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SCRAPER FOR DOCTOR BLADE

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Fig. 1

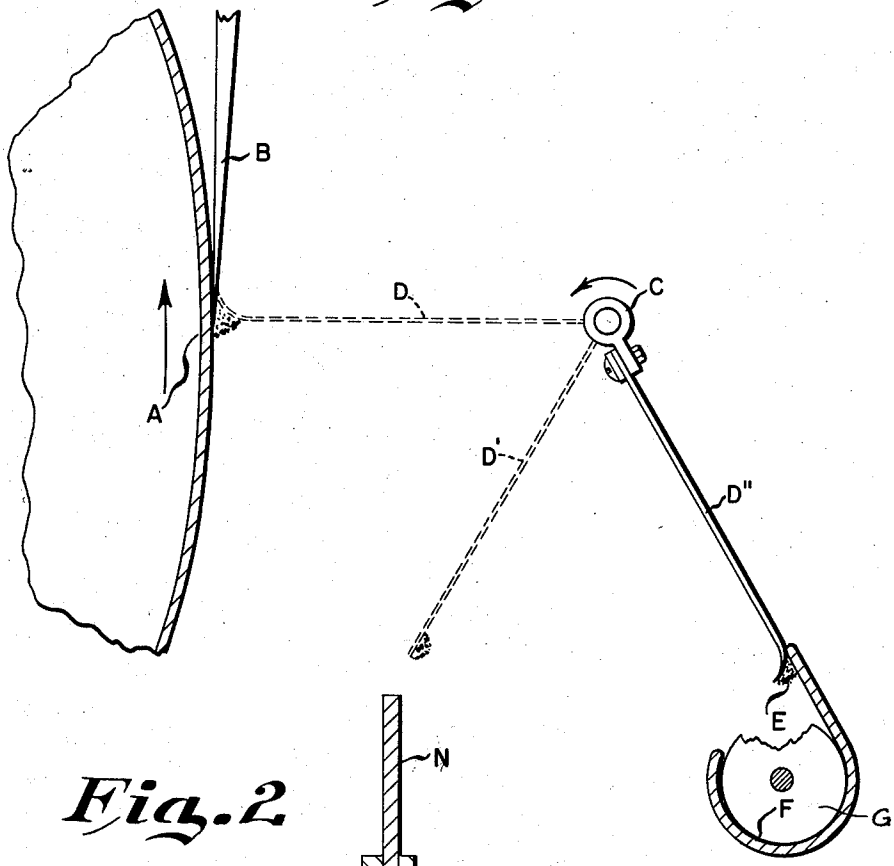
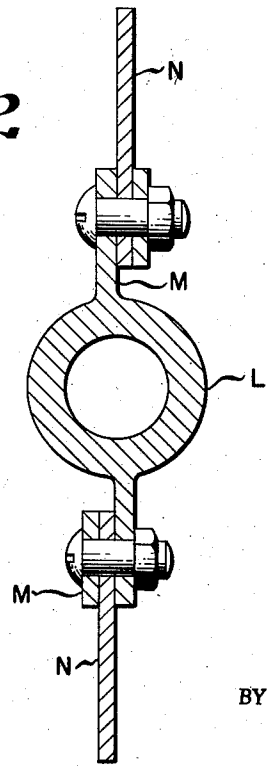


Fig. 2



INVENTOR

CHARLES S. BARKLEY

BY Walter K. Steinbrenner

ATTORNEY

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SCRAPER FOR DOCTOR BLADE

Charles Stuart Barkley, Metuchen, N.J., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware

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1 Claim. (Cl. 34—112)

This invention is directed to the removal of volatile substances from viscous products and to the handling and recovery of viscous products from which the volatile components are removed by heating in a thin layer on a revolving drum.

Drum driers are devices in which materials to be dried are applied continuously in thin layers to one or more heated revolving drums. These materials are dried as the drum revolves, and finally are continuously removed from the drum, usually by a scraping device known as a doctor blade. These drum driers are usually used for drying solid materials, in the form of either solutions or slurries or dispersions. The dried solid, depending on its physical characteristics, is removed as flakes, lumps, crystal aggregates, or continuous sheets, all of which are readily collected and removed by well known means, for packaging or further processing. It should also be possible to use drum driers for drying viscous liquids but here the difficulty arises that the dried product adheres to the doctor blade and cannot be handled as either a liquid or a solid. The object of the present invention is therefore to adapt the known types of drum driers to the handling of viscous liquids by introducing means for removing and collecting them.

It is an object of the present invention to provide a novel apparatus for recovering drum-dried materials, viscous in nature, which materials heretofore have been recovered only with extreme difficulty.

It is a further object of the present invention to provide a novel apparatus and method for recovering drum-dried viscous polymers.

These and other objects will become apparent in the following description and claim.

More specifically, the present invention is directed to a drum drier unit comprising a heated drum, a doctor knife, and a screw conveyor, which unit is adapted for handling drum-dried viscous materials by utilizing one or more resilient blades adjacently rotating in an axis parallel to that of said drum so as to sweep said doctor blade to remove the drum-dried viscous material collected thereon, a trough lip being positioned so as to collect said viscous material from the resilient blades as they rotate and contact said lip causing the viscous material to fall into the trough containing said screw conveyor.

In the accompanying drawing, Figure 1, is shown the basic unit components of the present invention; and, Figure 2 is an enlarged detail of one form of resilient blade assembly. Figure 1 is a section of the apparatus perpendicular to the axis of the drum. A is the surface of the drum and B is the doctor blade. Both of these are of conventional design and arrangement. Thus the drum, of which only part of the surface is shown in the sketch, is mounted in a horizontal position and is hollow, with suitable inlets and outlets for circulating a heating medium and is rotated at a selected constant speed. The liquid material to be dried is applied to the drum in the

usual manner by having the drum surface pass through a pool of the liquid which is maintained, for example, in a pan below the drum or, in the case of a double drum drier, in the "nip," that is, the space above the line in which the two drums are in contact or closely approach each other. The doctor blade B is set against the drum surface A at an adjustable angle and is pressed against it by springs, not shown. The screw conveyor G and assembly F with its axis parallel to that of A, is also provided in the conventional equipment to collect the dried material as it falls from the doctor blade and convey it to the side. It consists, of a worm rotating in an open, cylindrical trough. Rotatable shaft C, parallel to the axis of the drying drum bears flexible blade D, which is shown in three positions D, D′, and D″, and lip E which is an extension of one side of the trough of the conveyor assembly. The shaft C and drum A rotate in the same direction. The blade D and lip E extend for the full length of the drum surface A. C and E are positioned so that the D engages and sweeps over the part of the external surface of the doctor blade B on which the dried viscous material is collecting. Thus D is somewhat bent as it does so and thus exerts pressure against B and so as to remove the dried viscous material therefrom; as D continues to rotate, bearing the adhering material removed from the drum, it then engages the lip E as shown by D″ and is again somewhat bent, thus exerting a pressure against it so as to remove the viscous material, which then falls or flows into the trough and is carried off by the screw conveyor for storage or packaging. The rates of rotation of the drum, the wiper blade assembly, and the conveyor are preferably kept in fixed ratio by having the shafts for all three geared together or similarly correlated.

In a preferred embodiment of the invention, the drier consists of two drums, each 72 inches long and 32 inches in diameter, heated internally by steam at 50 pounds pressure and rotating at 20 r.p.m., with the material to be dried fed into the nip between them. Each drum is provided with a doctor knife and with a double-bladed wiper, shown in cross-section in Figure 2; this double-bladed wiper unit represents a preferred species. Each of these wiper assemblies extends for the full length of the drums. Each wiper assembly consists of a shaft (L) to which are fixed the vanes (M) to which the blades (N) are bolted. These blades are of polytetrafluoroethylene ⅛ inch thick and extend 2¾ inches from the center of the shaft when fully extended, that is, when not exerting their wiping action against the doctor blade or the lip of the screw conveyor as shown in Figure 1. The assembly rotates at 10 r.p.m. in the opposite direction to that of its drum. This equipment dried a 40% aqueous dispersion of a fluid polychloroprene, with a viscosity of 800,000 centipoises at 50° C. in dry state, at a rate of 500 to 600 pounds per hour.

The resilient blades used for wiping the viscous material from the doctor blade may be made, for example, of thin steel or thicker sheets of polytetrafluoroethylene or of a vulcanized elastomer of high modulus. The blades may be directly fixed in a hub or shaft or may be attached to the outer edges of vanes of stiffer material which are in turn attached to the shaft. Preferably, two or more blades are used on the same shaft.

The present invention is applicable to any type of drum dried, either single or double drum, with the material to be dried applied either to the upper or lower portion of the drum and with the doctor blade at any suitable location.

The invention may be applied to the removal and collection of any substance which is a viscous liquid in the isolated state and from which volatile matter has

been recovered. This invention has many applications in the fields of fluid polymers, foodstuffs, pigment pastes, inks, coating compositions, and the like.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that this invention is not limited to the specific embodiments thereof except as defined in the appended claim.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

A drum drier unit comprising a heated drum, a doctor knife, and a screw conveyor recovery assembly, respectively adapted for drying and recovering viscous materials, said recovery assembly comprising at least one resilient blade adjacently rotating in an axis parallel

to said drum, said blade sweeping said doctor knife to remove the viscous material collected thereon, a trough lip collecting said viscous material from said resilient blade when said resilient blade rotates and contacts said lip whereby the viscous material falls into the trough containing said screw conveyor.

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