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ADJUSTING MEANS FOR ATTRITION MILLS AND THE LIKE

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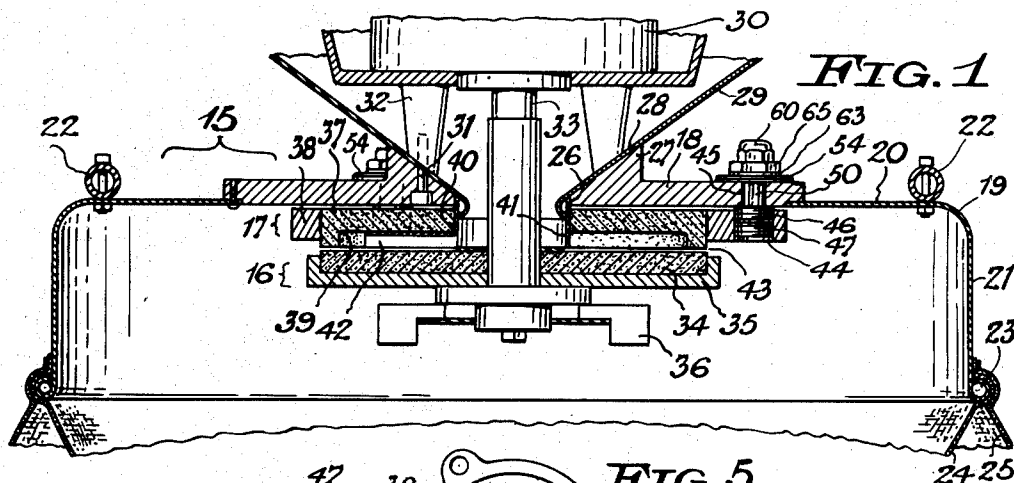


FIG. 6

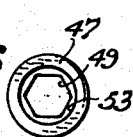


FIG. 5

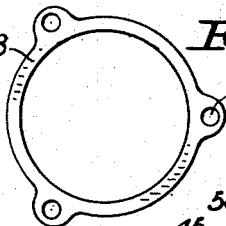


FIG. 2

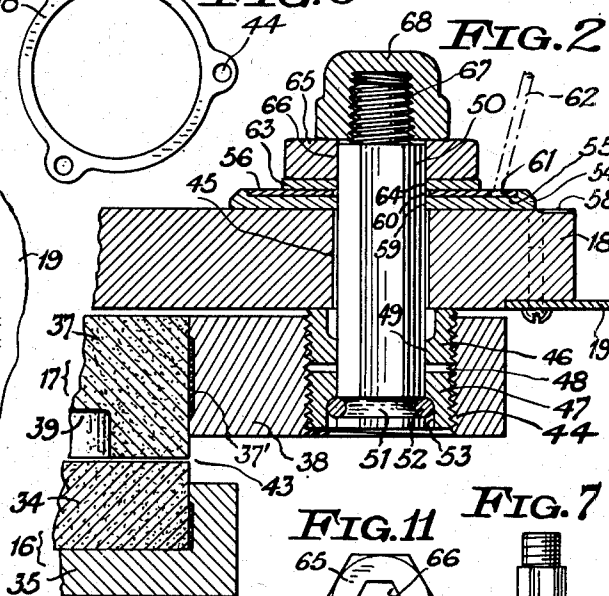


FIG. 3

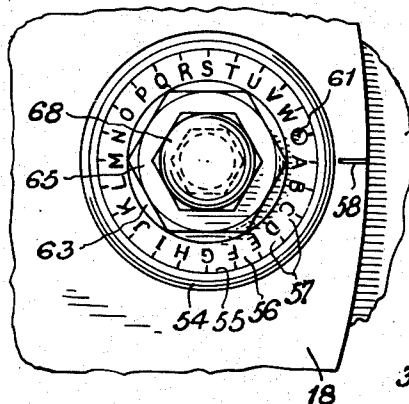


FIG. 4

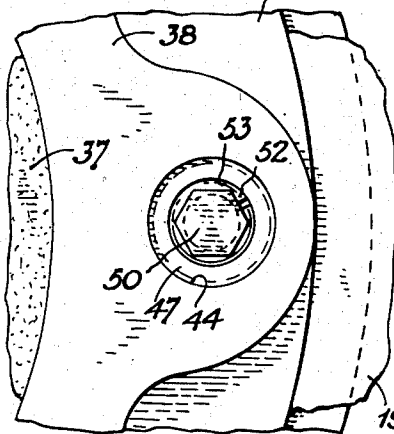


FIG. 10

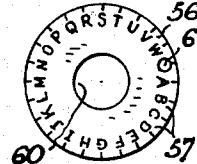


FIG. 11

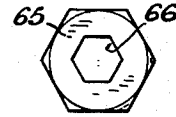


FIG. 12

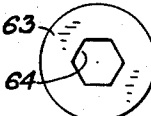


FIG. 7

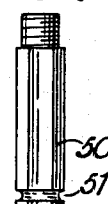
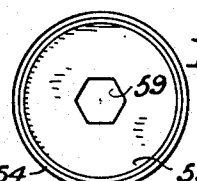


FIG. 8



FIG. 9



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ADJUSTING MEANS FOR ATTRITION
MILLS AND THE LIKE

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9 Claims. (Cl. 241-258)

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The present invention relates to adjusting or
tramping means for attrition mills and the like.

A type of attrition mill heretofore devised for
processing grain and other materials includes
a rotor member and a cooperating stator mem-
ber, the latter being axially shiftable to vary the
space or gap between these members. In a mill
of this type the marginal gap between the rotor
and stator members may be quite narrow, as
when grinding flour, or it may be relatively wide,
as when cracking or scouring grain. Adjustment
of the gap is also necessary in order to compen-
sate for wear. In many forms of these mills, it
is inconvenient to inspect or check the gap be-
tween the rotor and stator members. Adjusting
apparatus heretofore provided for such mills has
required expert manipulation to obtain a uniform
gap of the desired width.

An object of the present invention is to pro-
vide improved adjusting means by which quick
and accurate adjustment of the gap between the
relatively rotatable members of a rotary attrition
mill or the like can be made in the field by un-
skilled users.

Another object is to provide mill adjusting
means of this character which is of simple and
durable construction and capable of inexpensive
manufacture.

The invention further consists in the several
features hereinafter described and claimed.

In the accompanying drawing,

Fig. 1 is a fragmentary vertical sectional view
of an attrition mill incorporating adjusting de-
vices of the invention;

Fig. 2 is an enlarged detail vertical sectional
view showing one of the adjusting devices;

Fig. 3 is a top view of the mounted adjusting
device;

Fig. 4 is a bottom view of the mounted adjust-
ing device;

Fig. 5 is a plan view of a support ring for a
stator stone;

Fig. 6 is an end view of a screw-threaded plug
member;

Fig. 7 is an elevational view of a locator stem;

Fig. 8 is a plan view of a snap ring for the
locator stem;

Fig. 9 is a top view of a dial holder;

Fig. 10 is a top view of a dial disk;

Fig. 11 is a top view of an adjusting collar, and

Fig. 12 is a top view of a washer.

In the drawing, 15 designates generally an at-
trition mill provided with adjusting means of the
invention. By way of example, the mill is here
shown to be of the type in which a disk-like ab-

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rasive rotor 16 rotates on a vertical axis and coop-
erates with an overlying centrally apertured stator
17. The stator is adjustably supported as here-
inafter described at the underside of a circular
mounting plate or back plate 18. A sheet metal
housing member 19 has a flat top wall 20 secured
to the marginal portion of the mounting plate
to form an extension thereof, and has a depend-
ing cylindrical wall or skirt 21 concentrically sur-
rounding the rotor and stator. The inverted cup-
like housing thus formed is carried by frame bars
22 secured to the top wall 20 of the housing mem-
ber 19. The lower edge of the housing skirt 21
has a bead 23 adapted for detachably supporting
the usual sieve 24 and filter tent 25 when the
machine is used as a flour mill.

The mounting plate 18 has a central opening
26 and an upstanding central boss 27 with a con-
ical seat 28 for the inwardly sloping bottom of a
hopper 29. An electric motor 30 is suitably se-
cured in the hopper, as by screws 31 which engage
supporting feet 32 for the motor and also secure
the hopper to the mounting plate. The motor
has a vertical shaft 33 which projects downwardly
through the centrally apertured mounting plate
and mill stator.

The mill rotor 16 is supported and driven by
the motor shaft and comprises an abrasive disk
or stone 34 rigidly attached on a marginally
flanged metal carrier disk or tray 35 to which the
lower end of the motor shaft is secured. A fan
36 is disposed below the carrier disk 35 and ro-
tates therewith.

The mill stator 17 comprises an abrasive disk
or stone 37 rigidly secured, as by cementing at
37', in a lugged metal support ring 38. The stator
stone 37 has a circular bottom cavity 39 and a
communicating central opening 40 which registers
with the central opening 26 of the mounting plate.
A cylindrical shell 41 extends in the registering
openings of the mounting plate and stator stone
and has a radial feeding arm 42 in the stone
cavity 39. The marginal portions of the stator
and rotor stones are spaced from each other to
form an annular gap 43 for discharge of com-
minuted material.

The support ring 38 of the mill stator has
formed through its lug portions three screw-
threaded vertical bores 44 spaced 120° apart, the
axes of these bores being equidistant from and
parallel to the rotor axis. The bores 44 are aligned
with three similarly spaced vertical bores 45 of
smaller diameter formed through the mounting
plate 18. A pair of upper and lower annular
screw members 46 and 47 are snugly threaded in

tandem relation in each support ring opening 44, there being a small gap 48 between the two screw members. The screw members, which are preferably identical, are provided with aligned axial openings 49 of non-circular cross-section receiving therethrough against relative rotation a driving and clamping stem 50 of corresponding cross-section, these cross-sections preferably being hexagonal. Each stem, which forms a locator, extends upwardly through the corresponding opening 45 in the mounting plate. Near its lower end, each stem is provided with a surrounding annular groove 51 receiving therein a split resilient retainer ring 52 presenting a shoulder engaging the bottom of a counterbore or pocket 53 formed in the lower screw member 47, the ring 52 being confined against spreading by the side walls of the counterbore. This construction provides a slight universal action between the locator stem and the lower screw member. The lower screw member forms, in effect, a head on the stem. Each upper screw member 46 has its upper flat annular face in engagement with the flat bottom or inner face of the mounting plate 18.

Three dials rest on the flat upper or outer face of the mounting plate 18 and surround the corresponding locator stems 50. Each dial comprises a holder disk 54 with a shallow circular top recess 55 receiving therein a calibrated dial disk 56 flush therewith, the dial disk having suitable indicia or characters 57, such as an arcuate series of letters, on the marginal portion of its top face adapted to cooperate with a radial index mark 58 formed in the marginal portion of the mounting plate. The holder disk 54 has a central hexagonal opening 59 in which the locator stem 50 fits in driving relation. The dial disk 56 is normally rotatable with the associated holder disk but has a central circular opening 60 loosely receiving the locator stem so as to permit rotative adjustment of the dial disk with respect to the holder disk, as hereinafter described. For this purpose the dial disk has a small opening 61 near its outer edge adapted to receive a pointed tool 62, Fig. 2. Resting on the dial disk is a washer 63 having a central hexagonal opening 64 in which the locator stem fits. Bearing on the washer 63 is a hexagonal adjusting collar 65 having a central hexagonal opening 66 in which the locator stem fits in driving relation. The collar is adapted to be turned by a wrench or other suitable tool. The locator stem 50 has a reduced screw-threaded upper end portion 67 receiving thereon a cap nut 68 in releasable clamping engagement with the upper face of the adjusting collar 65. The clamping pressure is transmitted through the collar 65, washer 63, dial disk 56, and holder disk 54 to the upper or outer face of the mounting plate 18, thus urging the locator stem 50 upwardly and holding the upper screw member 46 firmly against the bottom or inner face of the mounting plate 18, the clamping pressure being transmitted from the retainer ring 52 on the stem to the lower screw member 47, through the stator support ring 38, and thence to the upper screw member 46. This arrangement takes up any play between the two tandem screw members 46 and 47 and the screw threads in the opening 44 of the stator support ring 38, so as to insure against any looseness of the support ring which is carried by the screw members.

In the initial adjustment of the mill, which may be a factory adjustment, the cap nuts 68 on the three locator stems are slightly loosened, and

the stems are turned by the adjusting collars 65 until the stator stone 37 lightly contacts the rotor stone 34 during its rotation. The locator stems are then turned slightly by the collars 65 in the reverse direction until the stones are just out of contact, providing a small uniform clearance or gap 43 between the stones. This adjustment of the stones is suitable for producing fine flour. The dial disks 56 are then individually turned in the then stationary holder disks 54 by the pointed tool 62 until all the dial disks are in the same relative position with respect to the associated index marks 58. By way of example, all three of the dial disks may be set to the "A" position shown in Fig. 3. The cap nuts 68 are then tightened to hold the mill stator firmly in its adjusted position.

After the mill is in use and it is desired to grind a coarse flour or meal, or to produce cracked grain, the operator slightly loosens the cap nuts 68 and then turns the locator stems 50 by the associated wrench-receiving collars 65 through equal predetermined angles indicated by the associated dials. During this manipulation each dial disk 56 is frictionally engaged between the associated holder disk 54 and washer 63 so that the dial disk turns with the locator stem. The washer 63 also guards the dial indicia from accidental wrench marks. The cap nuts 68 are then retightened, thereby clamping the stator support ring 38 in its new raised position to provide a greater but uniform clearance between the stator and rotor stones. When the mill is to be readjusted to produce fine flour, the cap nuts 68 are again slightly loosened and the locator stems 50 with their dials are turned back to their original positions, whereupon the cap nuts are retightened to maintain the adjustment.

After the mill has been in use for some time, wear on the grinding surfaces will increase the discharge gap between the relatively rotatable stones, but the gap can be restored to its proper width by manipulating the adjusting devices, as above described. The compensating adjustment can be easily and accurately effected by relatively unskilled persons since the dials will indicate the proper amount of angular displacement of the locator stems and make it unnecessary to inspect or gage the gap between the stones.

In the machine illustrated, the mounting plate 18 and support ring 38 form a pair of relatively translatable body members, and the adjusting means serves to effect accurate and rigid positioning of the shiftable body member.

While the adjusting means of the invention is particularly useful in attrition mills, it is also applicable to other machines in which similar adjustment of parts is desired.

What I claim as new and desire to secure by Letters Patent is:

1. In combination, a pair of relatively displaceable first and second body members having therein aligned openings the axis of which extends parallel to the direction of displacement, the opening in said first body member being screw-threaded, first and second rotatable screw members engaged in said threaded opening and disposed in tandem relation, said first screw member being axially engageable with the adjacent side of said second body member, a rotatable stem extending axially in said screw members in driving relation therewith and also extending through the opening of said second body member, said stem having an axial thrust engagement with said second screw member for urging said second

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screw member and first body member toward said second body member, a dial at the side of said second body member distant from said first screw member, said stem extending through said dial in driving engagement therewith, said second body member having index means cooperating with said dial, and a clamping nut on said stem for clamping said dial to said second body member and for applying clamping pressure through said stem to said screw members.

2. In combination, a pair of relatively displaceable first and second body members having therein aligned openings the axis of which extends parallel to the direction of displacement, the opening in said first body member being screw-threaded, first and second screw members engaged in said threaded opening and disposed in tandem relation, said first screw member being axially engageable with the adjacent side of said second body member, a rotatable stem extending in the aligned openings of said body members and disposed in driving relation with said screw members for displacing said first body member, said stem further having a connection with said second screw member for applying axial pressure to said second screw member in a direction toward said second body member, and clamping means cooperating with said stem for urging said screw members relatively toward each other and toward said second body member to lock said first body member in adjusted position.

3. In combination, a body member having a screw-threaded opening therein and being displaceable in a direction parallel to the axis of said opening, first and second rotatable screw members engaged in said threaded opening and disposed in tandem relation, driving means rotatively engageable with said screw members for displacing said body member, and clamping means cooperating with said driving means for urging said screw members relatively toward each other in said threaded opening to lock said body member in adjusted position.

4. In combination, a pair of relatively displaceable first and second body members having therein aligned openings the axis of which extends parallel to the direction of displacement, the opening of said first body member being screw-threaded, rotatable screw means engaged in said threaded opening and axially engageable with the adjacent side of said second body member, a rotatable stem in driving relation to said screw means for effecting relative displacement of said body members, said stem extending through the opening of said second body member, a dial at the side of said second body member distant from said screw means, said rotatable stem extending through said dial in driving relation thereto, said second body member having index means cooperating with said dial, and a clamping nut on said stem for clamping said dial to said second body member and for applying clamping pressure through said stem to said screw means.

5. In combination, a pair of relatively displaceable first and second body members having therein aligned openings the axis of which extends parallel to the direction of displacement, the opening in said first body member being screw-threaded, rotatable screw means engaged in said threaded opening and axially engageable with said second body member, a rotatable stem of non-circular cross-section extending axially in said screw means in driving relation thereto for effecting relative displacement of said body members, said stem having an annular groove at an

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end portion thereof, a resilient ring in said groove axially engaging said screw means for applying axial pressure to said screw means, said screw means having a pocket receiving said ring, a rotatable dial at the side of said second body member distant from said screw means, said dial receiving said stem therethrough in driving relation thereto, and a clamping nut on said stem for clamping said dial to said second body member and for applying clamping pressure through said stem to said screw means.

6. In combination, a body member having an opening, a rotatable clamping stem extending in said opening, a shiftable member having a screw connection with said stem for effecting displacement of said shiftable member parallel to said stem by rotation of said stem, a rotatable dial holder surrounding said stem in driving engagement therewith and bearing on said body member, a dial disk surrounding said stem and being relatively rotatable with respect thereto for effecting rotative adjustment of said dial disk while said stem is stationary, said dial disk frictionally bearing at one side against said holder and being normally rotatable with said holder and stem, a rotatable member surrounding said stem in driving engagement therewith and frictionally bearing on the other side of said dial, said body member having index means cooperating with said dial disk, and a releasable clamping nut on said stem for holding said stem and dial disk against rotation.

7. In combination, relatively displaceable first and second body members having aligned openings the axis of which extends parallel to the direction of displacement, the opening in said first body member being screw-threaded, rotatable screw means in said threaded opening axially engageable with said second body member, a stem extending in said openings and disposed in driving relation to said screw means for rotating said screw means to displace said first body member, said stem further having an axial connection with said screw means for urging said screw means toward said second body member, a rotatable dial slidably surrounding said stem in driving relation thereto and bearing at the side of said second body member distant from said first body member, a tool-receiving collar slidably surrounding said stem in driving engagement therewith, and a clamping nut on said stem for applying clamping pressure to said dial and collar and for applying clamping pressure through said stem to said screw means.

8. In combination, first and second relatively displaceable body members having aligned openings the axis of which is parallel to the direction of displacement, the opening in said first body member being screw-threaded, first and second rotatable screw members engaged in said threaded opening and disposed in tandem relation, a rotatable stem extending in said openings and disposed in driving relation to said screw members for simultaneously rotating said screw members, and clamping means including said stem for urging said screw members relatively toward each other to lock said screw members with respect to said first body member.

9. In an attrition mill and the like having a rotor member and a cooperating stator member which latter is axially shiftable to vary the gap between said members, a mounting member for said stator member disposed at the side of said stator member distant from the rotor member and having a plurality of openings therethrough

parallel to and spaced about the axis of the rotor member, said stator member having screw-threaded openings therein aligned with said mounting member openings, rotatable screw means in said threaded openings axially engage- 5 able with said mounting member, stems extending in said mounting member openings and being in driving relation to said screw means for axially shifting said stator member, dials at the outer side of said mounting member receiving said re- 10

spective stems therethrough in driving relation therewith, said mounting member having index means cooperating with said dials, and clamping means on each stem for clamping the associated dial to said mounting member and for applying clamping pressure through said stem to the associated screw means.

No references cited.