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Lacher

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[54] **CENTRIFUGE AND ROTATING DISCHARGE MEANS THEREFOR**

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[51] **Int. Cl.** **B04b 7/04**

[58] **Field of Search** ..... 233/46, 47 R, 27, 28, 23 R, 233/24, 21, 1 R; 127/19; 210/379, 382

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[57] **ABSTRACT**

A centrifuge includes a centrifugal drum, a deflector plate for directing the centrifuged material from the drum, and a circumferential baffle plate assembly enveloping the deflector plate. The baffle plate assembly rotates in the same direction as the drum and absorbs the kinetic energy of the centrifugal material in such a way as to minimize damage to the material.

3 Claims, 2 Drawing Figures

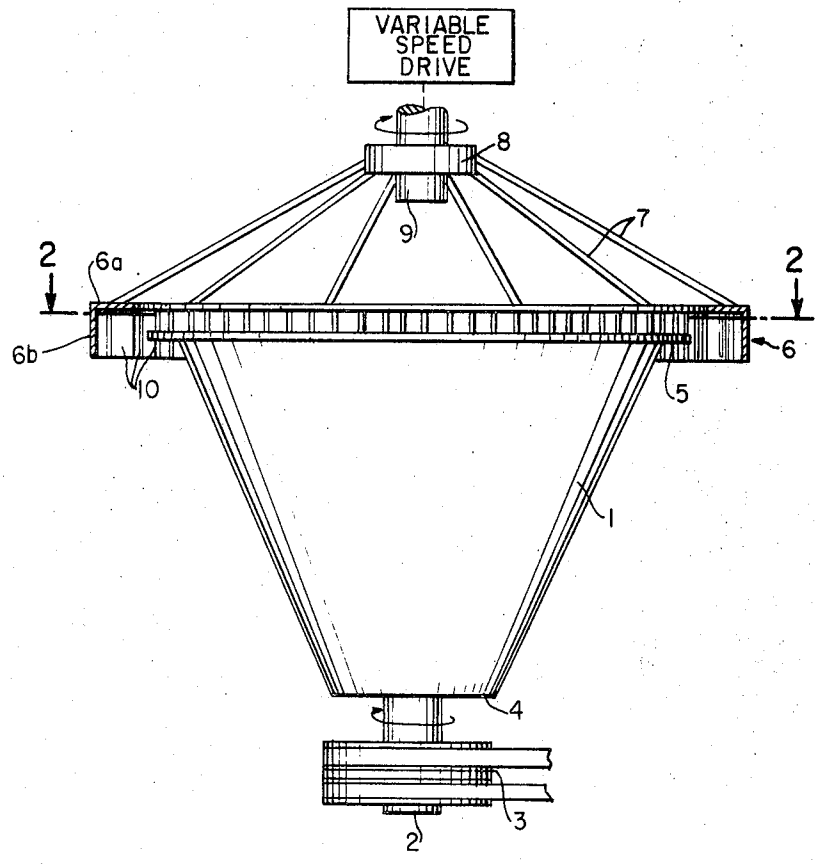


FIG. 1

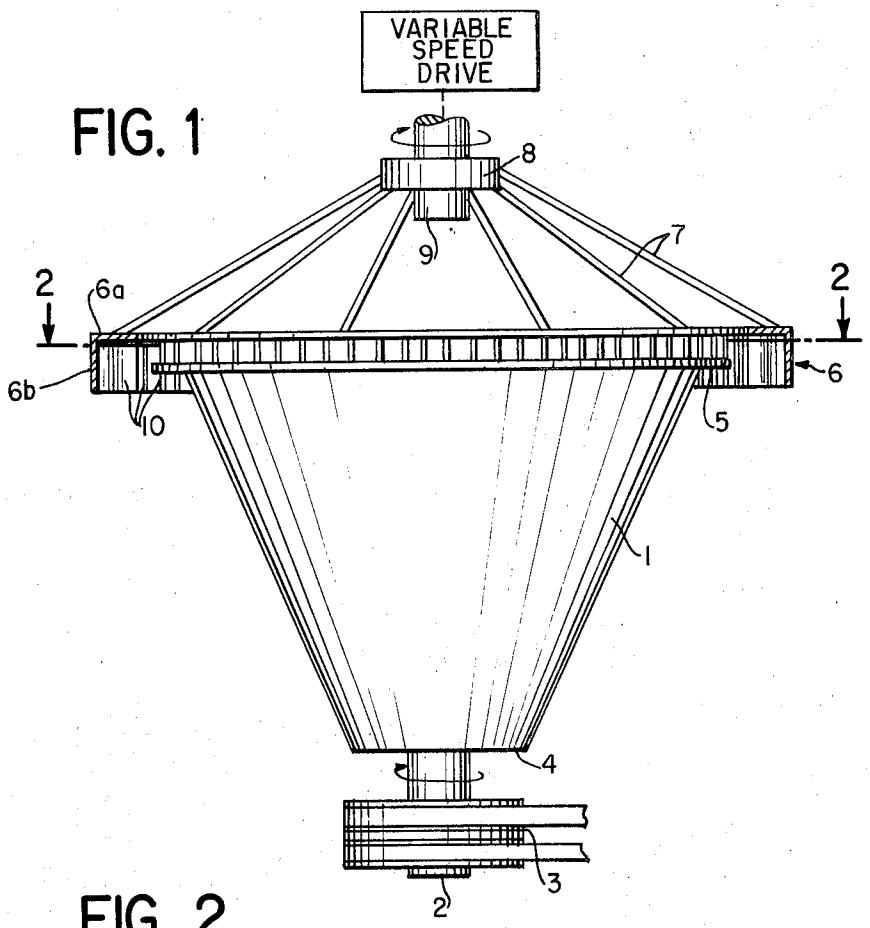
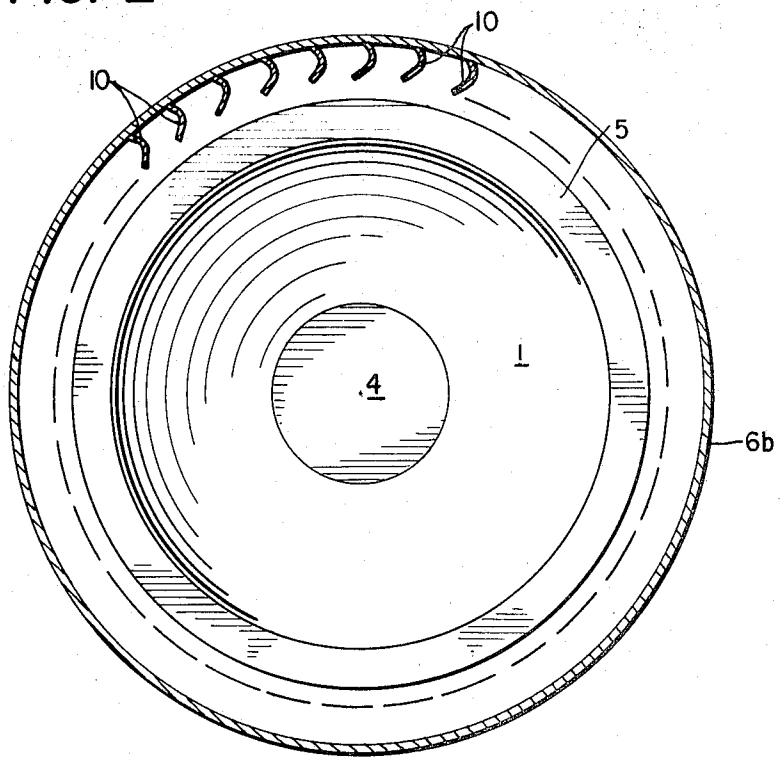


FIG. 2



CENTRIFUGE AND ROTATING DISCHARGE MEANS THEREFOR

This invention pertains to centrifuges.

In conventional centrifuges, the contents are spun off at great speed by a deflector plate, and, in some cases, the contents are likely to be damaged by impact against a surface, such as the inner wall of a housing. To avoid this, the deflector plate may be surrounded by a device capable of taking up, at least in part, the kinetic energy of the centrifuged material. One known arrangement includes a separate revolving plate, projecting past the edge of the deflector plate, so that the contents of the centrifuge strike against the slanted surface of the plate and are deflected downward.

However, even with this arrangement, only a samll portion of the kinetic energy is absorbed by the downward deviation, and the impact against the edge of the deflector plate still creates relatively severe stresses and the possibility of damage to the centrifuged material.

The present invention substantially overcomes this drawback and provides a centrifuge wherein the contents are exposed to virtually no impact energy and practically the entire kinetic energy of the contents is absorbed.

According to the invention, an annular assembly comprising a frame bearing spaced baffle plates circumferentially envelopes the deflector plate and rotates in the same direction as the drum. The annular assembly is secured to a shaft which may be driven independently of the centrifugal drum shaft. The energy transfer between the centrifuged material and baffle plates is analogous to that which exists in a turbine wherein the kinetic energy of a propellant is similarly absorbed by deflection from the turbine blades. The velocity of the rotating baffle plates may be adjusted to regulate the magnitude of the kinetic energy absorbed from the contents of the centrifuge as a function of the nature and composition of such contents.

The invention is explained in detail below with reference to the accompanying drawings, wherein:

FIG. 1 is a side view of a centrifuge, partially in section, according to a preferred embodiment of the invention, and

FIG. 2 is a cross-sectional view along the line 2—2 of FIG. 1.

The centrifuge consists of a centrifugal drum **1**, the wall of which may include conventional screens and openings (not shown) or other means to separate solid and liquid components. The bottom **4** of the drum **1** is secured to a shaft **2** to which is secured a V-belt pulley **3** at its free extremity so that a driving or braking force can be applied to the shaft **2** by a V-belt system (not illustrated). The centrifuge may be mounted with its axis in a vertical or horizontal plane.

A deflector plate **5** is supported at the open end of the centrifugal drum **1** which may be shaped as a truncated cone or funnel. At a radial distance from deflector plate **5**, an annular assembly **6** is mounted so that it projects above and below deflector plate **5**. As more particularly shown in FIG. **2**, assembly **6** may include an L-shaped annular frame **6A** to which curved baffle plates **10** are secured, for example, by welding. The baffle plates each have an axis of curvature which is parallel to the axis of the drum. The entire assembly **6** is secured to struts **7** (see FIG. **1**) which extend upwardly at an angle and are connected to a plate **8** fixed

to the bottom of a revolving shaft **9** adapted to rotate assembly **6** in the same direction as drum **1**. Shaft **9** is connected to a variable speed drive (not illustrated) so that its rate of rotation can be regulated to provide the smoothest possible discharge of the centrifuged material. The shaft **9** can be designed as a hollow shaft, or with a V-belt pulley, and can transfer energy to or from the device as described.

The baffle plates **10** extend toward the axis of drum **1** adjacent deflector plate **5** with each plate presenting an outer convex surface and an inner concave surface. The convex surface faces in the direction of rotation of drum **1** and assembly **6** while the concave surface faces in a direction opposite thereto to form kinetic energy absorbing means of expelled discharge from deflector plate **5**.

In operation, material to be processed is filled (from top or bottom) into the centrifugal drum **1**. Under the impact of centrifugal forces, the material moves upwardly along the walls of the drum and is thereby centrifuged. The rotational speed being high, for example in the order of 2,000 rpm, the particles of the centrifuged material exiting from the centrifugal drum are directed radially outwardly by the deflector plate **5**. After bridging the relatively short distance between the deflector plate and the assembly **6**, the individual crystals or granules move at a small angle virtually parallel to the inner surfaces of the baffle plates **10** and further along such surfaces, until such time as they have substantially surrendered their kinetic energy to the assembly **6**. Thereafter, they fall downward beyond the baffle plates and are collected in a hopper (not shown) for further processing and/or packing.

Inasmuch as the assembly **6** and shaft **9** can be driven by a variable speed drive, it is possible, depending upon specific operating conditions, to select the relative angular velocity of the assembly **6** in relation to the drum **1**, even while in operation, so as to achieve optimum operating conditions to provide the smoothest possible discharge of the contents.

The major advantage of the invention lies in its technical simplicity, ease of maintenance and a mode of operation designed to substantially avoid the destruction of the centrifuge contents exiting from the drum. The principles of the invention may be employed with other types of drums (e.g. cylindrical) and with continuously or intermittently operated centrifuges. If desired, distributing means (such as stationary guide vanes) may be mounted between the drum **1** and wheel **6**.

The invention may be used in many different processes. For example, the centrifuge according to the invention would have utility in a sugar refining process where it is desired to separate the sugar crystals out of massecuite. The invention would permit high-speed centrifuging without damage to the crystals.

What is claimed is:

1. A centrifuge for use in centrifuging particulate matter including a centrifugal drum, a deflector plate for causing at least a portion of the contents of the drum to be expelled outwardly from the drum, a circumferential spaced baffle plate assembly surrounding said plate for absorbing the kinetic energy of the material expelled from the drum, said baffle plate assembly including a supporting annular frame and a multiplicity of similarly curved, spaced-apart baffle plates secured to an inner surface of said annular frame, said baffle

plates extending toward the axis of rotation of said drum adjacent said deflector plate and each having an outer convex surface facing the direction of rotation of said drum and an inner concave surface facing opposite the direction of rotation of said drum, said inner concave surface forming kinetic energy absorbing means of material expelled from said deflector plate, means for rotating said drum and means for rotating said assembly in the same direction as said drum rotates.

2. A centrifuge according to claim 1, wherein the axes of curvature of said baffle plates are substantially parallel to the axis of rotation of said drum.

3. A centrifuge according to claim 2, wherein said means for rotating said assembly includes a variable speed drive.

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