May 20, 1930. E. H. FRICKEY 1,759,448

GRINDER

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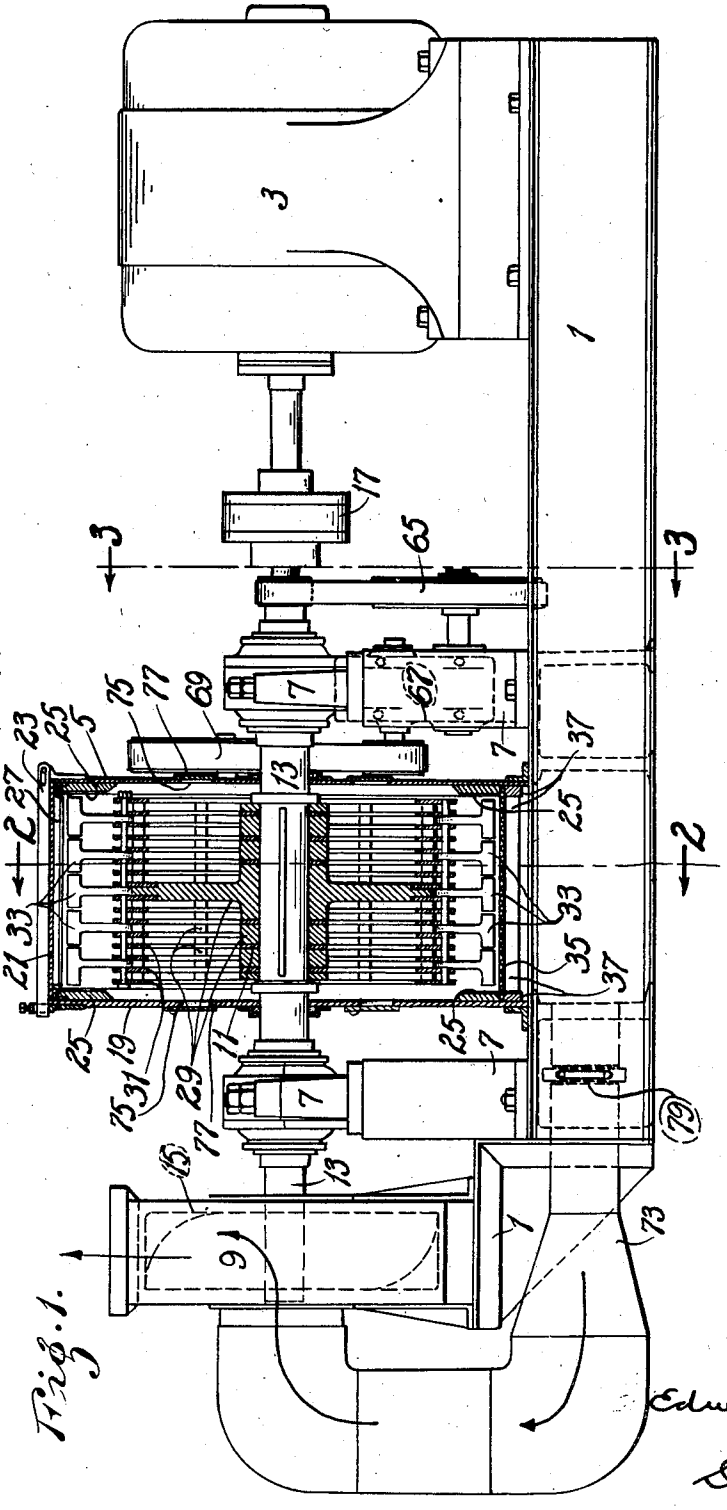



Fig. 1.

Edward H. Frickey,
Inventor;
Dale G. Haynes,
Attorney.

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Fig. 3.

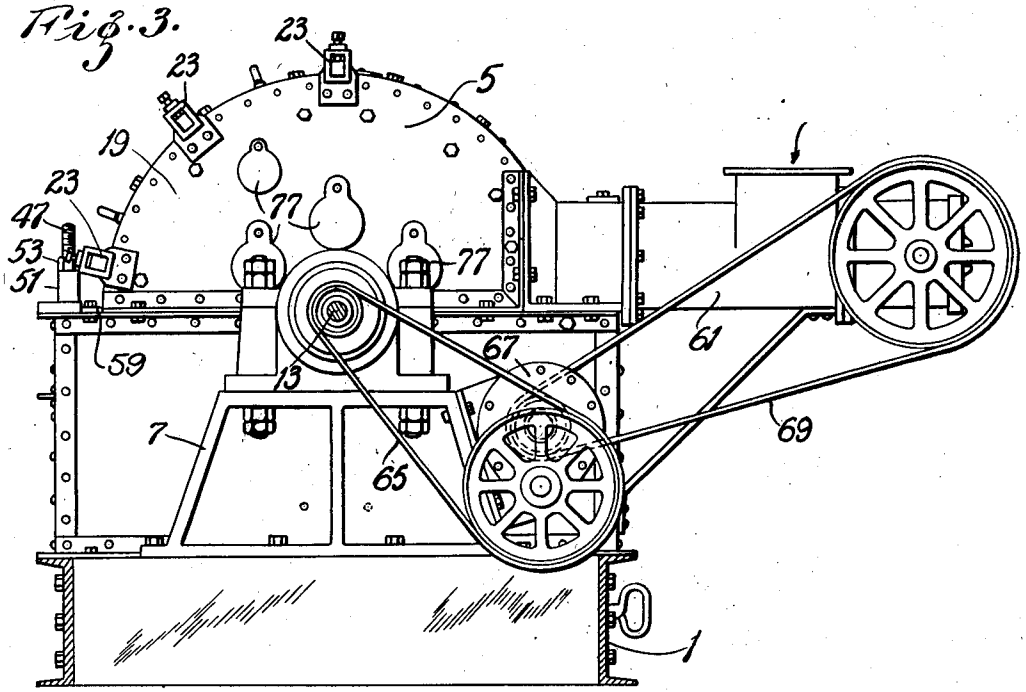
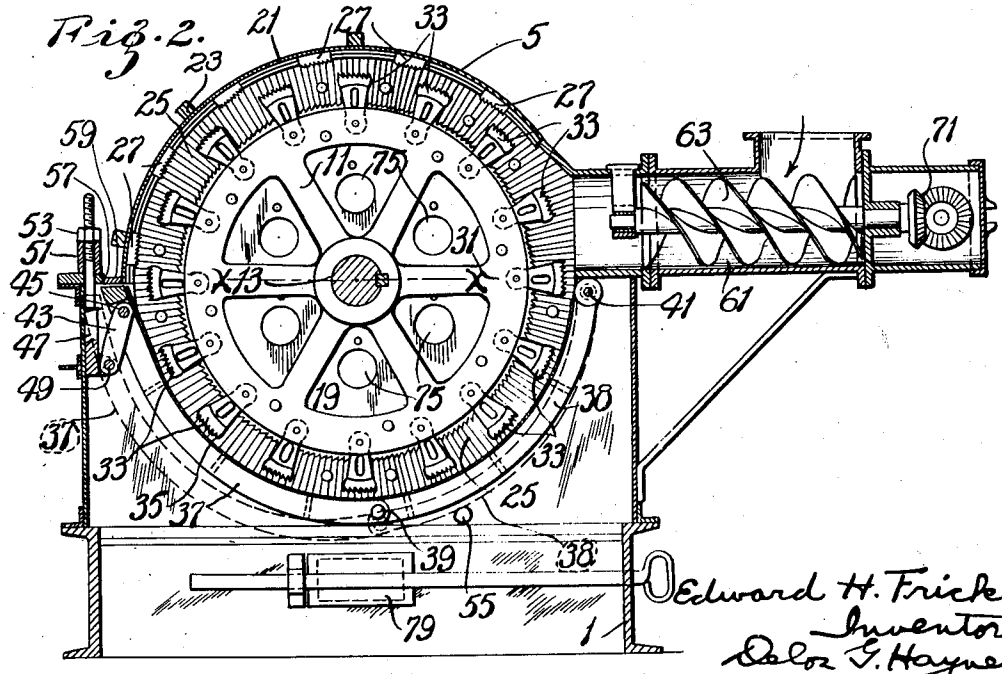



Fig. 2.




Edward H. Frickey
Inventor,
Dolor G. Haynes.
Attorney.

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# UNITED STATES PATENT OFFICE

EDWARD H. FRICKEY, OF ST. LOUIS, MISSOURI, ASSIGNOR TO DIXIE MACHINERY MANUFACTURING COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI

## GRINDER

Application filed October 21, 1927. Serial No. 227,715.

This invention relates to grinders, and with regard to certain more specific features, to grinders for screenings and like granular materials, including grain.

Among the several objects of the invention may be noted the provision of a grinder including the novel combination of a feeding conveyor and draft apparatus for maintaining maximum capacity or passage of material through the machine, and the provision of the device of the class described having more universal means for accomplishing the adjustment and replacement of certain screen portions. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combination of elements, features of construction, and arrangement of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a longitudinal section of the apparatus, certain portions being shown in full;

Fig. 2 is a lateral section through the grinding and conveyor elements of the device, taken substantially on line 2—2 of Fig. 1; and,

Fig. 3 is a cross section taken on line 3—3 of Fig. 1.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 a supporting frame for the various elements of the apparatus. Said elements comprise a driving motor 3, a grinder 5 proper, pedestal bearings 7 for supporting a rotor 11 of said grinder 5, and preferably a centrifugal suction blower 9.

A main shaft 13, borne in the bearings 7, serves to support the rotor 11 of the grinder and the fan blades 15 of the centrifugal blower 9; and hence said rotor and said blades have the same angular velocity. The shaft 13 is coupled to the motor 3 by means of a suitable spring coupling 17.

The grinder proper comprises a casing 19, including a removable cover 21 held by fasteners 23, through which casing 19 passes said shaft 13. The side walls of the casing are provided with suitable peripheral corrugated members 25 for cooperation with certain beaters, to be described. On the inside of said cover 21 are also mounted corrugated plates 27 for operative cooperation with said beaters.

The rotor 11 is keyed, or otherwise held, to the shaft 13 within the casing 19 and comprises suitable spacers 29 for spacing supporting rings or wheels 31. Near the peripheral edges of said rings 31 are provided means for oscillably mounting a plurality of crushers or beaters 33, the purpose of which beaters is to forcibly thrust the grain or the like against said corrugated members 25, 27. The beaters and corrugated members do not come into actual contact but exert a crushing and grinding action on the grain therebetween.

Below the rotating beater elements and within the casing 19 is provided a curved or substantially semi-circular screen 35, adapted to permit passage of material which has been reduced to a proper degree of fineness, but adapted to retain coarser material and permit it to be again forced around, either partially or completely by the beaters, for another passage over the plates 25 and/or 27.

The support for the screen is novel per se, as well as in combination, and comprises a pair of grids 37, 38 hinged together at a downward point 39. One of the grids, namely grid 38, is hinged within the casing 19 at a point 41 just outside the peripheries of said annular plates 25 and near the horizontal center line X—X of the rotor 11. The grids have curved or arcuate shapes adapted to fit the screen 35, which is also arcuately shaped to fit the periphery of the plates 25. Also, the width of the grids 37, 38 are such as to permit them to hold the screen in clamped position against the peripheries of the plate 25 when the grids are in a raised position (see Fig. 1).

The grids 37, 38 are held in a raised position by means of a link 43 pivoted to the upper end of the grid 37 at 45, said link 43 being

also pivoted at 49 to a slide link 47. The slide link 47 is slidable in a sleeve 51 and is made adjustable by means of a threaded nut 53.

It is evident that upon threading down the nut 53, that the slider 47 is drawn up to pull up the grids 37, 38 against the screen 35 to hold said screen in clamped position against the lower peripheries of the plates 25 (see solid lines, Fig. 2).

Upon upwardly threading the nut 53, the slider 47 drops and permits the grids 37, 38 to drop to the dotted line positions shown in Fig. 2. A cross pin 55 is provided to be engaged by the grid 38 at a predetermined position of said grid, whereupon the other grid 37 hinges on the grid 38 at the hinge 39. At the same time the swinging link 43 permits the movement required by this secondary hinging action, whereby ample room is provided for removing the screen 35 through the opening 57 left after removing a small closure plate 59.

Heretofore grids of this type have been hinged at only one point, such as point 41 and no compensating links have been provided such as link 43. With the present improvement, it is possible to obtain on machines of much larger size a larger space for removal of the screen. Previously, the merely tangential movement of the swinging end of the single grid has necessitated a much greater grid movement for a given opening. Here the unhinged end of the grid 37 has a radial component of movement which provides a larger and more effective opening for screen removal with a given grid movement.

Grain or the like is supplied to the rotor and casing by means of an inlet passage 61 equipped with a screw conveyor 63. The conveyor 63 is driven at a reduced speed from the main shaft 13 by means of a belt and pulley combination 65, geared speed reducer 67, belt and pulley combination 69 and a pair of mitre gears 71. Speed reduction is such as to provide a suitable ratio between the speed of operation of the grinding elements and that of the conveyor, so that approximately as much material is supplied to the machine as can be ground and sent through the screen 35.

In order to effect faster passage of small particles through the screen 35, there is provided the suction blower 9 which induces a draft in a pipe 73 connecting the inlet of said blower with the region directly below the screen 35. Air is caused to be drawn through the casing 19 and the elements of the rotor 11 by providing openings 75 in the sides of the casing. These openings are provided with movable and adjustable plates 77, whereby the amount of air drawn in may be controlled.

Heretofore, in machines of this class, no automatic, direct and positive inlet conveying system has been used so that its rate of feed depends upon the rate of operation of the machine. It is evident that ordinarily it would be exceedingly difficult to build a machine in which the ratio of feed to output would be properly equalized for all classes of material. With the present invention the control for effecting the proper ratio is exceedingly simple and, taken in combination with the conveyor itself, provides means for obtaining increased output.

A second damper control 79 is provided in the pipe 73 for cutting off any action of the blower 9. The effects of the control 79 and the controls 77 are entirely different. The former, when closed, prevents the blower from reducing the pressure within the casing 19, while the latter, when closed permits said blower to reduce said pressure.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a grinder, a separately removable and flexible screen, means for supporting said screen comprising a plurality of hinged members, one of which is hinged on the grinder and an adjustable support for the other hinged member, said support having means for permitting movement of said other hinged member about a center other than said hinge on the grinder and means for predetermining the movement of the member hinged to the grinder independently of said other hinged member, whereby space may be attained permitting removal of said screen.

2. A grinder comprising a casing, grinding elements including a rotor and peripherally formed elements cooperating therewith, a screen adapted to fit the periphery of said elements and a plurality of hinged members adapted to clamp the screen against said periphery, one of which elements is hinged with respect to the casing and another one of which elements is hinged with respect to said element which is hinged with respect to the casing, said screen comprising a separate, flexible and removable element adapted to be withdrawn from the grinder without dismantling either the grinder or the screen.

3. A grinder comprising a casing, grinding elements including a rotor and peripherally formed elements cooperating therewith, a screen adapted to fit the periphery of said elements and a plurality of hinged members adapted to clamp the screen against said pe-

riphery, one of which elements is hinged with respect to the casing and another one of which elements is hinged with respect to said element which is hinged with respect to the casing and means for adjusting said hinged elements whereby they may have movement relative to said casing and relative to one another, said screen comprising a separate, flexible and removable element adapted to be withdrawn from the grinder without dismantling either the grinder or the screen.

4. A grinder comprising a casing, grinding elements including a rotor and peripherally formed elements cooperating therewith, a screen adapted to fit the periphery of said elements and a plurality of hinged members adapted to clamp the screen against said periphery, one of which elements is hinged with respect to the casing and another one of which elements is hinged with respect to said element which is hinged with respect to the casing, means for adjusting said hinged elements whereby they may have movement relative to said casing and relative to one another and means for limiting the movement of the element which is hinged with respect to the casing, said screen comprising a separate, flexible and removable element adapted to be withdrawn from the grinder without dismantling either the grinder or the screen.

In testimony whereof, I have signed my name to this specification this 19th day of October, 1927.

EDWARD H. FRICKEY.