throughout the bed of the coarse coffee particles in the extraction zone. Coffee meal fines remain immobilized as they become wetted in which condition they do not tend to migrate. As a result channeling and packing in the extracting chamber of roasted coffee being percolated is reduced. Compared to extraction procedures not employing coffee meal there is provided a higher concentration of soluble coffee solids in the extract from a given percolation chamber. Moreover, the extract is in a condition substantially free of fines and sediment. The distribution of coffee meal and ground coffee fines in a pelletized form in a column of ground roasted coffee enables the use of a finer grind of coffee to be percolated without troublesome pressure drops and thereby provides a high rate of extraction of soluble coffee solids.

The coffee meal can be pelletized with or without ground coffee fines in accordance with this invention using pressure alone to bind the fine coffee particles together in an immobilized state in the pellet; but preferably the coffee meal has blended therewith a small quantity of moist coffee extract which provides a bond for the meal when it is shaped and dried. Although moist coffee extract is the preferred bonding agent, a number of other non-coffee substances can be employed as bonding agents, viz., polyhydroxy compounds such as higher polyhydric alcohols like sorbitol and mannitol; monosaccharides like the ketones fructose and sorbose; the aldoses glucose and galactose; disaccharides like lactose and maltose; and other polysaccharides. The use of a dried coffee extract or similar bonding agents permits low pressures to be employed in pelletizing the fines thereby avoiding large amounts of heat being developed by the higher pressures otherwise necessary which can impart undesirable flavor to the coffee meal and in turn to the extract therefrom.

In any event, the distribution of the coffee meal fines in the form of relatively large pellets throughout the remaining particles of roasted coffee in the percolator positions the fines in a relatively immobilized state at least in the early percolation cycles and the fines are localized therefore in the voids space between the coarser coffee particles leaving the remaining voids space in a relatively open condition which minimizes clogging and channeling in the extraction chamber.

While the provision of coffee meal in a pellet form