Dec. 24, 1940. E. B. SYMONS 2,226,330

IMPACT CRUSHER

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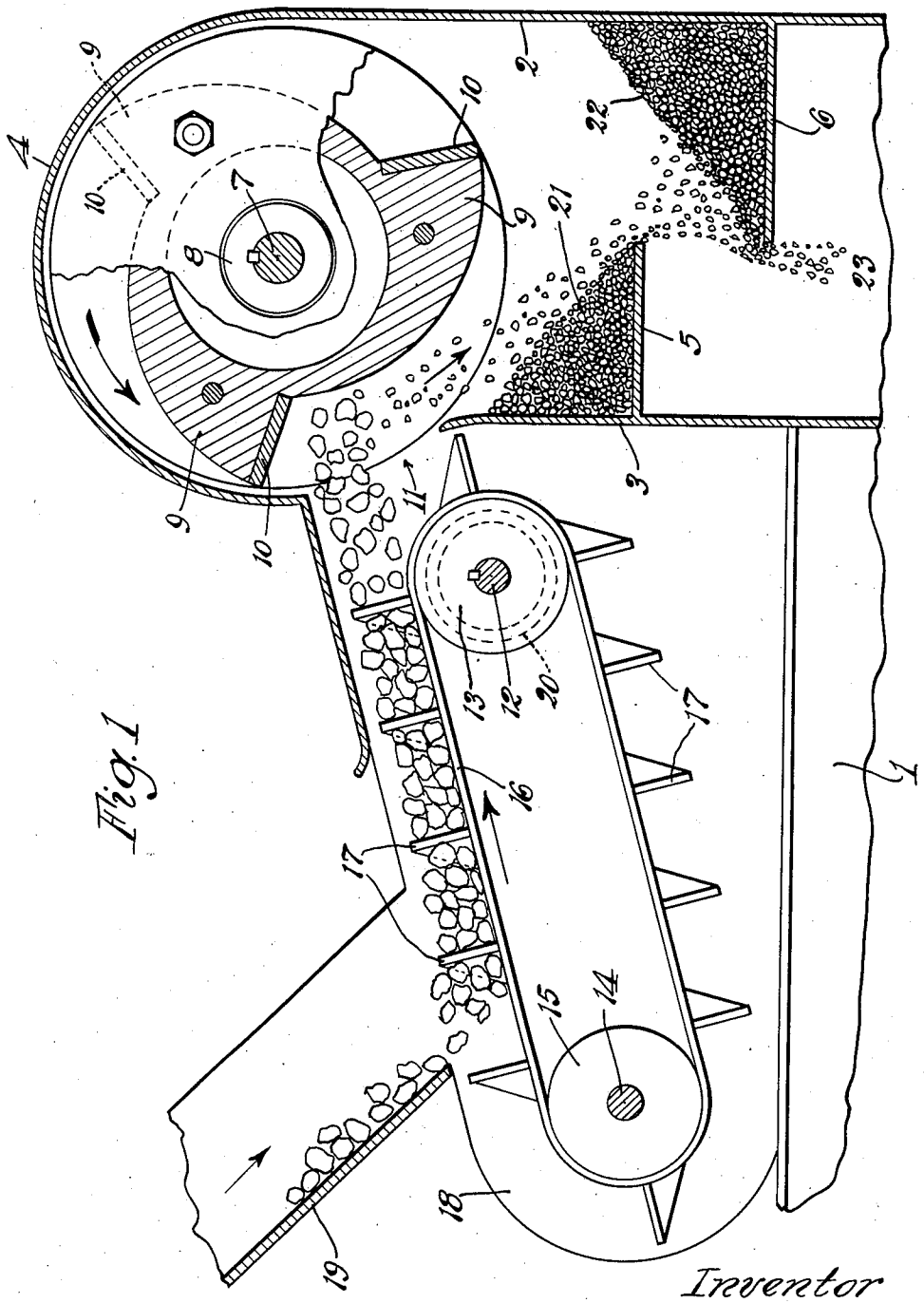

Fig. 1

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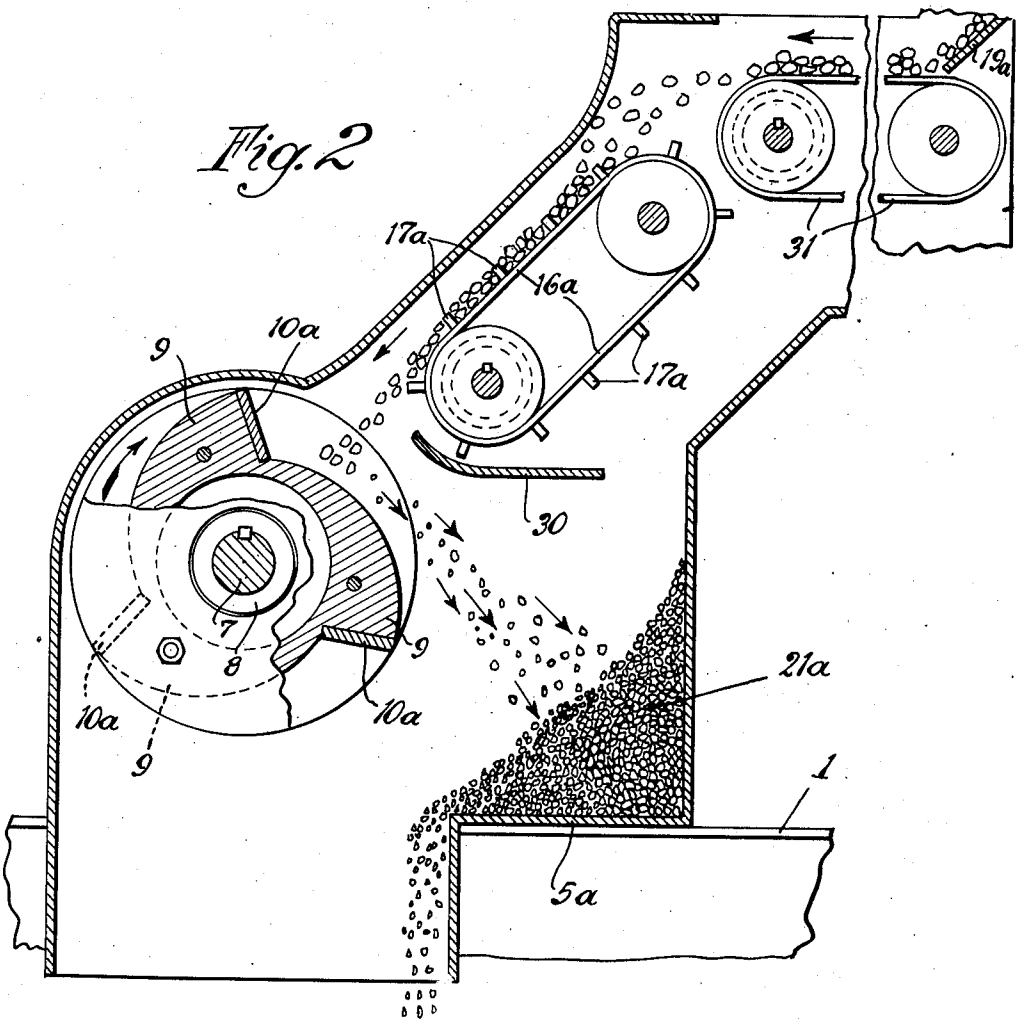
Fig. 2



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UNITED STATES PATENT OFFICE

2,226,330

IMPACT CRUSHER

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Application October 14, 1938, Serial No. 234,944

1 Claim. (Cl. 83—46)

My invention relates to an improvement in impact crushers and has for one purpose the provision of means for projecting or delivering material to be crushed into the path of movement of the impact members of a rotor.

Another purpose is the provision of conveying means whereby the speed of delivery of the particles into the crushing zone may be accurately controlled.

Another purpose is the provision of improved crushing means wherein particles crushed by the impact of a rotor are centrifugally directed for glancing blows against a pile of already crushed or partially crushed material.

Other purposes will appear from time to time in the course of the specification and claim.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a vertical section taken transversely of the axis of rotation of a rotor; and

Figure 2 is a similar view through a variant form of the device.

Like parts are indicated by like characters throughout the specification and drawings.

Referring first to Fig. 1, 1 generally indicates any suitable foundation upon which is mounted a housing which includes walls 2, 3, a top member 4, and material supporting shelves 5, 6 extending in staggered relation from the walls 2 and 3. 7 generally indicates the shaft of a rotor member having a hub 8 with outwardly extending vanes 9 upon which any suitable impact members or plates 10 may be mounted. Any suitable means may be employed for imparting the desired speed of rotation to the shaft 7, the details of which form no part of the present invention and are not indicated herein. The housing is apertured as at 11 to permit an entry port through which the particles to be crushed may be directed.

In order to direct the said particles to the crushing zone, I employ a high speed conveyor. I illustrate, for example, a drive shaft 12 in which is any suitable pulley or drum 13. 14 is an idler shaft carrying a pulley 15. 16 is a flexible belt structure passing about the pulleys 13 and 15 and provided with any suitable flights or conveying members 17. 18 is any suitable surrounding housing. 19 is a down spout adapted to deliver material to one end of the belt 16. 20 is any suitable drive pulley or the like which may be connected to any suitable source of power whereby the conveyor 16 is driven at high speed and the particles fed down the chute 19 are thrown through the aperture 11 into the path of movement of the impact plates 10.

As will be clear from the figure, the particles are centrifugally directed downwardly against a mass of material 21 gathering upon the shelf 5. The parts are so proportioned and located that the centrifugally delivered particles strike the mass 21 at an angle providing a glancing blow. There is an additional impact or reducing effect of particle against particle and while the shelf 5 maintains a constant mass of material as at 21, the excess material is constantly flowing over the outer lip of the shelf 5 and is delivered upon another mass of material 22 upon the shelf 6, and thence passes downwardly through any suitable spout or delivery zone 23. Some of the particles may miss the pile 21 altogether and strike the pile 22, but in either event there is an impacting or reducing effect resulting from the centrifugal direction of the crushed particles against the mass of particles at rest.

I find in practice that a rotation of the pulley 13 at the rate of 1500 R. P. M. causes a sufficient acceleration of the particles to get them well into the path of movement of the crushing plates or impact members 10, whereby a highly efficient crushing takes place.

Referring to Figure 2, I illustrate a variant form of the device in which the conveyor 16a is downwardly inclined, whereas it is shown as practically horizontal or even slightly upwardly inclined in Figure 1. It may be practical to deliver the material directly to the upper end of the conveyor 16a but under some circumstances it is desirable to have an additional feeding conveyor 31, which receives the material from the down spout 19a and delivers it at relatively high speed to the upper end of the conveyor 16a, the flights 17a of which then fling the material into the path of movement of the plates 10a. If desired, the end of the conveyor 16a may be protected by a shield 30.

In the form of Figure 2, I illustrate but a single shelf 5a which holds the mass of material 21a.

It will be realized that whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative and diagrammatic, rather than as limiting me to my precise showing.

The use and operation of my invention are as follows:

I provide a rotor including the impact members 10, rotated at high speed by any suitable means not herein shown. I employ a belt 16, with flights

17, to project the particles to be crushed into the path of movement of the members 10. The high speed conveyor may be driven at speeds as high as 1500 R. P. M., with reference for example to the shaft 12 and the pulley 13 carried thereby. The result is a very rapid feeding of the material and a delivery of particles in free flight into the path of movement of the impact members 10.

While a wide variety of relative speeds and dimensions may be employed, it will be understood that the members 10 are so spaced about the rotor in relation to the speed of movement of the belt and the speed of movement of the rotor as to give the particles flung into the path of the impact members 10 by the belt enough time to get completely into the path of the impact members. The result is a full face crushing impact which drives the broken particles centrifugally in the direction of the arrow of Figure 1. This is in contrast to a glancing impact or an impact concentrated at the outer edge of the members 10, which would result if the members 10 were too closely spaced, or if the relative speeds of conveyor and impact member were not such as to permit the particles to get fully within the path of the impact members 10 before being struck.

In other words, the linear speed of the conveyor or of the particles delivered from the conveyor must be sufficiently high in relation to the spacing of the members 10 and the speed of rotation of the rotor to permit successive areas or increments of the material to be crushed to penetrate fully into the path of movement of the members 10 for a full face crushing impact. It is as if a stream of material were being projected generally toward the axis of rotation of the impact member, the lengths of this stream being successfully clipped off and smashed out of the way by the movement of the members 10 in the course of the rotation of the rotor.

I claim:

In an impact crusher and feeding means therefor, a rotor and means for rotating it about a generally horizontal axis, said rotor including a hub and a plurality of impact members outwardly extending therefrom, and feeding means for said rotor including a belt and a plurality of pulleys about which said belt passes, said pulleys being mounted for rotation about horizontal axes, one of said pulleys being located adjacent the periphery of movement of the impact members of said rotor, and means for simultaneously driving said rotor and said belt at speeds adapted for projection of material from said belt directly into the path of movement of said impact members whereby such particles are positioned to receive a full face crushing impact, the impact member spacing being correlated with the speed of the feed conveyor.

EDGAR B. SYMONS.