L. F. McNALLY.

GRINDING MACHINE.

APPLICATION FILED FEB. 23, 1916.

1,244,352. Patented Oct. 23, 1917.

Fig. 1.

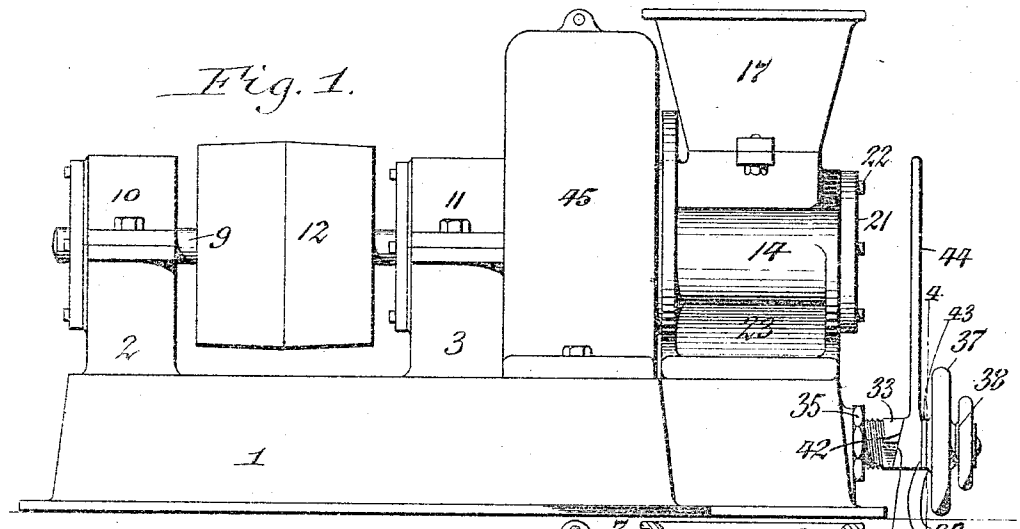
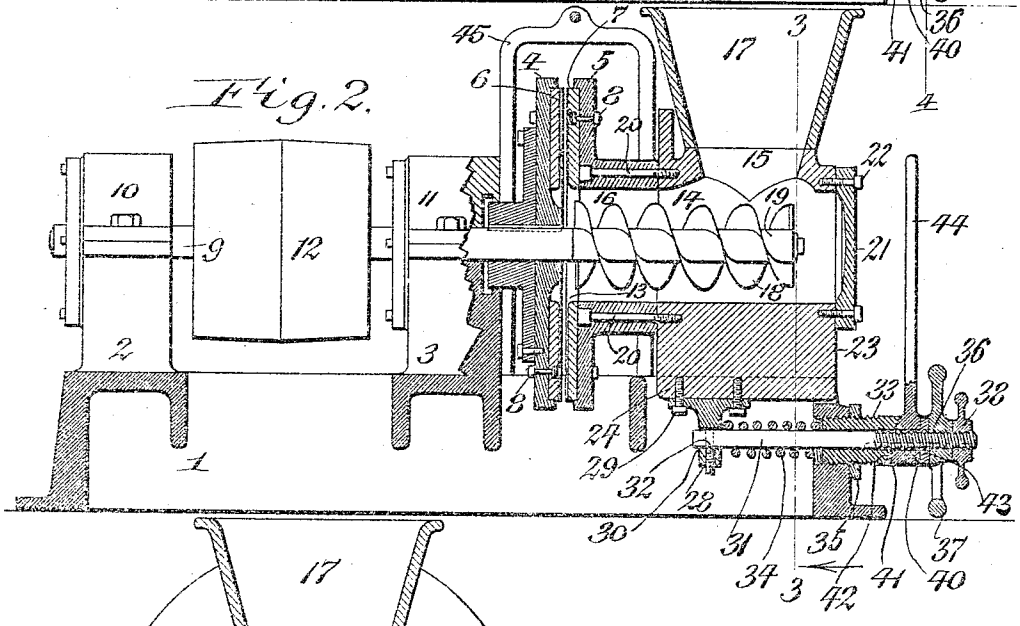


Fig. 2.



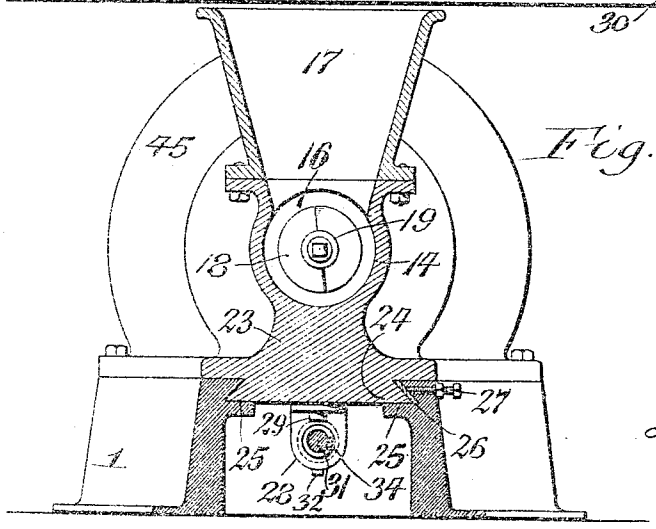
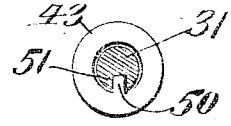


Fig. 3.

Fig. 4.



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GRINDING-MACHINE.

1,244,352. Specification of Letters Patent. Patented Oct. 23, 1917.

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To all whom it may concern:

Be it known that I, LEO F. McNALLY, a citizen of the United States, residing at Salamanca, in the county of Cattaraugus and State of New York, have invented new and useful Improvements in Grinding-Machines, of which the following is a specification.

This invention relates more particularly to a machine for grinding grain or other materials in which two relatively movable grinding members are employed, one of these members being rotatable and the other normally fixed and capable of adjustment toward and from the rotatable member for the purpose of adjusting the degree of fineness to which the material is to be ground and also for separating the grinding members so as to clear them of any obstruction and also permit of ready inspection and repairing.

In such machines, as heretofore constructed, a feed chamber has usually been employed by which the material to be ground was fed to the grinding members, this feed chamber being stationary and the normally fixed grinding head being movable relatively to the same.

In such prior structures the adjusting device for the normally fixed grinding member was so located that the same was liable to be affected by moisture and dust from the material which was being ground and therefore rendered adjustment of the normally fixed grinding member difficult, and the same was also arranged externally of the main frame of the machine to a large extent so that it was in the way of the attendant and also necessitated a somewhat complicated and expensive construction.

One of the purposes of this invention is to mount the normally fixed grinding member and the feeding chamber on the main frame so that they may be simultaneously adjusted toward and from the rotatable grinding member, thereby permitting the employment of an adjusting mechanism for these parts which is not liable to be affected by the moisture or dust particles from the material which is being ground.

Another object of this invention is to provide an adjusting device for the feed chamber and the grinding member mounted thereon which is arranged principally within the frame of the machine where the same is concealed from view and not only produces a neat and finished appearance of the machine but also renders the machine more compact, less liable to interfere with the free movement of the operator about the machine and also enables this adjusting device to be constructed at comparatively low cost.

In the accompanying drawings:

Figure 1 is a side elevation of a grinding machine containing my invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a vertical transverse section thereof taken on line 3—3, Fig. 2. Fig. 4 is a cross section, on an enlarged scale, on line 4—4, Fig. 2.

Similar characters of reference indicate corresponding parts throughout the several views.

The main frame of this machine may be of any suitable construction to properly support the working parts, but as shown in the drawings the same comprises a base 1 and two standards 2, 3 rising from the rear part of this base.

4, 5 represent two relatively movable grinding members which are preferably constructed in the form of circular heads or disks which are arranged axially side by side, the grinding head 4 being preferably mounted to rotate about a horizontal axis while the normally fixed grinding head 5 is arranged axially in line with the rotatable grinding head but is capable of axial adjustment toward and from the same. On their opposing faces these grinding heads are provided with grinding plates 6, 7 which are removably secured thereto by screws 8 or the like and which receive the material to be ground between them adjacent to the axis thereof so that this material in passing radially outward between the grinding plates is ground or reduced and escapes at the periphery of the grinding heads.

The rotatable grinding head 4 is mounted on a horizontal driving shaft 9 which is

journaled lengthwise of the frame in bearings 10, 11 arranged at the upper end of the standards and is turned by a driving belt passing around a pulley 12 mounted on this shaft between its bearings.

The material to be ground is fed to the grinding plates adjacent to the axis of the grinding heads through a feed opening or passage 13 formed axially in the normally fixed grinding head. This material is supplied from a feeding chamber 14 which is mounted on the front end of the base and provided on the front part of its upper side with an inlet 15 for the material to be ground and at its inner or rear end with an outlet 16 which registers with the feed passage of the normally fixed grinding head. The material to be ground is directed into the inlet of the feeding chamber by means of a hopper 17 secured to the top of the feeding chamber, as shown in the drawings, or by any other suitable means. The movement of the material from the feeding chamber through the outlet thereof and the central passage of the normally fixed grinding disk to the space between the grinding plates is preferably effected by means of a screw conveyer 18 which is arranged horizontally and lengthwise within the feeding chamber and the grinding head 5 and mounted on a forward extension 19 of the driving shaft which is arranged in the feeding chamber.

The normally fixed grinding head is secured to the rear or inner end of the feeding chamber by means of screws 20, as shown or by other suitable means so that this grinding head and the feeding chamber and the parts connected therewith are compelled to move inwardly and outwardly together in adjusting the normally fixed grinding head and its plates relative to the rotatable grinding head and its plates.

While thus moving the normally fixed grinding head and the feeding chamber in unison for varying the distance between the two sets of grinding plates no sliding joints are employed between the feeding chamber and the companion grinding head mounted thereon through which moisture and dust are liable to leak which otherwise would cause these parts to stick and render the adjustment of one grinding disk relatively to the other difficult and inconvenient.

The front or outer end of the feeding chamber is preferably provided with an opening which is normally closed by a removable head or wall 21 which is secured thereto by means of screws 22, thereby permitting of convenient access to the interior of the feeding chamber for inspection and cleaning when this is necessary.

The feeding chamber may be slidably mounted on the main frame so that the same together with the parts connected therewith may be adjusted toward and from the rotatable grinding head. This, however, is preferably accomplished by mounting the feed chamber on the upper side or top of a carriage 23 which has its lower or underside constructed in the form of a dove tail 24 which slides in a correspondingly shaped dove-tail guideway 25 on the upper front part of the base of the frame, as best shown in Fig. 3. Any looseness between the dove tail portion of this carriage and the guideway may be taken up by means of a filling piece 26 arranged between one of the inclined faces of the carriage dove-tail, and one or more adjusting screws 27 arranged on the base of the frame and engaging with the outer side of this filling piece.

Although the means for adjusting the feeding chamber and the parts mounted thereon lengthwise toward and from the rotatable grinding head may be varied those shown in the drawings have been found satisfactory in practice and are constructed as follows:

28 represents a bracket depending from the under side of the feed chamber carriage into the front part of the base which is made hollow, said bracket being preferably formed separate from the feed chamber and secured thereto by any suitable means, for instance by means of screws 29, as shown in Figs. 2 and 3. In its lower part this bracket is provided with an opening 30 which is threaded to receive the end of the adjusting rod 31 and is held from turning by the dowel pin 32 so that this rod is rigid with the bracket and hopper chamber. The outer end of this rod projects through the front end of the base and is provided with an external thread and a keyway on the bottom side of the rod. 33 represents an adjusting bushing which receives the outer part of the shifting rod and is provided with an external screw thread whereby the same is secured in an internally threaded opening in the adjacent part of the base. Surrounding the inner part of the shifting rod and bearing at its opposite ends against the front side of the bracket and the rear end of the bushing is a helical spring 34 which tends constantly to push the bracket, the feeding chamber, the normally fixed grinding disk and the parts moving therewith inwardly or toward the rotatable head. The tension of this spring can be adjusted by screwing the abutment bushing inwardly or outwardly on the base and after such adjustment the abutment bushing may be held securely against turning by means of a clamping screw nut 35 applied to the exterior of this bushing and bearing against the outer side of the base, as shown in Figs. 1 and 2. On the threaded portion of the

shifting rod is arranged an adjusting screw nut 36 which is preferably provided with a hand wheel or rim 37 for turning same. This adjusting screw nut is secured to the shifting rod after it has been set or adjusted to the desired position by means of a clamping screw nut 38 mounted on the outer end of the threaded portion of the shifting rod and bearing against the outer end of the adjusting screw nut 36.

Means are provided for quickly releasing or separating the normally fixed grinding disk from the rotatable grinding disk when the plates between the same become clogged by some hard material which they are unable to crush. In its preferred form this quick releasing device comprises a rotatable cam 40 which turns about the axis of the shifting rod and bears at its outer end against the inner side of the adjusting screw nut 36 while its inner side is provided with an incline or cam face 41 which engages with a corresponding incline or cam face 42 on the outer end of the abutment bushing. When the face of this releasing cam is parallel with the face of the abutment cam and these faces engage flatwise with each other, as shown in Figs. 1 and 2, the spring 34 is permitted to move the feeding chamber and the parts associated therewith into their innermost position which is determined by the position of the head of the adjusting rod. If the space between the grinding disk becomes clogged and a quick separation of the same is necessary or desirable to either prevent injury to the machine or enable the obstruction to clear itself from the grinding plates this is accomplished by turning the releasing cam so that a wedging action of this cam is produced relatively to the abutment bushing whereby the shifting rod is moved outwardly or forwardly together with the feeding chamber, normally fixed grinding heads and associated parts, thereby separating the grinding plates and releasing the obstructing material. A washer 43 splined to the adjusting rod 31 is preferably mounted on the latter between the cam 40 and the adjusting screw nut 36 by engaging a lug 50 in the bore of this washer with a keyway 51 in the adjusting rod for preventing the rotation of this cam from affecting this screw nut, as shown in Figs. 1, 2 and 4. The releasing cam is operated by means of a handle 44 projecting laterally therefrom, as shown in Figs. 1 and 2.

If during the ordinary operation of the machine any hard material should get in between the two pairs or sets of grinding plates which the latter are unable to crush, the normally fixed grinding head and feed chamber would yield due to the resistance of such material and be forced forwardly or outwardly the required extent, this being possible owing to the yielding resistance which is offered by the spring 34. By turning the adjusting screw 36 in one direction or the other the space between the grinding plates may be regulated according to how fine it is desired to grind the material and this screw nut also permits of separating the grinding heads or disks a considerable distance in order to render the grinding plates conveniently accessible for inspection, adjustment and repairs.

This adjusting device therefore enables the grinding heads to separate automatically for the purpose of avoiding breakage in case unduly hard material enters the space between the grinding plates. These heads may also be quickly separated a considerable extent for clearing their plates from unduly hard obstruction, the heads may be readily adjusted to secure the desired degree of fineness in the grinding operation and the heads may also be widely separated for convenience in replacing worn grinding plates with new ones.

Inasmuch as this adjusting device is arranged underneath the feeding chamber and principally within the hollow parts of the base a very compact construction is produced which is not only simple and capable of being produced at comparatively low cost but the same is also out of the way where it interferes least with the free movement of the attendant and it also produces a neat and sightly appearance of the machine.

The grinding heads and the adjacent parts of the driving shaft and feeding chamber are inclosed by a casing 45 which is removably mounted on the adjacent part of the frame and is open on its underside so as to discharge the material ground between the heads downwardly to the underside of the machine where the same may be disposed of in any suitable manner.

I claim as my invention:

1. A grinding machine comprising a frame, a feed chamber movably mounted on said frame and having an opening at its outer end, a cover detachably secured to the chamber over said opening, two relatively movable grinding elements facing each other and one mounted on said frame and the other on said feed chamber and an adjusting device connecting the lower parts of said frame and the feed chamber.

2. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and adjustable on said frame toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and an adjusting device connecting the lower parts of said frame and the feed chamber.

3. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and slidable on said frame toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and an adjusting device arranged between said frame and feed chamber on the lower parts thereof.

4. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and slidable on said frame toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and an adjusting device arranged between said frame and feed chamber and comprising yielding means which operate to move said chamber and normally fixed head toward the rotatable head and positively operating means for withdrawing said chamber and normally fixed head from said rotatable head.

5. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head and having an axial feed passage, a feed chamber carrying said normally fixed head and movable therewith on the frame toward and from said rotatable head and having an inlet on its top for the material to be ground and an outlet for the same in its inner end which opens into the axial passage of said normally fixed head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and an adjusting device connecting the lower parts of said frame and the feed chamber.

6. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and movable toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and a sliding connection between said chamber and frame comprising a dove-tail guideway arranged on the upper side of said frame and a dove-tail carriage supporting said chamber and engaging with said dove-tail guideway.

7. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and movable toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and means for adjusting said chamber on said frame arranged between the underside of said chamber and the adjacent part of said frame.

8. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and movable toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and means for adjustably connecting said chamber and frame comprising a bracket depending from the underside of said chamber, a shifting rod mounted on said bracket and slidable in said frame and provided with a screw thread, a spring interposed between said frame and bracket and operating to move said chamber and the parts mounted thereon toward said rotatable head, and an adjusting screw nut arranged on the threaded part of said rod and abutting against a part on the outer side of said frame.

9. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and movable toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and means for adjustably connecting said chamber and frame comprising a bracket depending from the underside of said chamber, a shifting rod mounted on said bracket and slidable in said frame and provided with a screw thread, a spring interposed between said frame and bracket and operating to move said chamber and the parts mounted thereon toward said rotatable head, an adjusting screw nut arranged on the threaded part of said rod, and a cam rotatable between said screw nut and a part on the outer side of said frame.

10. A grinding machine comprising a frame, a rotatable grinding head journaled on said frame, a normally fixed grinding disk facing said rotatable head, a feed chamber carrying said normally fixed head and movable toward and from said rotatable head and having an opening at its outer end, a cover detachably secured to the chamber over said opening, and means for adjustably connecting said chamber and frame comprising a bracket depending from the underside of said chamber, a shifting rod mounted on said bracket and slidable in said frame and provided with a screw thread, a spring interposed between said frame and bracket and operating to move

said chamber and the parts mounted thereon toward said rotatable head, an adjusting screw nut arranged on the threaded part of said rod, a clamping screw nut arranged on the threaded portion of said rod and engaging with the outer side of said adjusting screw nut, a bushing surrounding said rod and secured to said frame and having a cam-shaped outer face, a cam mounted on the inner side of said adjusting screw and rotatable about the axis thereof and provided on its inner side with a cam face which engages with the cam face of said bushing and a washer splined on said rod and arranged between said cam and adjusting screw nut.

LEO F. McNALLY.

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