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Dickens

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[54] **HAMMER MILL WITH INTEGRAL SUBSAMPLING PORTION**

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[52] **U.S. Cl.** **241/73,** 241/74, 241/101.3

[51] **Int. Cl.** **B02c 13/14**

[58] **Field of Search** 241/73, 74, 101.3

[56] **References Cited**

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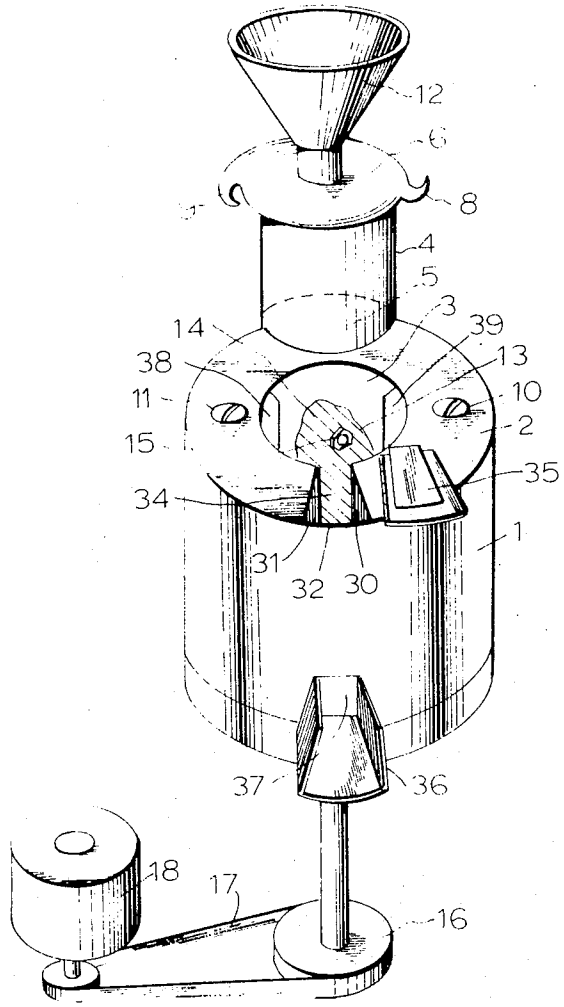
Primary Examiner—Roy Lake

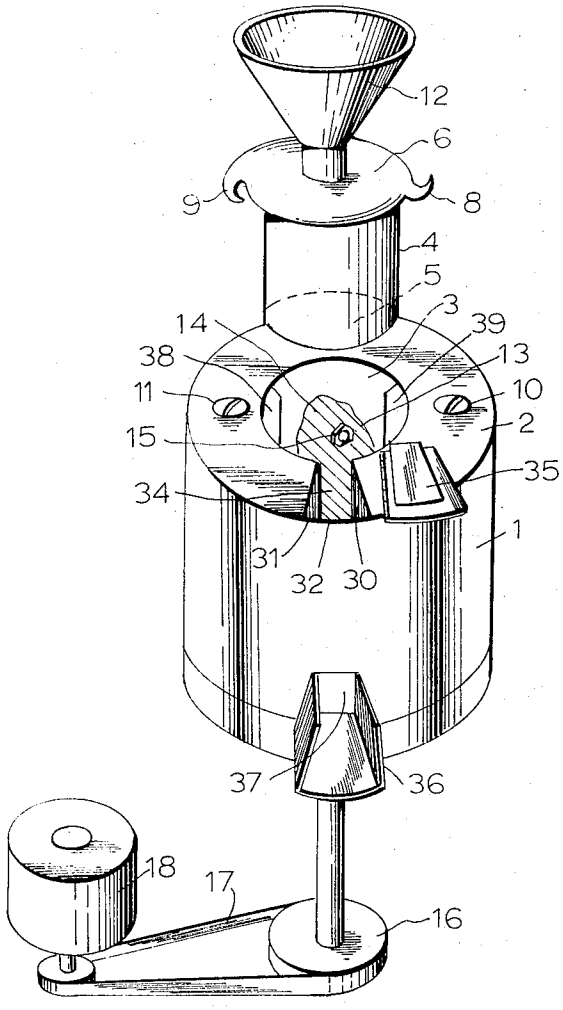
Assistant Examiner—E. F. Desmond

[57] **ABSTRACT**

The invention relates to a mill for comminuting agricultural products such as peanuts, corn, soybeans, cottonseed and the like. The mill is characterized by the incorporation of an integral subsampling device whereby a comminuted, blended subsample is delivered concomitant the comminution operation. The mill comprising a central, vertically disposed shaft component with radially extended comminuting elements, separate concentric screen component and concentric casing component spaced in sequence outward therefrom, employs a pair of radially disposed partitions between the screen component and the casing component which partitions form a compartment in the shape of a hollow cylinder sector. The sector shaped compartment catches the comminuted material immediately upon passage through the screen and delivers a comminuted subsample related to the original sample as that portion of the screen included in the sector shaped compartment relates to the total screen area (i.e., a 36° arc of screen included in the sector shaped compartment will deliver approximated 1/10 of the original samples as a comminuted subsample.

1 Claim, 1 Drawing Figure




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HAMMER MILL WITH INTEGRAL SUBSAMPLING PORTION

A non-exclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

The problem of obtaining a representative sample of shelled peanuts for aflatoxin analyses makes it necessary to draw large samples of kernels. (Presently 10-pound samples are used, but eventually much larger samples may be required.) These samples of peanuts should be finely comminuted and thoroughly blended before a 100 gram subsample is taken for aflatoxin analyses.

Present equipment for comminuting, blending and sub-sampling samples of peanut kernels has the following disadvantages. (1) The equipment is costly and requires considerable laboratory space. (2) The chopper does not comminute the kernels finely and uniformly. (3) The blender does not blend the samples of peanut meal thoroughly. (4) Over 20 minutes is required to comminute, blend and subsample a 10-pound sample. (5) The equipment will not accommodate samples weighing 20 pounds or more. (6) The blades on the chopper become dull and must be changed often.

The subsampling mill that is the subject of this invention will comminute, blend and subsample a 10-pound sample within 5 minutes. The mill will handle samples up to 100 pounds or more. All material is comminuted finely enough to pass through a ⅛-inch screen and the equipment requires very little maintenance. The machine is simple in operation and economical in cost so that subsampling mills can advantageously be located at peanut shelling plants as well as in the analytical laboratories. Large samples of peanuts can then be comminuted, blended and subsampled at the shelling plants and a small ½-pound subsample can be mailed to the aflatoxin laboratory rather than the whole 10-pound (or larger) sample. Such a procedure saves considerable handling and transportation costs, also the reject portion of the ground sample can remain with the sheller to be sold as oil stock.

Detailed consideration of the mill structure requires the aid afforded by the accompanying drawings.

Referring to FIG. **1**, item **1** is a casing approximately 10 inches in diameter concentrically surrounding the screen and comminuting elements of the mill, **2** is a circular top integral to the side wall of the casing, **3** is a circular opening approximately 6 inches in diameter sized to allow passage of the screen component **4** which component is about 5 ⅛ inches in diameter with open bottom, foraminous wall **5** with ⅛ inch perforations integral circular top **6**, 6 ½ inches in diameter, with radially extended flange **7**, fastening means **8** and **9** which means coact with counterpart means **10** and **11** on the casing top to locate and secure the screen component in the mill, **12** is a conical shaped sample feeding port which provides ingress to the interior of the mill, said interior being bounded by the inside wall and top of the screen component and said interior including the centrally located vertically disposed ½ inch diameter shaft component **13**, a plurality of radially extended comminuting elements 4 ½ inches, 1 inch wide and spaced ½ inch apart on the shaft, of which item **14** is one, fastening means **15** lock washer and nut for threaded end of shaft for securing the said elements to the shaft component, drive means **16** in the form of a pulley wheel is integral the lower exposed end of the shaft component and driving means **17** and **18** are in the form of a vee belt and a three-quarter horse power electric motor which turn at the rate of 3,600 rpm.

Again in FIG. **1**, items **30** and **31** are partitions extended radially inward from the outside wall **32** of the casing component to contact the outside wall **33** of the curved foraminous surface portion of the screen component which several enumerated items jointly define the subsampling compartment **34** extending from the circular casing top where the compartment can be closed by hinged flap **35** to a point below the lower edge of the screen component at which location the compartment terminates with a sample delivery chute **36** directed downward and radially outward to form the subsample egress port **37**.

Baffles **38** and **39** vertically disposed on the inside walls of the casing component and directed radially inward to contact the outer wall of the screen component perform the dual purpose of preventing comminuted material from circulating between the casing component and screen component and providing points of attachment and support for the circular shaped, flat, partial bottom of the mill which bottom serves to close the mill area beneath the screen component only. The annular shaped mill bottom area radially outside the partial bottom is open except for the subsample chut location to allow comminuted material in excess of the collected subsample to exit the mill. The partial bottom of the mill in addition to its closure purpose provides anchorage at its center for bearing means and associated support means adapted to mount the shaft component.

I claim:

1. A hammer mill with included subsampling means comprising a cylindrical casing component, a cylindrical screen component concentric within the casing component and a rotatable shaft component carrying comminuting elements centered axially within the screen component substantially as follows:

a. curved means defining said casing component in the form of a vertically disposed, hollow right cylinder,

1. means defining a circular, flat top integral the casing and provided with a concentric circular opening sized to permit passage therethrough of the said screen component,
2. a plurality of vertical baffles disposed full length of the inner curved surface of the casing component, said baffles extended radically inward to contact the outer surface of said screen component,
3. at least one pair of baffles together with the adjacent casing and screen surfaces defining a compartment extended vertically the length of the casing from the circular top of the casing where the compartment is provided with a flap closure hinged to the casing top to a location below the bottom edge of the screen component, the bottom of the compartment provided with means defining an open delivery chute directed radially outward and downward to the outside of the casing,
4. means defining a circular, flat, partial bottom for the casing component, said partial bottom effect-

ing closure of the concentric central portion of the casing inside the baffles and concomitantly exposing the radially adjacent annular area intermediate the baffles and extending to the casing, said partial bottom integral and supported by the lower inboard ends of the baffles and said partial bottom provided with center located bearing means and associated support means adapted jointly to carry a vertically mounted rotatable shaft, which shaft passes through, extends above and extends below said partial bottom,

b. curved foraminous means defining said screen component in the form of a hollow right cylinder with open bottom and of diameter approximating but less than that of the partial bottom of the casing component and of diameter providing a clearance fit inside the inboard edges of the casing baffles,

1. means defining a circular top integral the screen component, said top provided with an extended peripheral edge in the form of a flange extended radially outward beyond the curved foraminous surface an amount sufficient to provide overlap closure of the circular opening in the top of the casing component, said peripheral edge provided with fastening means adapted to coact with counterpart fastening means on the top of the casing component thereby to position and immobilize the screen component relative the casing component, the circular top of the screen component provided additionally with a centrally located, vertically disposed, conical shaped feeding means adapted to provide ingress relative the interior of the screen component,

c. a shaft component passing centrally through the bearing and support means of the casing partial bottom and extending above the bottom of the casing component and within the screen component and extending exposed below the partial bottom of the casing component, rotational drive means integral the lower exposed end of the shaft component, radially extended impact grinding elements distributed in fixed, stacked, array along that portion of the shaft above the casing partial bottom and inside the casing and screen components, said elements adapted to sweep, with rotational clearance, the interior of the screen component.

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