June 21, 1932. J. WASS 1,864,385

GRINDING, CRUSHING, AND MIXING MILL

Filed March 21, 1930 3 Sheets-Sheet 1

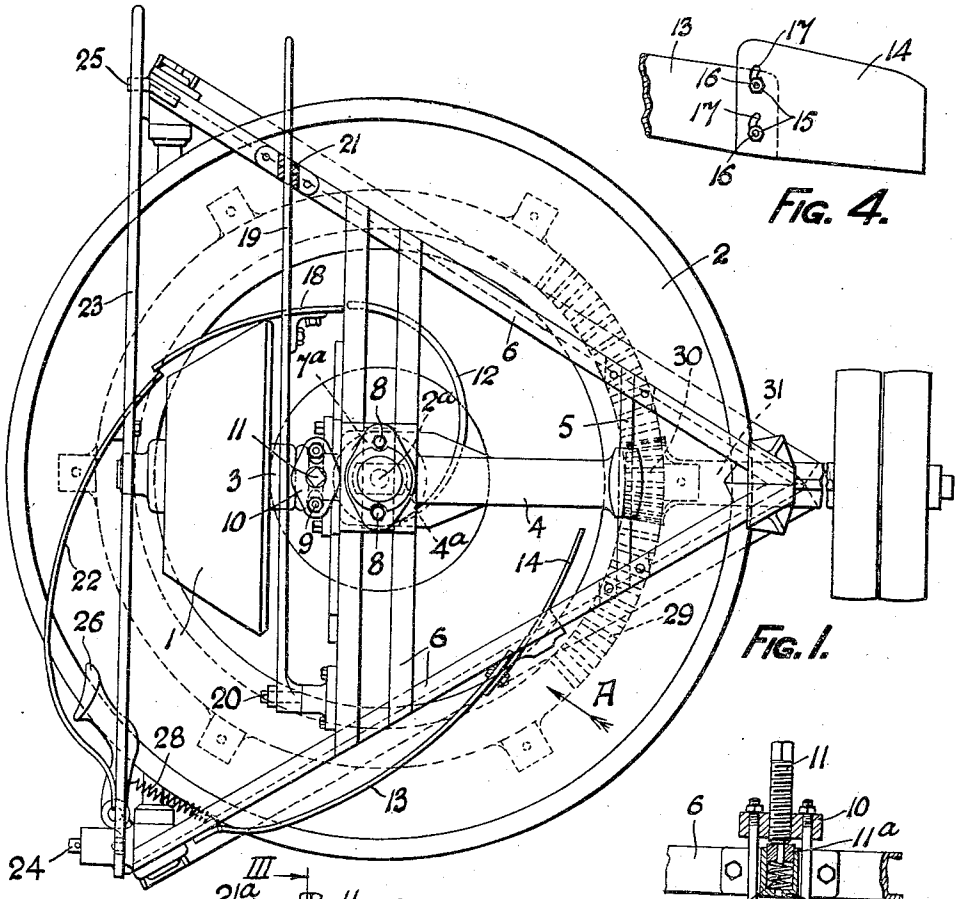


FIG. 1.

FIG. 4.

FIG. 3.

FIG. 2.

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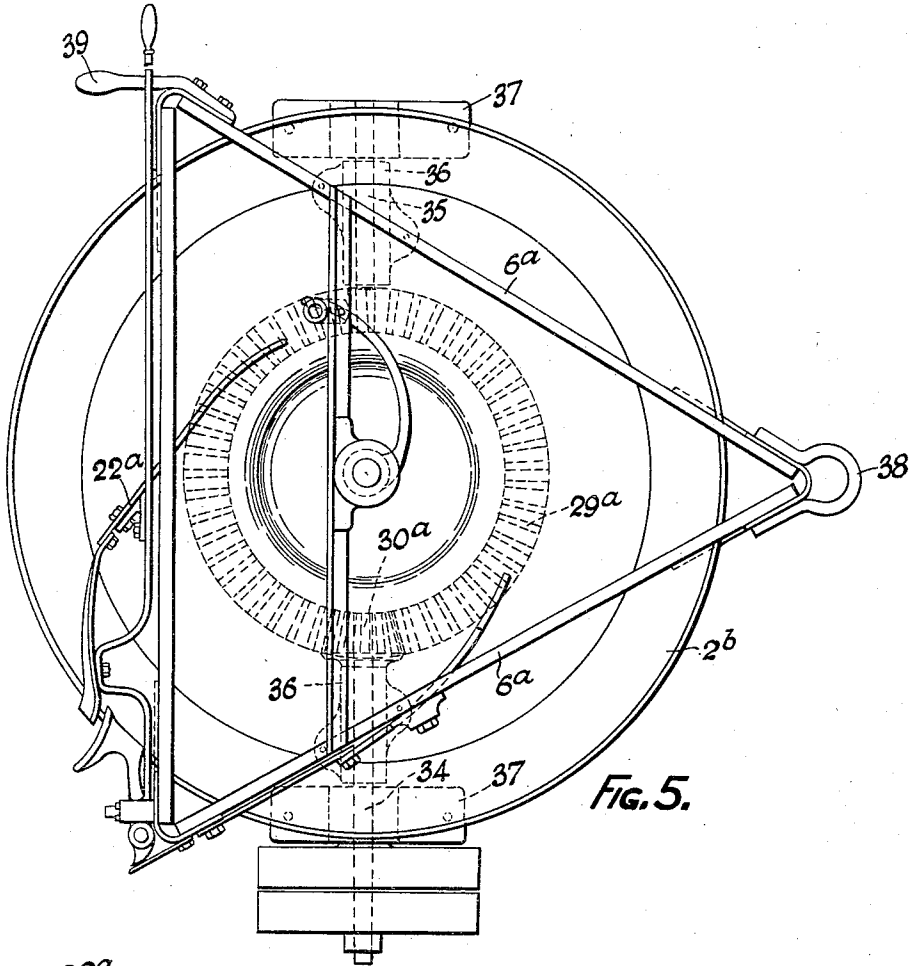


FIG. 5.

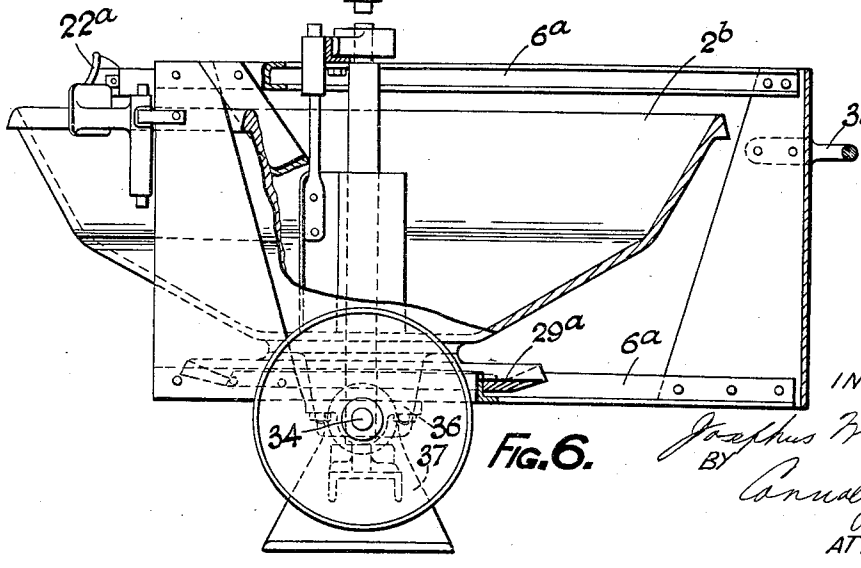


FIG. 6.

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GRINDING, CRUSHING, AND MIXING MILL

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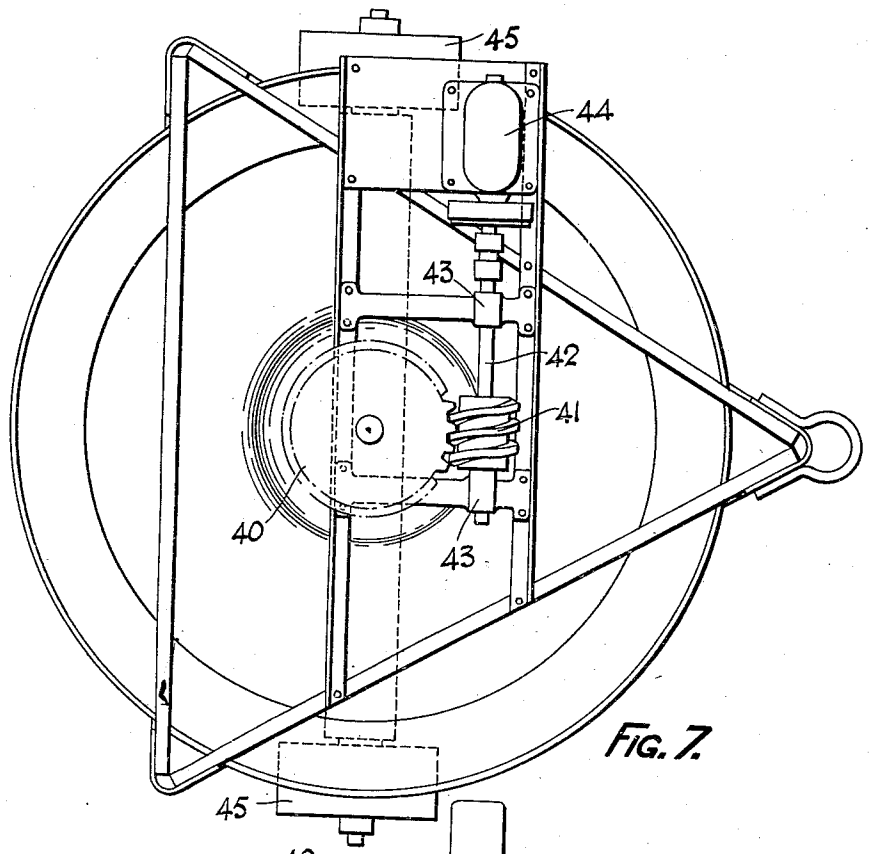


FIG. 7.

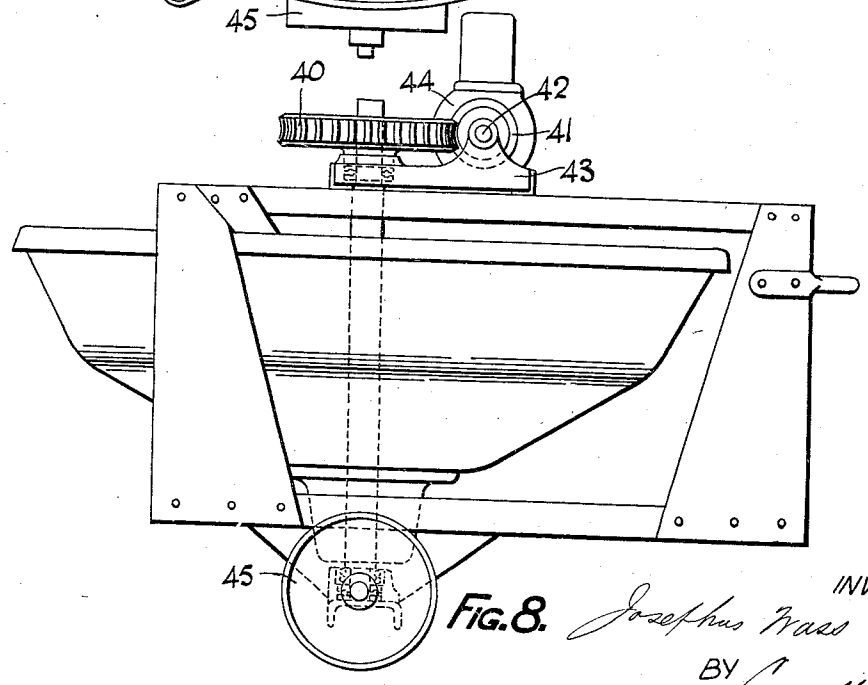


FIG. 8.

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UNITED STATES PATENT OFFICE

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GRINDING, CRUSHING, AND MIXING MILL

Application filed March 21, 1930, Serial No. 437,738, and in Great Britain July 6, 1929.

This invention relates to grinding, crushing and mixing mills and has reference more particularly to those of the edge runner type, the object of the invention being to improve such machines generally, and to provide a machine which can be employed as a mixer without using the roller or rollers, as will be hereinafter described.

The invention is mainly concerned with machines of the type aforesaid wherein one or more rollers having conical or similar peripheral surfaces cooperate with a correspondingly sloping portion of a pan.

In further describing the invention reference will be made to the accompanying drawings, wherein specific examples of the various improvements constituting the invention are illustrated.

In the drawings

Figure 1 is a plan view of a crushing and mixing mill embodying several improvements according to this invention.

Figure 2 is a part sectional side elevation thereof.

Figure 3 is a sectional detail taken on line III—III of Figure 2, and

Figure 4 is a further detail viewed in the direction of the arrow A in Figure 1.

Figure 5 is a plan view, and

Figure 6 a part sectional side elevation of of a modified form of the invention.

Figure 7 is a plan view, and

Figure 8 a side elevation of a further modification hereinafter referred to.

According to the invention I provide a mill of the aforesaid edge runner type wherein the roller 1 or rollers is or are carried by a support or supports movable by mechanical means for raising and holding the roller or rollers from the bottom of the pan 2 so as to accommodate larger batches of material or to enable the mill to be used simply for mixing materials i. e. without subjecting the latter to the grinding and rolling action of the roller or rollers.

The invention also includes the provision of an adjustable spring attachment in association with the roller support or supports, whereby the pressure exerted by the roller or rollers for milling can be varied to suit different requirements. By means of this arrangement the roller or rollers can be adjusted so as to thoroughly mill the desired material e. g. sand for foundry use, without over-milling or excessively crushing same.

There are also provided, according to the invention, deflectors of improved construction and arrangement for thoroughly mixing the material and effecting the discharge of the mixture over the edge of the pan when required. These deflectors comprise inner and outer deflectors serving as mixers, a deflector which is movable into and out of the pan for controlling the discharge of the mixed material and another movable deflector which is used when mixing only and no grinding is required, and when the mill is discharging mixed material. In this connection a feature of the invention is that the outer deflector comprises at least two sections adjustably connected so that the front section can be adjusted, as wear takes place, to present a different part thereof to the material. It is found that the wear takes place at one particular point at the front end of the outer deflector and thus when a one-piece deflector is employed this soon becomes useless. By providing the adjustable section the life of the deflector is considerably prolonged as will be readily understood.

To assist further the discharge of the mixture from the pan, the latter may be arranged so as to be capable of being tilted or tipped during the rotation thereof.

The invention also includes the provision of a scraper for the edge of the pan whereby the latter can be kept clean. A small shoot may be combined with this scraper so that the material collected by the latter can be deposited in a heap on the floor adjacent to the mill or in a suitable receptacle.

Conveniently the scraper is held in contact with the edge of the pan by means of a spring. Alternatively a screw adjustment may be provided for setting the scraper in the required position.

The mill may be mounted on road wheels so as to be movable from place to place, or it may be a fixture. When mounted on road

wheels the mill may be arranged to tilt on said wheels for discharging purposes.

I will now describe specific examples of the various improvements aforesaid as applied to a mill comprising a single conical roller 1 and a rotary power driven pan 2, the latter being dish-shaped to provide the sloping surface with which the roller co-operates for milling purposes.

According to that example of the invention illustrated in Figures 1 to 4, the aforesaid roller 1 is mounted on a stub axle 3 or equivalent at one end of an arm or like carrier 4 which, at the other end, is pivotally mounted on a pin 5 carried by the frame 6 of the mill so as to extend horizontally and diametrically above the pan 2. The said arm or carrier is acted on from above by a compression spring 7 encircling the pan spindle 2*a*, which latter passes through a slot 4*a* in the cam or carrier, the pressure exerted by said spring, and consequently that exerted by the roller on the material in the pan, being varied in accordance with requirements by means of a plate 7*a* and adjusting screws 8 carried in the frame. For lifting the roller so as to enable the mill to be used simply as a mixer, or to accommodate larger batches of material, there is provided a U-shaped or equivalent member 9 (see particularly Figure 3) which embraces the aforesaid arm or carrier 4 and is adjustably carried by a nut device 10 movable by a screw 11 mounted on the aforesaid frame adjacent to the spring attachment, e. g. between the latter and the roller. The screw 11 is preferably mounted on the frame in a resilient manner, and for this purpose carries on its lower end a collar or bush 11*a* adapted to slide vertically in a bearing 11*b* on the frame against the action of a spring 11*c*, the latter acting as a cushion for the roller as it passes over rough material in the pan. The arrangement is such that upon rotation of the screw 11 in one direction the U-shaped member is moved vertically and consequently raises the pivoted arm and the roller against the action of the spring 7. It will be understood that when the roller is in the operative position the U-shaped member is adjusted so as to have the arm unsupported thereby so that the roller is fully subjected to the pressure exerted by the spring.

A curved inner deflector 12 is mounted within the pan, so as to extend in spiral fashion from the hub thereof, for the purpose of deflecting the material on to the sloping portion of the pan and under the roller for milling. This inner deflector together with an outer deflector 13 also serves to thoroughly mix the material in the pan. The outer deflector which is attached to the frame and curved so as to extend partly round and inwards towards the centre of the pan, has a detachable front end piece 14 (see Figure 4) which is secured to the remainder by means of nuts 15 and bolts 16 which latter are passed through curved slots 17 in either the end piece or the part to which it is secured so that said piece can be adjusted to present fresh portions thereof to the material when wear takes place as hereinbefore mentioned. Another curved deflector 18, which in effect forms a continuation of the inner deflector 12 when in the operative position, is detachably secured to a hand lever 19 fulcrumed at 20 on the frame so as to extend across the pan with the deflector located between the free end of the lever and the fulcrum. By means of the lever this deflector can be moved into and out of the operative position, in which latter position it is placed when mixing only and no grinding is required, and when the mill is discharging after grinding or mixing. The hand lever 19 is located within a bracket 21, a notch or recess 21*a* being provided therein for holding the deflector in the raised position. The aforesaid deflector 18 is located between the inner deflector 12 and another movable discharging deflector 22 which is also attached to a hand lever 23 fulcrumed at 24 on the frame so as to enable it to be lifted out of the pan when the mill is mixing or grinding and lowered when the material is to be discharged. Means of any suitable form, such as a bracket 25, are provided for holding this deflector in the raised position. It will be understood that the lower edges of the movable deflectors are shaped to suit the pan.

The edge scraper hereinbefore referred to conveniently consists of a pivoted member 26 mounted on a bracket 27 attached to the frame and pulled into contact with the edge of the pan by a tension spring 28. This scraper may be shaped so that the material collected thereby is cleared off the edge of the pan and deposited in a heap near the pan or in a convenient receptacle for further use. A small shoot (not shown) may be combined with the scraper to direct the said material to the required point.

The rotary pan is furnished with a bevel wheel or ring 29 driven by a bevel pinion 30 on a belt or other power driven shaft 31, and the pan spindle 2*a* is carried at the top and bottom in suitable ball-bearings 32 and 33 carried by the top and bottom frame members respectively.

When both of the movable deflectors are lowered these and the inner deflector are disposed end to end so that in effect a continuous deflector is formed and the material is discharged at one definite point, the mill being practically self-delivering.

In order to assist in the discharge of the material from the pan, we may mount the latter so as to be capable of being tipped with the frame. An arrangement of this character is illustrated in Figures 5 and 6 wherein the frame 6*a* is mounted on two short

spindles 34 and 35 by means of brackets 36. The said spindles are carried in bearings 37 the spindle 34 being power driven and furnished on its inner end with a bevel pinion 30*a* for driving engagement with a gear wheel or ring 29*a* on or carried by the pan 2*b*. The pan is carried in the frame as above described, the arrangement being such that for discharging purposes, in addition to the movable discharging deflector 22*a*, the whole frame and pan may be turned about the axes of the spindles 34 and 35.

To assist in the tilting movement of the frame, the latter is furnished on opposite sides with handles 38 and 39. Further, in this arrangement, I prefer to make the pan deeper as illustrated so as to accommodate a bigger charge of material.

It will be understood from the drawings that both the above described arrangements are intended as fixtures, mainly for indoor requirements. I may, however, mount the mill upon road wheels, and an arrangement of this kind is shown in Figures 7 and 8.

In this arrangement the pan is rotated by a worm wheel 40 mounted on the upper end of the pan spindle, said wheel being engaged by a worm 41 on a power driven shaft 42 in bearings 43 carried by the top members of the frame. The mill may be arranged as a composite unit, in which case an electric motor 44 or the like may be carried by the frame and coupled to the shaft 42. It will be understood that the pan and frame may be tilted about the road wheels 45 to assist in the discharge of the material.

The various improvements hereinbefore described increase the utility and efficiency of a mill of the type concerned, and consequently output is increased and better results and greater economy are achieved.

It is to be understood that, although specific terms are employed in the foregoing description, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claim.

What I claim then is:—

A grinding, crushing and mixing mill of the type referred to, which includes a pan for the reception of the material to be treated, a scraper for the edge of the pan whereby the latter can be kept clean, a frame in which the pan is rotatably mounted, means for rotating the pan in the frame, deflectors in the pan for mixing the material and effecting the discharge of the mixture over the edge of the pan when required, supports for said frame in which the latter is pivotally mounted so as to be capable of being tilted when required to assist the discharge of the mixture from the pan, a roller for co-operation with the pan for treating the material, and a support for said roller which is pivotally mounted in said frame and is movable for raising the roller from the bottom of the pan, for the purpose described.

In testimony whereof I affix my signature.

JOSEPHUS WASS.