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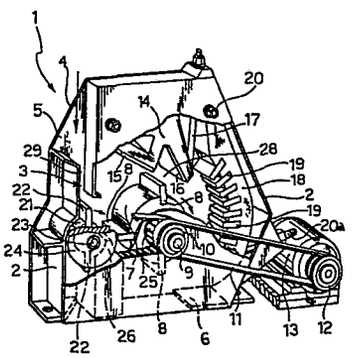
(54) Horizontal axis hammer mill.

(57) A horizontal axis hammer mill is described in which, the crushing chamber (3) has, in addition to the main rotor (7) provided with crushing hammers (8), a second rotor (21) having the specific function of throwing the material supplied to the mill at a predetermined velocity between any two successive hammers (8) of the main rotor (7).

The hammer mill of the invention is thus able to provide a considerably improved output compared with hammer mills of the prior art.



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Horizontal Axis Hammer Mill

The present invention relates to a horizontal axis hammer mill comprising, in a crushing chamber provided with a feed aperture for the inert material to be crushed and a discharge aperture for the crushed material, a main rotor having a horizontal axis, provided with a plurality of hammers projecting radially therefrom, at least one support with collision plates the position of which is adjustable relative to the said main rotor and a motor for driving the said rotor.

It is known that, as in all fields of the art, even in the field of comminution machines for inert materials, and in particular hammer mills of the said type, constant research has been in progress for a long time to increase productivity. It is also known that almost all the suggestions and technical proposals advanced for achieving the said object have remained at the level of simple suggestions. One of the most well beaten paths for increasing the capacity of hammer mills and grinding machines in general is that of achieving the possibility of increasing the feed (quantity and speed) of the inert material to be crushed in the machine, a possibility which necessarily implies an appropriate increase in the speed of rotation of the hammers. One of the major obstacles encountered on this path has been the fact that on increasing the speed of the hammer carrying rotor, there has been an increase in the rejection of inert material supplied to the crushing chamber.

The problem which is at the root of this invention is that of overcoming this obstacle and achieving super-charging, possibly controlled, of a hammer mill when desired.

The idea for solving the said technical problem is essentially that of throwing the material to be crushed into the crushing chamber at a velocity and along a trajectory which is strictly correlated with the actual speed of rotation of the hammer carrying rotor, so that

the material is always reliably taken by the subsequent hammers, independently of the value of the speed of rotation thereof.

On the basis of this idea and in accordance with the present invention, there is provided a hammer mill of the type considered above, which is characterised in that it comprises, in the said crushing chamber and in correspondence with the feed aperture, a member for throwing-conveying the material to be crushed towards the said main hammer carrying rotor.

In accordance with a preferred embodiment of the invention, the said throwing-conveying member comprises a second rotor, supported with its axis of rotation horizontal and parallel to the axis of the said hammer carrying rotor, at least two hammers projecting radially from the said second rotor in positions diametrally opposite thereon, the said second rotor being keyed onto a shaft rotated by the said gear unit at a speed corresponding to the predetermined speed of rotation of the said main hammer carrying rotor.

Further characteristics and advantages of the invention will become clearer from the description of one embodiment of a hammer mill according to the invention, made with reference to the single Figure of the appended drawings in which the said mill is schematically shown in axonometric view.

With reference to the said Figure, a horizontal axis hammer mill according to the invention is generally indicated 1 and conventionally comprises a support structure 2, defining within it a crushing chamber 3. In this crushing chamber 3, which is provided at one side with an aperture 4 and respective duct 5 for the introduction of inert material to be crushed, and a discharge aperture 6 for the crushed material, a main rotor 7 is rotatably supported in a conventional manner with its axis horizontal and is provided with four hammers 8, projecting radially from

the said rotor at 90° from each other. More particularly the said rotor 7 is keyed onto a shaft 9 on which is also keyed a pulley 10, kinematically connected, for example through a belt 11, to a drive pulley 12 rotated by a motor 13.

In the crushing chamber 3, and again conventionally, a support 14 is pivoted to the upper part of the support structure 2 and carries for example two collision plates 15, 16. The position of this support 14 and the plates 15, 16 relative to the hammers 8 can be adjusted by means of a tie rod 17 actuated from outside the said support structure by conventional means not shown.

A second support 18 for a plurality of collision plates 19 and shaped substantially as a segment of a cylinder, partially surrounds the rotor 7, extending to the vicinity of the discharge aperture 6. This support 18 is pivoted at 20 on the support structure 2 with its pivot axis parallel to that of the support 14 mentioned above. The position of the said support 18 and plates 19 relative to the hammers 8 is also adjustable from outside the support structure 2, for example by operating a tie rod 20a.

It should be noted that the collision plates 19 are formed essentially like the hammers 8 and that the distance between the collision plates 19 and the hammers 8 defines the grain size of the crushed material discharged from the mill 1.

Within the crushing chamber 3, the support structure 2 rotatably supports a second rotor 21 with its axis horizontal below the feed duct 5. This rotor 21 is provided, in diametrally opposed positions, with two hammers 22 projecting radially therefrom. More particularly, the rotor 12 is keyed onto a shaft 23 rotatably supported by the support structure 2 at the same height as that of the shaft 9 on which the main rotor 7 is keyed. A pulley 24 is keyed on the shaft 23 and connected kinematically with a corresponding pulley 25 keyed on the shaft 9, for example through a belt 27.

The diameters of the pulleys 24, 25 are predetermined such that the shaft 23 rotates at a predetermined speed correlated with the speed of rotation of the shaft 9.

By 26 is schematically shown a wall which divides the crushing chamber 3 into two adjacent chambers: a crushing chamber 28 proper which is in direct communication with the discharge aperture 6, and a chamber 29 which communicates directly with the aperture 4 and its inlet duct 5 and in which is rotatably supported the said second rotor 21. The upper edge of the wall 26 is substantially at the same level as the axes of rotation of the shafts 9 and 23.

The inert material to be crushed which reaches the rotor 21 at a velocity which is substantially the velocity at which it falls through the inlet duct 5 is deflected and thrown by the said rotor 21, generally at a higher velocity, into the crushing chamber 28 proper, towards the crushing rotor 7.

The predetermined correlation imposed between the speed of rotation of the rotors 7 and 21 is such that the material to be crushed is thrown by the rotor 21 at a velocity and along a trajectory such that it is always reliably made to reach the rotor 7 between two successive hammers thereof, independently of the actual value of the velocity of the said rotor. The technical problem of rejection of the inert material to be crushed by the hammer carrying rotor 7 is thus overcome. Indeed, when the velocity of the latter is increased in order to increase the productivity of the mill, the velocity of the rotor 21, and hence that of the thrown material, also increases correspondingly.

In the sense specified above, the rotor 21 thus constitutes a member for throwing-conveying the material to be crushed towards the crushing rotor and is able to achieve a desired supercharging of the mill 1 when required.

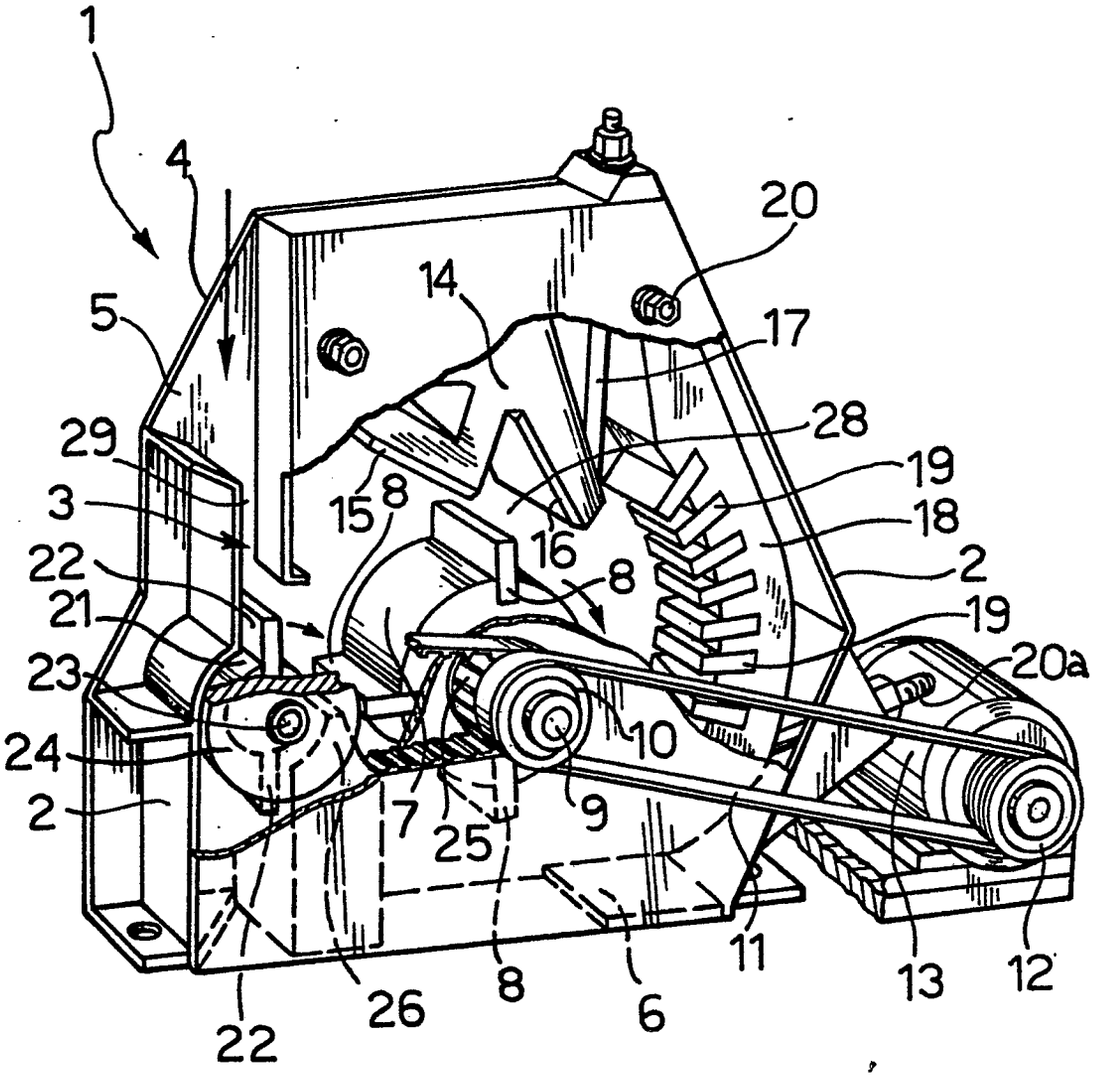
CLAIMS

1. Horizontal axis hammer mill comprising a crushing chamber (3) provided with a feed aperture (4) for the inert material to be crushed and a discharge aperture (6) for the crushed material, and housing a horizontal axis main rotor (7) provided with a plurality of hammers (8) projecting radially therefrom, at least one support (14, 18) with collision plates (15, 16, 19) the position of which can be adjusted relative to the said rotor (7) and a motor (13) for driving the said rotor,

characterised in that

the mill further includes in the said crushing chamber (3), and in correspondence with the said feed aperture (4), a member (2) for throwing-conveying the material to be crushed towards the said main hammer carrying rotor (7).

2. Hammer mill according to Claim 1, characterised in that the said thrower-conveyor member comprises a second rotor (21) supported with its axis of rotation horizontal and parallel to the axis of the said main hammer carrying rotor (7), and at least two hammers (22) projecting radially from the said second rotor (21) in diametrally opposite positions thereon, the said second rotor (21) being keyed to a shaft (23) which is driven at a speed correlated with the predetermined speed of rotation of the said main hammer carrying rotor (7).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