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[54] TUMBLING APPARATUS 9 Claims, 8 Drawing Figs.

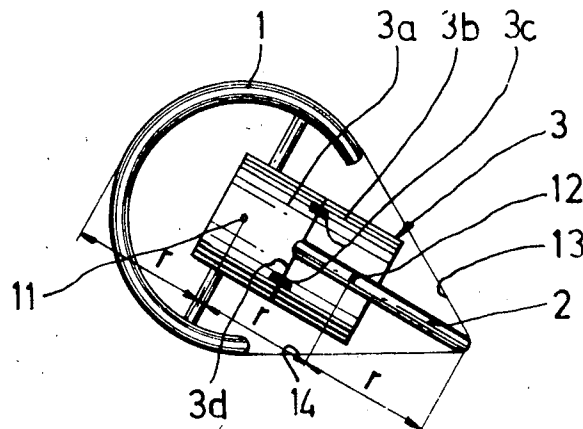
[52] U.S. Cl. 259/72
 [51] Int. Cl. B01f 9/00
 [50] Field of Search 259/48, 56,
 72, 73, 74, 75; 206/78 B; 229/8

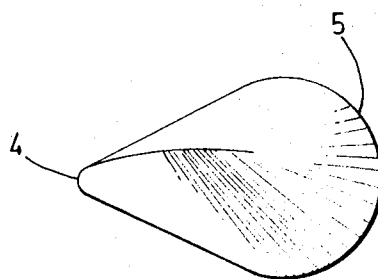
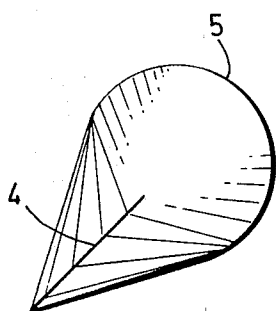
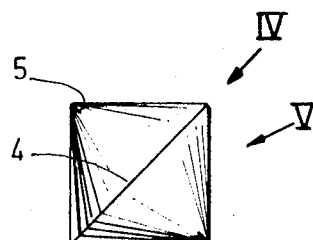
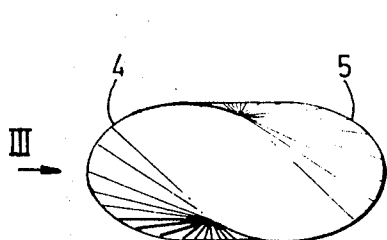
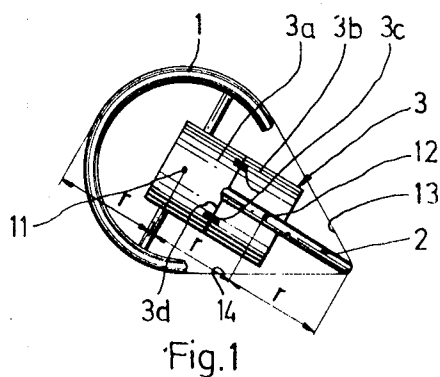
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ABSTRACT: Tumbling apparatus comprising a pair of convex rockers which define surfaces about which the apparatus may be rolled to provide a tumbling motion. Preferably, the rockers have the same radius of circular curvature, their centers of curvature being spaced by a distance equal to this radius. Preferably, each rocker lies in a plane such that the two planes, so defined, are orthogonal. A cover enclosing the rockers may be employed as a vessel in which the material is tumbled.





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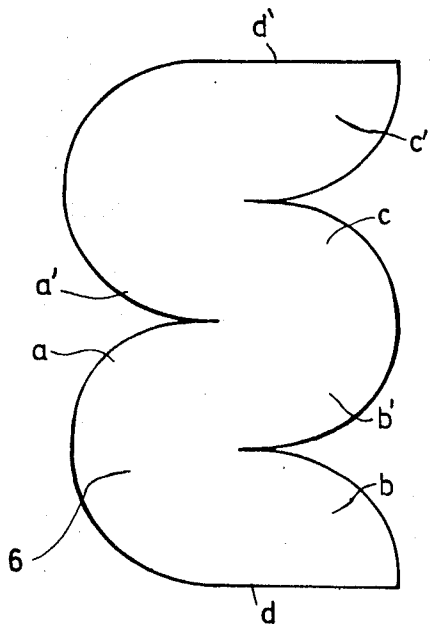


Fig. 6

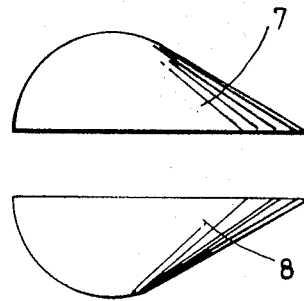


Fig. 7

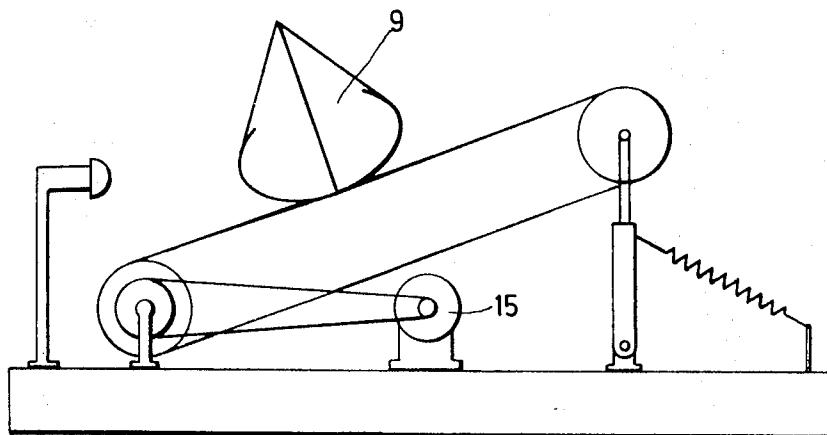


Fig. 8

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TUMBLING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to tumbling apparatus for tumbling fluids or granular material. Tumbling apparatus, for this purpose, is disclosed in U.S. Pat. No. 2,302,804.

SUMMARY OF THE INVENTION

This invention relates to tumbling apparatus for tumbling fluids or granular materials and, more particularly, to a simplified and less expensive tumbling apparatus.

In accordance with the invention, tumbling apparatus, for tumbling fluids or granular materials, comprises a pair of convex rockers, each defining a plane, and preferably having the same radius of curvature. The centers of curvature of the rockers are spaced by a distance equal to the radius of curvature, and the planes of the two rockers are orthogonal. The tumbling vessel is formed by a cover for the rockers.

An object of the invention is to provide tumbling apparatus which, by comparison with previously known tumbling apparatus, is significantly simpler to manufacture.

Another object of the invention is to provide tumbling apparatus characterized by a significant economy in manufacturing cost.

A further object of the invention is to provide tumbling apparatus which may be employed for functions for which procurement of known tumbling apparatus has been too expensive.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and further features of the invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 illustrates one embodiment of a tumbling apparatus;

FIGS. 2 to 5 illustrate a second embodiment, of which

FIG. 2 illustrates a sideview,

FIG. 3 illustrates the front view taken the direction of the arrow III of FIG. 2,

FIG. 4 illustrates a perspective view taken in direction of the arrows IV of FIG. 3, and

FIG. 5 illustrates another view taken in direction of the arrow V of FIG. 3;

FIG. 6 illustrates the development of the surface of the body illustrated in FIGS. 2 to 5;

FIG. 7 illustrates a cover body for the tumbling apparatus illustrated in FIG. 1; and

FIG. 8 illustrates an arrangement for mechanical tumbling.

DETAILED DESCRIPTION OF THE DRAWINGS

The apparatus illustrated in FIG. 1, for tumbling materials, comprises two convex rockers 1 and 2, which in this embodiment are arcuate members each having the same radius of circular curvature r . Each rocker 1, 2 has a center of curvature 11, 12 respectively. The centers of curvature 11, 12 of each of the rockers are spaced by a distance equal to the radius of curvature r . A plane, in which the one rocker lies, is perpendicular to another plane, in which the rocker lies. Both rockers are rigidly connected to a container 3, which is adapted to be opened. For example, the container 3 may be constructed so that it has two halves 3a and 3b which are held together by fasteners 3c. One half is connected with the rocker 1, and the other with the rocker 2. The connecting means employed may be either fixed to or detachable from the respective half.

Functionally, the apparatus is employed to mix or shake fluids or granular material, by tumbling. In order to do this, the material is inserted into the container 3 which, after hav-

ing been closed, is turned or rolled away on the floor. While the apparatus is being rolled, the two rockers 1 and 2 lie on the floor in a manner such that each has a point contact with the floor, these being the sole points of contact between the apparatus and the floor. The container makes a tumbling movement, which is similar to the tumbling movement effected by the tumbling apparatus disclosed in U.S. Pat. No. 2,302,804.

In the embodiment shown in FIG. 1, the two rockers 1 and 2 may be connected along the two lines 13 and 14 by a cover body, comprising a curved but developable surface, to which the lines 13 and 14 are tangents. FIGS. 2 to 5 show such a body, in which the edges, which form the two rockers, each have a circular arcuate curvature and extend over an arc of 240° . Such a cover body may, for example, be manufactured from a planar strip of tin (FIG. 6). By taking the strip of tin 6 and arching the strip so that the edges a and a' , b and b' , as well as c and c' , and finally d and d' about one another, the body is formed. FIG. 6 also shows the area on the floor, on which the body lies on rolling from d' to d .

FIG. 7 illustrates a cover body formed from two parts 7 and 8 each detachably connected to the other. The two parts, when joined together, define a hollow space which receives the substance to be tumbled. Alternatively, the body may be manufactured as a unitary article which is provided with a filling opening.

So far, manually motivated tumbling has been described. If, however, it is desired to mechanize the tumbling, this can be effected by employing the arrangement illustrated in FIG. 8. As can be seen, a tumbling apparatus according to the present invention, designated 9, is placed on an endless belt 10. The endless belt may then be driven by a motor 15 at a speed such that the tumbling apparatus 9 appears to remain at the same position and to tumble in situ.

I claim:

1. A tumbling apparatus, comprising two convex rocker means each rigidly connected with each other and lying in different planes, said rocker means facing convexly in opposite directions said rocker means together defining between each other a locus of unobstructed straight lines, said rocker means defining respective foci of curvature, said foci being offset, said planes in which said two rocker means lie being angularly oriented to one another.

2. Tumbling apparatus as defined in claim 1, wherein said planes, in which the two rocker means lie, are perpendicular to one another.

3. Tumbling apparatus as defined in claim 1, wherein the two convex rocker means are formed with the same radius of curvature.

4. Tumbling apparatus as defined in claim 3, wherein the centers of curvature of the rocker means are located in fixed spaced relation at a distance equal to said radius of curvature.

5. Tumbling apparatus as defined in claim 9, wherein a pair of edges of the cover body form the rocker means.

6. Tumbling apparatus as defined in claim 1, comprising a cover body connecting the rocker means to one another, said cover body being developed from a planar strip of material having contoured peripheral edges.

7. Tumbling apparatus as defined in claim 1, comprising a cover body connecting the rocker means to one another and formed of at least two parts disengageably connectable with each other to form said cover body, said parts conjointly defining a hollow vessel for receiving material to be tumbled.

8. An apparatus as in claim 1, wherein said rocker means are spaced from each other.

9. An apparatus as in claim 1, wherein the lines are skew relative to each other.