Nov. 23, 1937. A. J. MOSLEY 2,100,200

GRINDING MILL

Filed Aug. 9, 1933 3 Sheets-Sheet 1

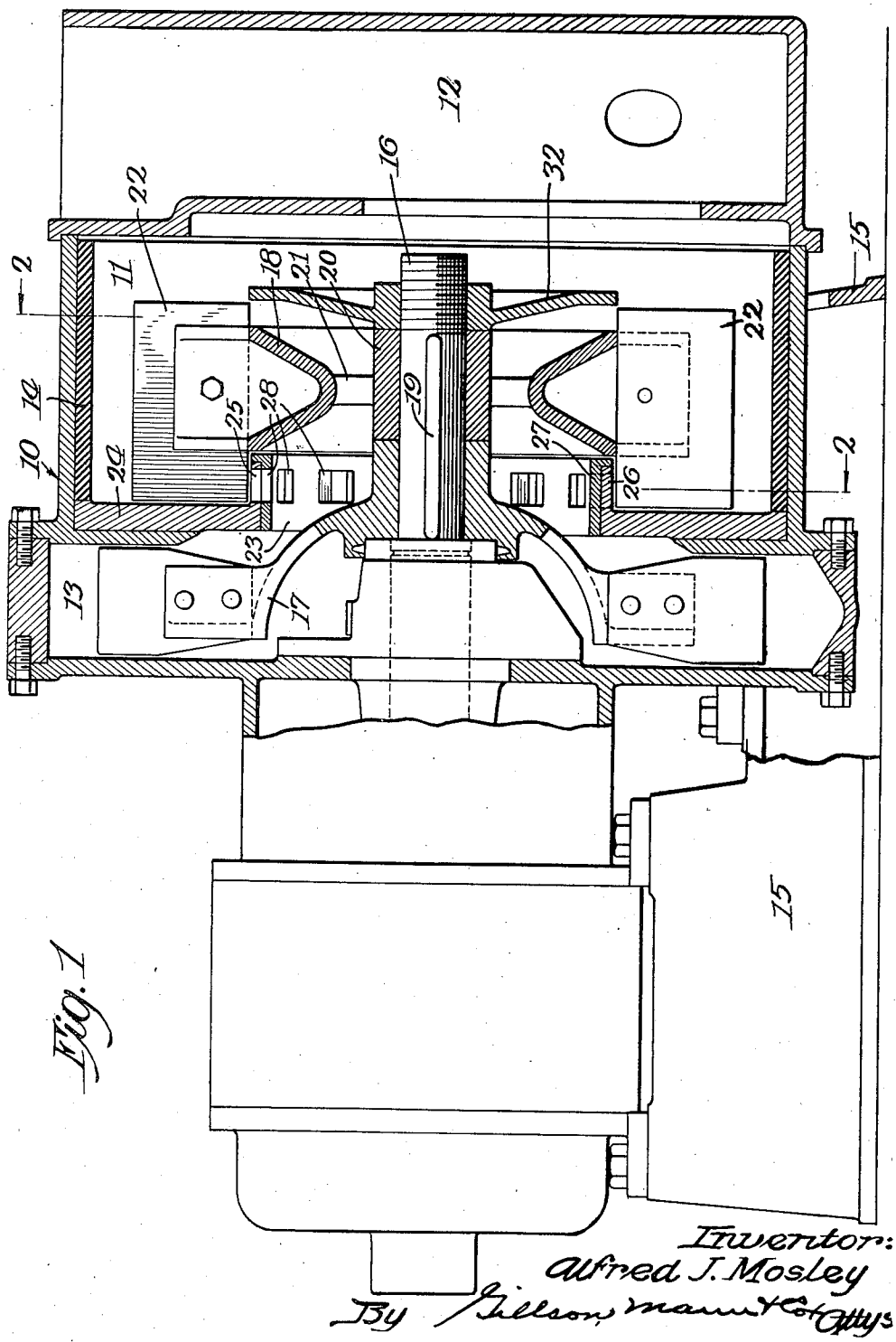


Fig. 1

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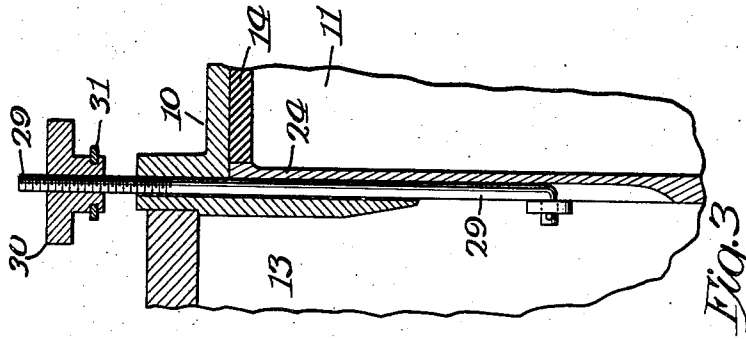


Fig. 3

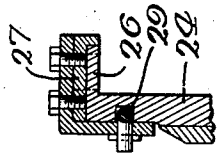


Fig. 4

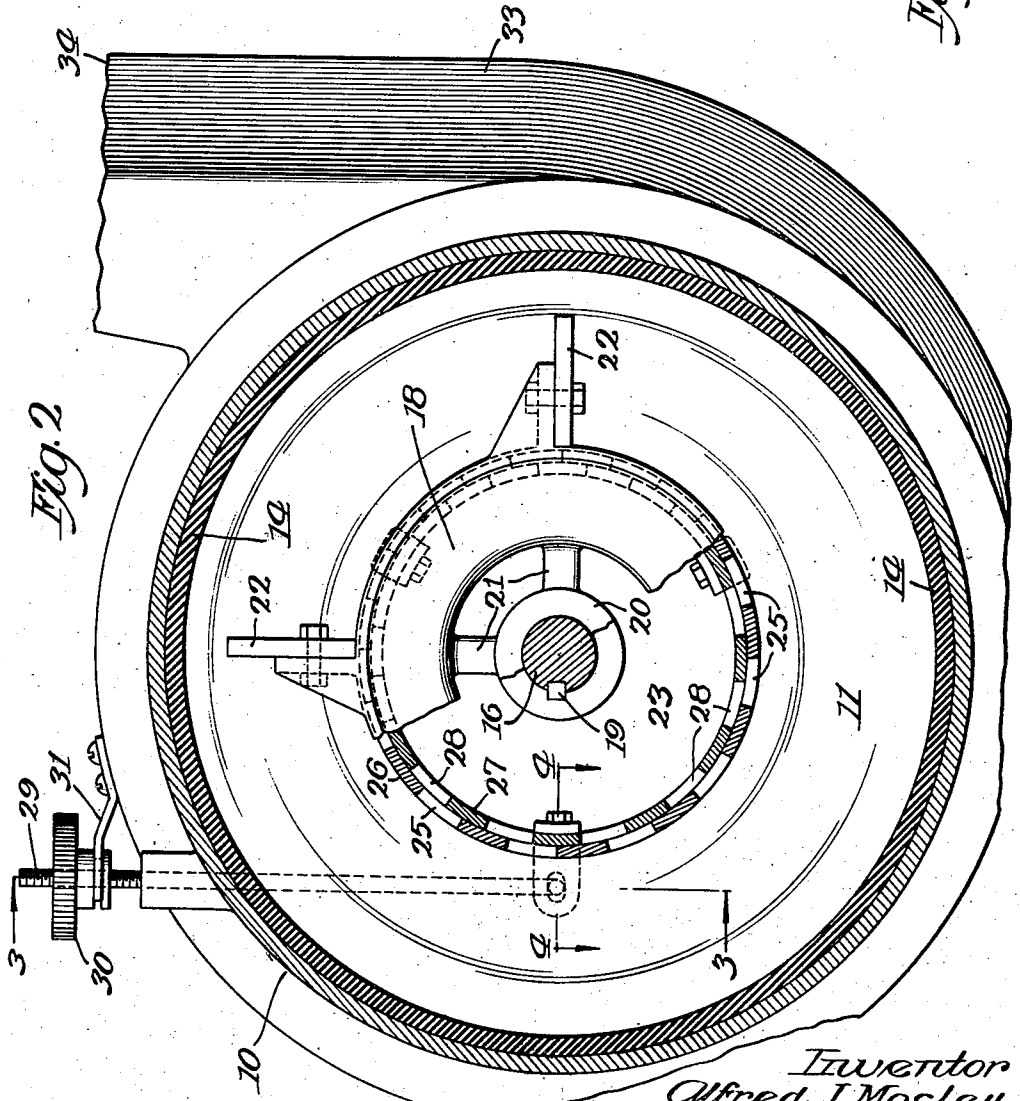


Fig. 2

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GRINDING MILL

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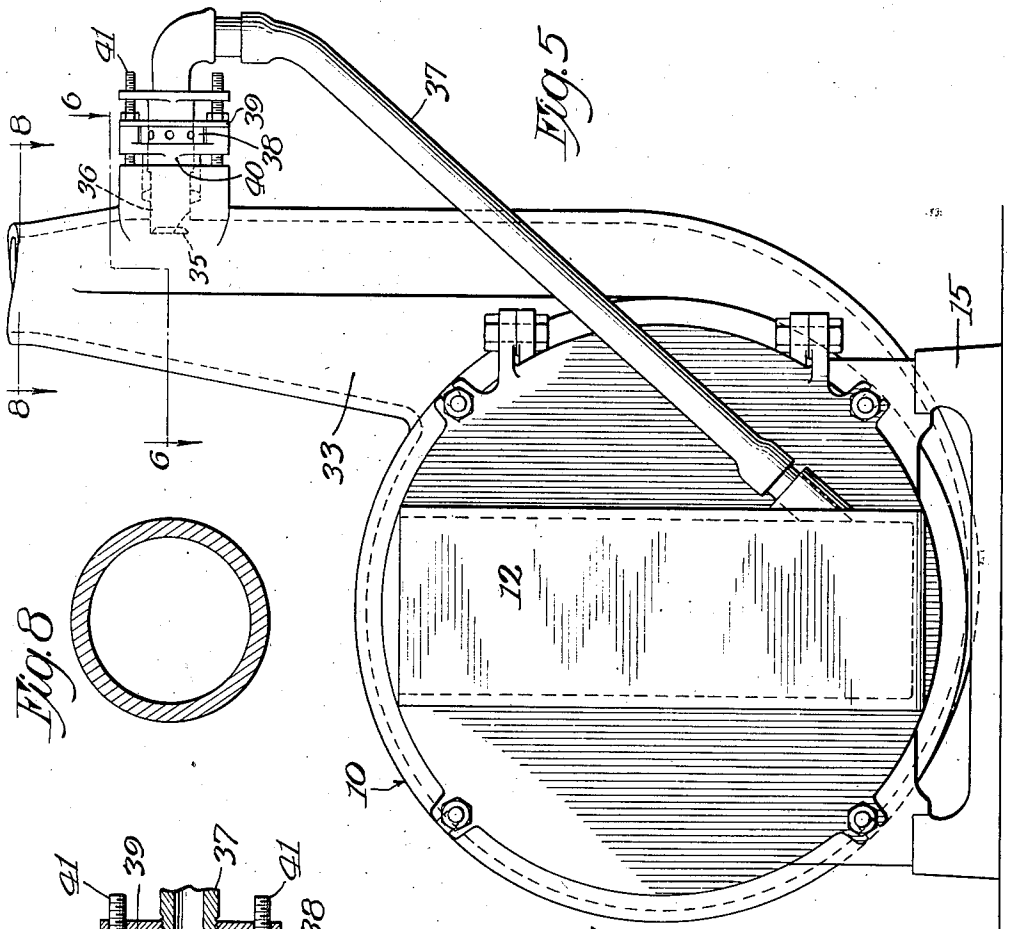


Fig. 5

Fig. 8

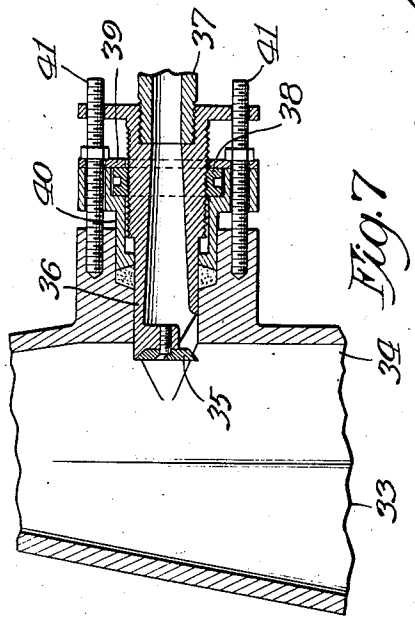


Fig. 7

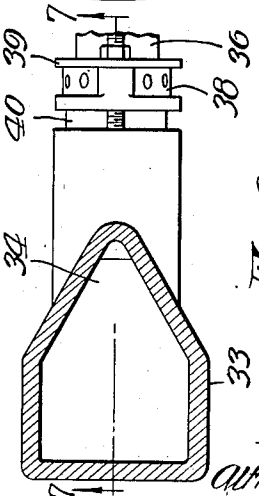


Fig. 6

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UNITED STATES PATENT OFFICE

2,100,200

GRINDING MILL

Alfred J. Mosley, Aurora, Ill.

Application August 9, 1933, Serial No. 684,370

3 Claims. (Cl. 83—11)

The invention relates to that class of grinding mills in which the reduced material is removed from the grinding chamber by the movement of air currents, and the extent of the reduction is governed by the length of time the material is retained in the chamber and this, in turn, is controlled by the strength of the moving air currents.

The principal object of the invention is to provide improved means for regulating the air current passing through the mill.

In the accompanying drawings:

Fig. 1 is a side view of a mill, partly in elevation and partly in section;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a detail section on the line 3—3 of Fig. 2;

Fig. 4 is a detail section on the line 4—4 of Fig. 2;

Fig. 5 is an end elevation of the mill;

Fig. 6 is a sectional view on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view on the line 7—7 of Fig. 6; and

Fig. 8 is a sectional view on the line 8—8 of Fig. 5.

The casing of the machine is shown at 10 and encloses a reducing chamber 11, a feed box 12, and a fan chamber 13, and is mounted on a base 15. The reducing chamber may have a lining of rubber, 14.

A shaft 16 mounted axially in the casing 10 and extending through the fan chamber 13 and into the reducing chamber 11, carries the motor armature or other suitable driver (not shown), the fan 17 and the reducing wheel 18. The fan 17 and the wheel 18 may be secured to the shaft 16 by a single key 19, as shown. The wheel comprises a rim to which the numeral 18 is applied, a hub 20 and a series of spokes 21. A series of beaters 22, of any desired number, are attached radially to the wheel rim and the reducing operation is performed by the attrition of the particles of the material upon each other, the necessary agitation being produced by the beaters.

The air currents for removing the pulverized material may be produced either by pressure or suction. In the machine as shown an exhaust fan is employed, its eye 23 being in the partition 24 separating the reducing chamber 11 from the fan chamber 13.

As the extent to which the reduction is carried is determined by the duration of the operation to which the material is subject, and as this will depend upon the strength of the air currents, provision is made for regulating such strength by varying the size of the ports leading from the portions of the reducing chamber in which the action upon the material is carried on. These ports 25 are located in an annular flange 26 projecting into the reducing chamber from the partition 24, and surrounding the eye 23 of the fan. The ports may be of any preferred number and size, and their available size is regulated by means of a damper ring 27 of annular form fitting within the flange 26 and being provided with ports 28 corresponding in number and size with the ports 25. The damper ring 27 may be turned for adjusting the size of the ports 25, by means of a screw rod 29 projecting outwardly through the partition 24 and carrying a knurled nut 30 upon its outer end, having an annular groove into which enter the arms of a forked bracket 31 secured to the casing 10.

The suction of the fan, effective through the ports 25, draws from the zone of the reducing chamber within which the beaters 22 revolve and, consequently, within which the reducing operation is active, and will carry out all of the material which has been reduced sufficiently to be controllable by the current developed. Larger particles will remain for further milling. The extent of the reduction can therefore be controlled by adjusting the size of the ports 25.

The wheel 18, being of the spoke variety, provides passage for air currents adjacent to the axis of the chamber 11, and consequently drawn from portions of the chamber 11 in which no active reducing operation is carried on. The size of the opening through the wheel may, if necessary, be regulated by means of a disk 32, threaded upon the end of the shaft 16 and adjustable toward and from the rim of the wheel. When the disk is turned back one or more washers (not shown) may be placed between its hub and the hub of the wheel.

If the character of the material is such that the attrition operation must be prolonged, or if it is desirable to finely reduce the material, the ports 25 may be closed to the desired extent so that the draft upon the zone of the reducing activity may be comparatively slight. As these ports are reduced in size the volume of air drawn through the wheel will, of course, be increased.

The material to be acted upon is fed to the mill through the compartment 12, and is withdrawn from the reducing chamber by the fan and discharged from the casing thereof through a curved conduit 33.

Inasmuch as some of the material may be withdrawn through the ports **25** before being reduced to the desired fineness, a separator may be provided to separate out this coarser material and return it automatically to the mill for further operation. For this purpose a portion of the discharge conduit is curved and, adjacent the fan casing, is preferably angular in cross-section, being V-shaped at its outer side, as shown at **34**. Larger particles of the material passing through this conduit will, by reason of their superior momentum, be carried by centrifugal force into the apex of the V-shaped section of the conduit, and will be intercepted by a deflector **35**, carried by the inner end of a discharge nipple **36** entering through the conduit wall, this nipple being open only at the side which is directed toward the advancing stream.

A conduit **37** leads from the nipple **36** into the feed box **12**, thus delivering the coarser material back to the mill for further operation. The nipple **36** is adjustably secured to the conduit **33**, so that it may be projected to a greater or lesser extent into the chamber of the conduit. This adjustment is provided for by a nut **38**, threaded upon the nipple and held against longitudinal movement by a plate **39**, secured to the gland **40**, through which the nipple enters the conduit by means of threaded posts **41**. The nut **38**, therefore, fits within a counterbore of the gland **40**, and may be rotated therewithin by means of a spanner wrench.

While an operative and preferred embodiment of the invention is shown and has been herein described, various changes may be made within the scope of the appended claims.

I claim as my invention—

1. In a reducing mill, in combination, a casing inclosing a reducing chamber, a beater wheel mounted to revolve in the chamber and having an imperforate rim and an apertured web, a side wall of the chamber being in substantial contact with the rim of the wheel and having ports open to the outer portion of the reducing chamber, means for varying the size of the ports, means for applying suction to the reducing chamber through the ports, and means for regulating the size of the wheel apertures.

2. In a reducing mill, in combination, a casing inclosing a reducing chamber and a fan chamber open thereto, a shaft located on the axis of these chambers, an axially apertured beater wheel and a fan carried by the shaft, an annular apertured flange extending into the reducing chamber to the rim of the wheel and surrounding the opening between the two chambers, and a damper ring concentric with the flange and movable from the outside of the casing to regulate the flange apertures.

3. In a reducing mill, in combination, a casing inclosing a reducing chamber and a suction fan chamber, the two chambers being separated by a wall having an aperture forming the eye of the fan assembly and an annular series of ports surrounding the eye, a shaft projecting from the outer wall of the fan chamber through the named aperture, a fan and a beater wheel mounted on the shaft, the wheel being tubular and having an imperforate rim making substantial contact with the eye of the fan assembly, a diaphragm facing the opposite end of the wheel chamber and spaced from the wheel rim to provide an annular air admission passage, and a damper for controlling the named ports.

ALFRED J. MOSLEY.