ABSTRACT

Contaminants are removed from spices and herbs by a washing process using dilute alkaline cleaning solutions and neutralizing agents and passing the substances to be cleaned through concentric zones with countercurrent flow, thereafter spray rinsing and drying.
PROCESS FOR CLEANING SPICES AND HERBS

BACKGROUND

It is probably not too well known that spices and herbs, e.g., pepper, cinnamon, ginger, rosemary, thyme, cloves, cumin, oregano, and the like, particularly those spices and herbs that are harvested under somewhat primitive conditions, are subject to contamination with live and dead insects, rodent excreta, manure, mold and other extraneous matter. It is quite difficult to remove these contaminants and the methods that have been used heretofore are not necessarily very effective. Furthermore, it is quite important that any method which is used must accomplish the result without destroying or affecting the flavor of the spice or herb which is being cleaned.

It would, therefore, be desirable to provide a new and improved process for cleaning spices and herbs containing contaminants which would effectively remove such contaminants without destroying the flavor of the spices and herbs.

OBJECTS

One of the objects of the present invention is to provide such a process which will remove rodent hair, insect fragments, dirt, bacteria and other undesirable material from spices and herbs without destroying the flavor.

A further object is to provide a process of the type described which is relatively inexpensive but at the same time highly effective.

Another object of the invention is to provide a process which utilizes relatively simple, uncomplicated apparatus.

Other objects and advantages of the invention will be apparent from the following description in conjunction with the accompanying drawings in which the single FIGURE shows diagrammatically one form of apparatus contemplated for the practice of the invention.

BRIEF SUMMARY OF THE INVENTION

In accordance with the invention a process of cleaning spices and herbs containing contaminants is provided which comprises: (a) introducing the spice and herb substances to be cleaned into a tubular first zone containing a dilute alkaline aqueous cleaning solution, (b) passing said solution containing said substances into an inverted conical second zone wider than said first zone while imparting a rotating force to said solution and substances, (c) causing said solution containing said substances to flow in a third zone concentric to said first zone countercurrent to the direction of flow in said first zone, (d) removing a part of said solution containing said substances from said third zone, (e) de-watering said part while neutralizing it with a dilute solution of an edible acid, (f) rinsing the residual spice and herb substances with water, (g) thereafter passing said substances through a dewatering zone while subjecting them to a high pressure water spray, and (h) drying the resultant product.

DETAILED DESCRIPTION OF THE INVENTION

As illustrated in the drawing, the process is carried out by introducing the washing solution and the spice and herb substances containing contaminants into a vessel 1 provided with a round feed tube 2 having an inlet 3 for the washing solution and the spice and herb substances. Disposed within the tube 2 is a drive shaft 4 from a multi-speed motor 5 to a paddle 6 with a downward thrust. The bottom of the vessel 1 has an inverted conical shape 7 converging with a valved outlet or drain 8. In the upper part of vessel 1 is an outlet 9 which can also be provided with a control valve, not shown.

The outlet 9 of vessel 1 empties onto a vibrating screen 10 over which is a series of spray nozzles generally indicated at 11 which are connected to pipe 12. The solid residue from vibrating screen 10 is transferred to inlet 13 at the top of tubular member 14 in vessel 15. Fresh water is also introduced into inlet 13 and the mixture of water and solids is drawn downwardly through tube 14 by paddle 16 which has a downward thrust and is operated by multi-speed motor 17 through connecting shaft 18. Vessel 15 has a valved outlet or drain 19 located at the bottom of the inverted conical shaft portion 20 of vessel 15. Near the top of vessel 15 there is provided an outlet 21 from which the contents of vessel 15 can flow onto a vibrating screen 22 where the solid materials remaining on said screen are subjected to a high pressure water spray from the nozzles generally indicated at 23 which are connected to pipe 24.

In practicing the process with the foregoing apparatus, the spice and herb substances are introduced into vessel 1 at inlet 3 along with a dilute alkaline cleaning solution. Usually a solution containing 0.2 percent sodium hydroxide is employed but it will be understood that this concentration is subject to variation. It is also desirable to use at least as great a volume of the cleaning solution as the volume of the spice and herb substances to be cleaned. Usually, it is preferable to employ a volume ratio of alkaline cleaning solution to spice and herb substances of about 2:1. The cleaning solution can also contain a wetting agent of any suitable type which meets the requirements for washing food grade materials.

The spice or herb substances can be fed to inlet 3 from a wet state or a dry state. This depends upon the absorption ability of the spice or herb. Some spices and herbs absorb moisture like a sponge while others have a very hard surface and absorb at a slower rate. These latter spices and herbs can be fed into the solution in a dry state. The spices that absorb at a fast rate are preferably presoaked in water prior to being immersed in the alkaline solution.

In the first solution vessel 1 there should be a downward and an upward flow of solution. This is necessary to insure a positive alkaline treatment of the spice or herb and is attained by having a round feed tube 2 mounted in the center of the vessel as indicated in the drawing. Also, as shown in the drawing, the paddle 6 is mounted just below the bottom of the round tube 2. Since the paddle 6 has a downward thrust it first pulls the spice or herb down through the feed tube and into the inverted conical bottom of the vessel 1, then upward to the top of vessel 1 where it flows out through outlet pipe 9. The vessel 1 should be relatively small. Contaminants which drop to the bottom are removed through valved outlet 8.

From the outlet pipe 9 the spice or herb is passed over a dewatering screen 10. While on the dewatering screen the spice or herb is sprayed from nozzles 11 with an edible acid bath, e.g., dilute acetic acid or phosphoric acid, which neutralizes the alkali.
From screen 10 the spices or herbs are fed to inlet 13 of a large rinse vessel 15 containing water. The temperature of the water in this vessel should be slightly above the temperature of the alkaline solution and the acid rinse. Usually, however, neither temperature will exceed 140°F. The warmer solution in vessel 15 will tend to open up the surfaces of the spices or herbs freeing any remaining trapped bacteria, dirt or other contaminants. A cold rinse would cause the surfaces of the spices or herbs to contract, trapping the bacteria, dirt and other contaminants.

While vessel 15 is a larger vessel than vessel 1, the construction is basically the same with the same flow pattern. A gentle stirring action is adequate for most spices or herbs, but for spices or herbs that tend to curl or roll, e.g., cinnamon, a turbulent action is desirable. The turbulent action can be created in two ways, viz., high pressure water spray nozzles, down in the vessel, that spray water into the slurry while agitating, or air pumped in the vessel that causes a turbulence in all directions, giving the spices or herbs a thorough scrubbing action.

From vessel 15 the spices or herbs pass through outlet 21 to washing screen 22. Over this screen there are several rows of high pressure water spray nozzles located at an angle that tends to hold the spices or herbs on the screen. The spices or herbs are actually forced through the spray and at this point the spices or herbs tend to roll and tumble causing all surfaces to be exposed to the spray. In this way any remaining contaminants are washed through the screen.

From screen 22 the spices or herbs go into a drier, not shown.

The foregoing process and apparatus have been found to be effective in cleaning various types of spices and herbs. Specific examples of spices and herbs which can be cleaned in accordance with the invention are as follows: pepper, korintji cassia A, cassia B, korintji cassia B, seychelle cinnamon bark, Nigerian split ginger, rosemary, thyme, cloves, cumin and oregano.

To illustrate the practical application of the invention, pepper has been cleaned very satisfactorily in repeated tests using the previously described conditions.

In another series of tests korintji cassia A, which was initially found to contain live and dead insects, extraneous matter and steam volatile oil, was cleaned using the foregoing process and apparatus with the result that when the product was analyzed it was found to contain no live or dead insects, rodent excreta, manure, insect infestation or extraneous matter. The mold content was reduced to 0.2 percent and the steam volatile oil was 2.9 ml per 100 grams (ASTA Second Edition 1968 method 16.0).

In another series of tests with cassia B, all live and dead insects, infestations, rodent excreta, and manure were eliminated, the mold content was reduced to less than 0.1 percent and the steam volatile oil content was 2.0 ml per 100 grams.

In another series of tests with korintji cassia B, the process and apparatus were used to eliminate all live and dead insects, insect infestations, rodent excreta, manure and extraneous matter and the mold content was reduced to 0.3 percent. The steam volatile oil content was 2.94 ml per 100 grams.

In another series of tests on seychelle cinnamon bark, all live and dead insect fragments, insect infestations, manure and rodent excreta were eliminated, the extraneous matter was reduced to 0.1 percent, the mold content was also eliminated, and the steam volatile oil content was 1.43 ml per 100 grams.

In another series of tests on Nigerian split ginger, all live and dead insect fragments, rodent excreta, manure and insect infestations were eliminated, the extraneous matter was reduced to less than 0.1 percent, the mold content was 0.1 percent, and the steam volatile oil content was 3.51 ml per 100 grams.

In the cleaning operations previously described, the final drying step can be carried out in any suitable type of drying apparatus but usually the temperature employed should not exceed 140°F.

The invention is hereby claimed as follows:

1. A process of cleaning spices and herbs selected from the group consisting of pepper, korintji cassia A, cassia B, korintji cassia B, seychelle cinnamon bark, Nigerian split ginger, rosemary, thyme, cloves, cumin and oregano, containing contaminants which comprises:
   a. introducing said spice and herb substances to be cleaned into a tubular first zone containing a dilute alkaline aqueous cleaning solution,
   b. passing said solution containing said substances into an inverted conical second zone wider than said first zone while imparting a rotating force to said solution and substances,
   c. causing said solution containing said substances to flow in a third zone concentric to said first zone countercurrent to the direction of flow in said first zone,
   d. removing a part of said solution containing said substances from said third zone,
   e. dewatering said part while neutralizing it with a dilute solution of an edible acid,
   f. rinsing the residual spice and herb substances with water,
   g. thereafter passing said substances through a dewatering zone while subjecting them to a high pressure water spray, and
   h. drying the resultant product.

2. A process as claimed in claim 1 in which said alkaline solution is an aqueous solution of caustic alkali and said edible acid is acetic acid.

3. A process as claimed in claim 1 in which contaminants are removed from the apex portion of said conical zone.

4. A process as claimed in claim 1 in which the volume ratio of solution in (a) to said spice and herb substances is approximately 2:1.

5. A process as claimed in claim 1 in which the water used in rinse step (f) is heated and the temperature of said water is higher than the temperature in steps (a) to (e) but not above 140°F.

6. A process as claimed in claim 1 in which rinse step (f) is repeated.

7. A process as claimed in claim 1 in which the drying temperature in step (h) is not above 140°F.

8. A process as claimed in claim 1 in which said substance to be cleaned is pepper.

* * * * *