

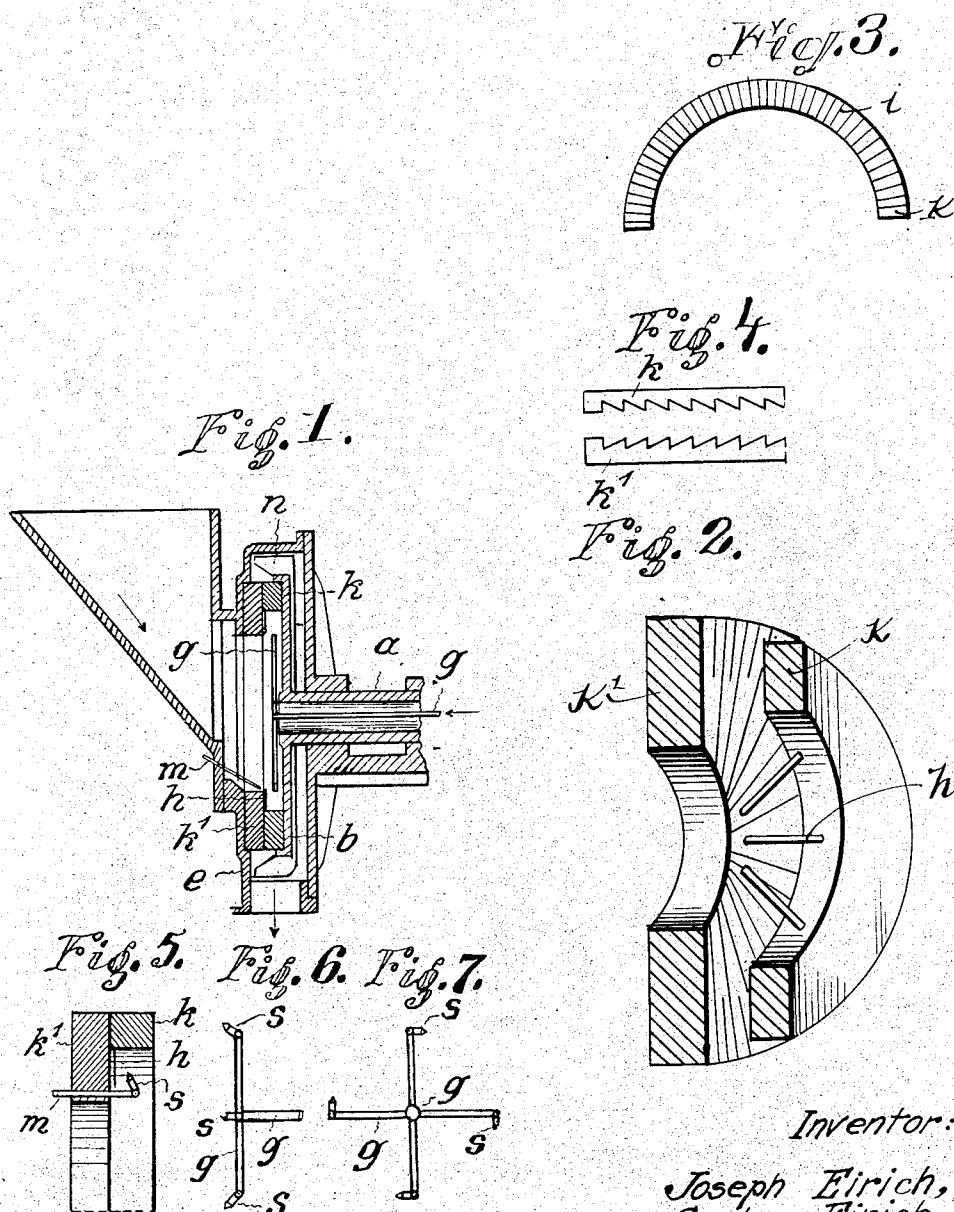
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DISK MILL

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DISK MILL

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1 Claim. (Cl. 83—8)

This invention relates to a process for the production of a homogeneous, fine-fibred or finely powdered material from fibrous or crustaceous substances in the presence of moisture or a liquid and an apparatus for carrying out the process. Substances, which can be homogenised or comminuted according to the process of this invention are, first of all fibrous substances of vegetable and mineral origin, as well as liquids containing the same.

According to the process of this invention the initial material is subjected in a disk mill to the cleaving action of two counter-operating disks, which are provided with radial or approximately radial cutting ribs, which are so arranged that they are always parallel to one another and accordingly do not exert a tearing, but only a resolving, action.

Examples of substances which may be treated by the process of this invention are vegetable fibres, such as tobacco stalks, cellulose or solutions or liquids containing the same, cotton or cotton linters, textile residues, felt, leather, artificial silk, asbestos and mineral wool, slag wool or glass wool.

Liquid of any kind, steam, air or the like, shall be introduced into the working zone of the mill under pressure, depending on the nature of the material under treatment and its behaviour during treatment, on its propensity to form dust or crust-forming substances, which may give rise to smearing or choking. The nature and quantity of the liquid, water, oil, etc., or vapours, depend on the nature of the material and the liquid adhering thereto. The function of the agents introduced is to cool the grinding discs with their cutting ribs, to keep the latter open and thereby to maintain the width of the gaps between the teeth unchanged during the passage of material therethrough. The formation of dust or small fragments which otherwise occurs is thereby prevented, since the gaps between the cutting ribs are now no longer filled with portions of the material being ground or deposits therefrom. Fibres comminuted to the desired extent are directly removed from the working zone and cannot be further comminuted.

The grinding disks are mounted so that one of them is stationary with the supporting structure, the other being rotatably mounted on the supporting structure. The essential condition is that a narrow gap should exist between the cutting ribs. The distribution of the ribs may be the same or different on both disks. The cutting ribs themselves may be rectilinear and radial or may

be disposed not quite radial, but slightly inclined, in which event the angle of inclination on both disks must be the same, so that no tearing action can take place, as will be seen, in Fig. 2a of the accompanying drawing. The not quite radial disposition of the cutting ribs in both disks slightly slows down the speed of the passage of the material under treatment, which is an advantage for certain substances.

The teeth of the cutting ribs may be serrated in transverse cross section, and each rib may be in the form of an isosceles or non-isosceles triangle. The grinding disks are with advantage provided with inclined surfaces so as to form an entry slot. The teeth may be distributed uniformly or non-uniformly on both disks. The cutting ribs on both disks must be disposed parallel to one another and must not cross so as to exclude a tearing action.

The liquid, vapour or air to be introduced, the pressure of which can be adjusted, is passed into the working surface through a tube system. In the example shown a liquid reservoir is formed by a widening of the grinding surfaces of the stationary disk inwardly, from which reservoir additional liquid is pressed into the working zone by the action of centrifugal force, the pressure of which is exerted in the direction of travel of the material under treatment. Individual arms, which effect pre-comminution of the material on sweeping over the exposed toothed portion of the stationary disk, are provided on the narrower rotating grinding disk. The material discharging at the periphery of the disks can be flung out of the casing by means of projecting blades.

A few embodiments of apparatus according to this invention are illustrated in the accompanying drawing, in which:

Fig. 1 is a vertical longitudinal section through one form of apparatus according to the invention,

Fig. 2 is a partial section showing the rings in detail,

Fig. 3 is a half ring of the working zone with radially directed ribs according to Fig. 2,

Fig. 4 shows a modification of the teeth of two disks,

Figs. 5 to 7 illustrate tube systems for the liquid feed.

Fig. 1 illustrates an apparatus with grinding rings k and k_1 of equal external diameter, but unequal width. The wide ring k_1 on the casing e is stationary and the narrow ring k on the disk b is rotatable. These working rings are provided with cutting ribs i as shown in Fig. 3, which for example proceed radially or nearly radially and

have a serrated cross-section (Figs. 3 and 4). On rotation these ribs must be parallel to one another. Furthermore the teeth of the rotating ring must align not with the vertical, but with the inclined, surfaces of the serrations of the stationary ring surface, so that long fibres or threads are formed. As shown in detail by Fig. 2, arms *h* are provided on the ring *k*, which sweep over the exposed toothed portion of the wide ring *k*, in order to effect pre-comminution.

The liquid or the like is conveyed to the working zone through the hollow shaft *a* or the tube *g* with branches mounted therein. A plurality of tubes *m*, which are disposed at an inclination or vertically to the rotatable grinding surface *k* serve to feed the liquid to the stationary working surface. The discharge ends of the tube carry inclined or movable nozzles *s* (Figs. 6 and 7), so that the injected liquid is fed as vertically as possible onto the working surface for the purpose of effecting a better cleansing action. The same applies to the arms of the tube system *g* (Fig. 1).

The finished product discharging between the grinding elements *c*, *c*, or *k* and *k*₁ is flung out by projecting blades *n*. In the event of any hard bodies passing through, the zone slot widens.

In the figures the apparatus according to the invention is shown with a horizontal shaft. It may be mentioned, that it is also possible to provide a vertical or inclined shaft.

We claim:

An apparatus for the production of fine comminuted fibrous masses from vegetable or mineral substances containing fibrous materials, comprising a support; a fixed annular disk non-rotatably mounted on said support, said disk having at least one opening of substantial size extending through the face thereof adjacent its axis, means for feeding the substances to the working face of said disk

through said opening, said working face having an inner surface and an outer surface, the outer surface being immediately inward of the periphery of said disk, said surfaces having a plurality of generally radial ribs of substantially triangular cross section and rectangular longitudinal section spaced therearound, a rotatable annular disk rotatably mounted on said support coaxially with the fixed disk, means for rotating said rotatable disk, said rotatable disk having a working face opposed to that on the fixed disk, and having an outer surface on said working face immediately opposite the outer surface of the fixed disk, and having a plurality of generally radial ribs similar to and parallel, respectively, with those on the fixed disk, the disks being mounted, with respect to one another, to provide a relatively narrow operating zone between the cutting edges of the opposed ribs, the cutting edges on the respective outer surfaces being substantially parallel with one another, the radial extent of at least one of the outer surfaces being relatively small, a plurality of blade-like members mounted on said rotatable disk inwardly of said outer surface, said blade-like members being coplanar and radial comprising a plurality of substantially radially extending arms mounted on the inner edge portion of said working face of the rotatable disk, the edges of said members operatively opposed to the inner surface of the fixed disk being spaced substantially from said inner surface of the fixed disk, said members being substantially spaced circumferentially from one another, and a plurality of fan-like blades mounted on the periphery of said rotatable disk and extending outwardly of the periphery of the fixed disk.

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