No. 844,085. PATENTED FEB. 12, 1907.

E. BARTHELMESS.

RING AND ROLLER AND LIKE MILL.

APPLICATION FILED MAR. 2, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

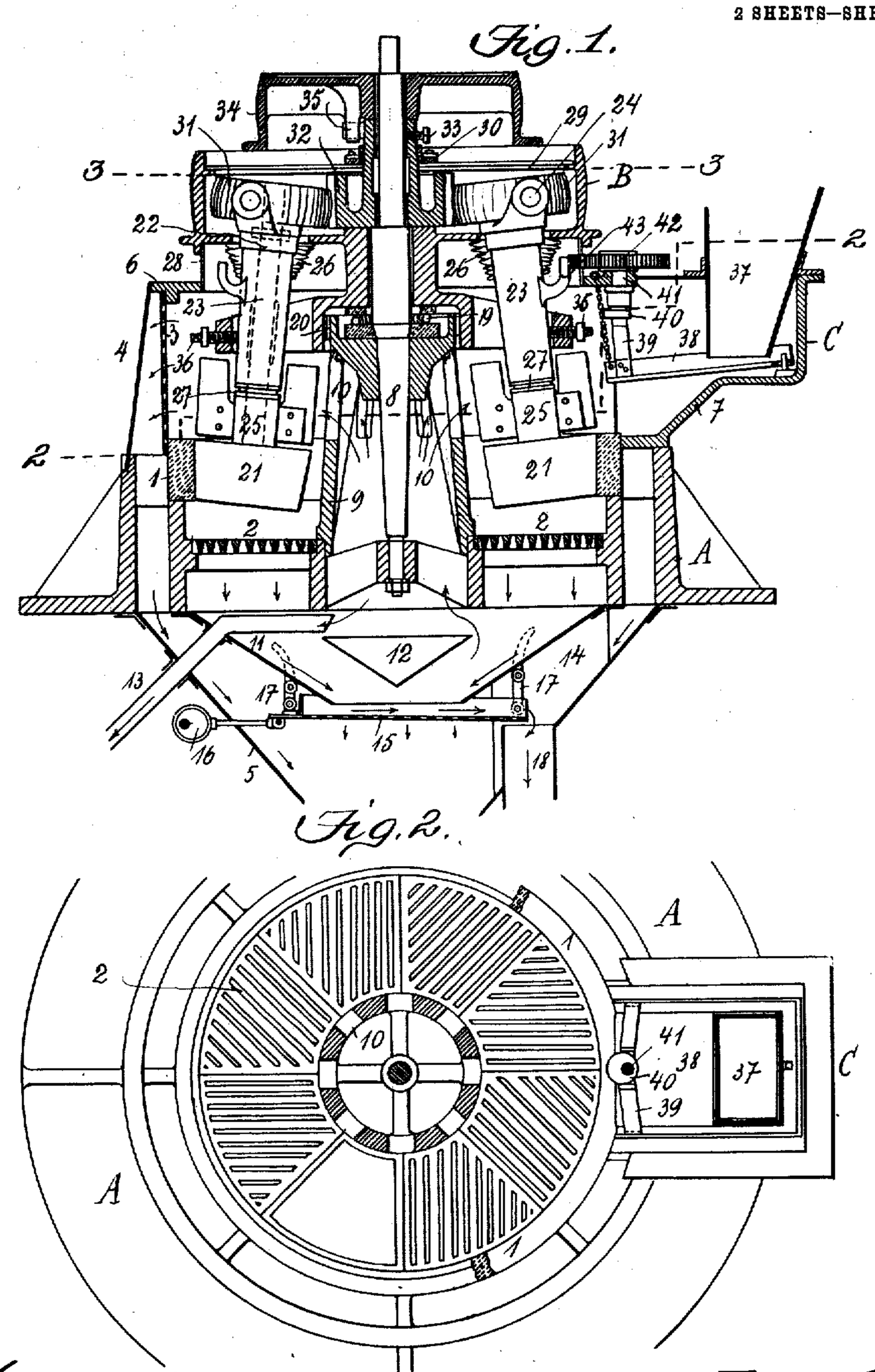

Fig. 2.

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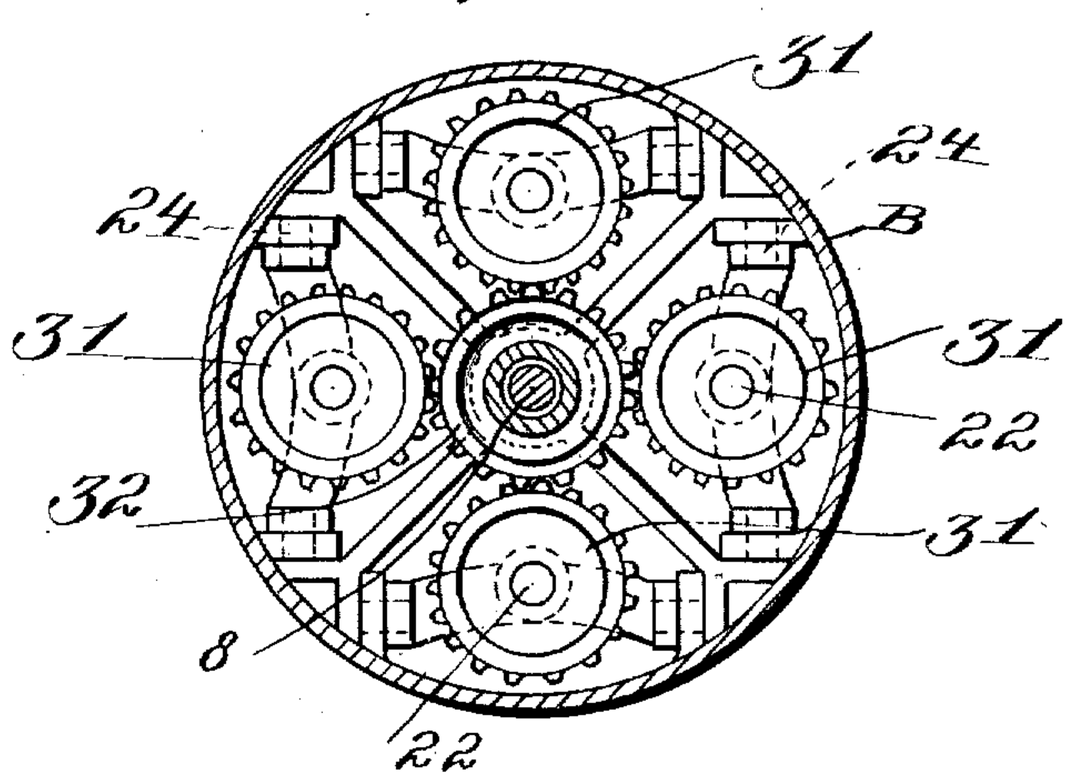
Fig. 3.



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UNITED STATES PATENT OFFICE.

EMIL BARTHELMESS, OF NEUSS, GERMANY.

RING AND ROLLER AND LIKE MILL.

No. 844,085. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed March 2, 1903. Serial No. 145,747.

To all whom it may concern:

Be it known that I, EMIL BARTHELMESS, a subject of the German Emperor, residing at Neuss-on-the-Rhine, Germany, have invented certain new and useful Improvements in Ring and Roller and Like Mills, of which the following is a specification.

My invention relates to ring and roller mills having the rollers or grinding-bodies mounted on pendulums and serving for grinding hard and soft materials—such as ores, coal, colors, &c.—to a very fine flour or for granulating the same to a definite size of grain by wet or dry grinding, the new features and improvements employed in these mills and forming the object of my said invention being set forth in the following description and in the accompanying drawings, in which—

Figure 1 is a vertical section of a pendulum-mill constructed according to my invention. Fig. 2 is a horizontal section on the line 2 2 of Fig. 1, interior parts being removed; and Fig. 3 is a similar view on the line 3 3 of Fig. 1.

My improved pendulum-mill comprises three principal parts—namely, the stationary grinding vessel or vat A, the main belt-pulley B, and the inlet or feed apparatus C. These features differ from the constructional forms of known pendulum-mills in that they enable new technical effects to be obtained, while obviating known disadvantages, this being so whether they are applied separately or together to a pendulum-mill.

The grinding-vat A bears all the fixed parts of the mill—namely, the grinding-ring 1, the bottom formed by grates 2, the fine sieve 3, the sheet-metal casing 4, the collecting-hopper 5, the annular cover 6, the inlet-hopper 7, and the shaft 8, which latter is preferably of steel and is rigidly mounted in a hollow column 9, of cast metal. The column 9 is provided in its upper part with elongated openings 10, through which a separating medium enters the grinding-vat to promote the carrying out of the grist—that is to say, the ground material—the separating medium, for example, being air, and which flowing downwardly separates the finely-ground material from that not sufficiently ground. The air is drawn in through openings in the cover of the grinding-vat, through which the shafts of the grinding bodies or rollers extend. A portion of the air passes downwardly, while the remaining portion passes out through the sieve 3. That portion of the air which passes downwardly through the vat is then drawn up through the element 9, as a natural suction is created owing to the operation of the grinding bodies or rollers, and from the element 9 the air is drawn in the vat through the openings 10. These openings are narrow, so that the air as it enters the grinding-vat is separated into jets and blows upward the finely-ground material. The grist is retained in the collecting-hopper 5 by its own weight and the arrangement of the sheet-metal baffles or deflectors 11 and 12.

The tube 13 serves for sucking off the dusty air. Its suction-opening is arranged at a point where the amount of dust in the air is the least.

In order to prevent the grist thrown through the fine sieve 3 from falling in the conduit 18, a protecting-wall 14 is provided.

16 is the eccentric driving-gear, and 17 17 are suspension-springs for a flat sieve 15.

The collecting-hopper 5 serves for catching the finished grain, while the insufficiently-ground material passes through conduit 18 in order to be returned to the mill.

The bottom 2 is composed of separate interchangeable grate members which can readily be removed to empty the mill at periodic intervals, if desired.

The main belt-pulley B, Fig. 1, turns loosely on the shaft 8 and rests on the hollow column 9, of cast metal, by means of a ball-bearing 19, which is rendered dustproof by means of felt packing 20. Said pulley serves as a carrier for any desired number of grinding bodies or rollers 21, suspended like pendulums, which can be swung out by means of shafts 22 and pendulum-sleeves 23 about the pins 24. 25 indicates hubs with vanes or webs. 26, 27, and 28 are packing-pieces, of felt, leather, or cloth, by means of which a complete closure against dust, water, &c., is attained. The interior of the pulley B is likewise packed against dust from the top by a sheet-metal cover 29 and felt packing 30. When it is desired to provide separate driving-gear for the pendulums themselves in order to increase the grinding power, the interior of the pulley B serves for receiving the gear-wheels 31 and the driving gear-wheel 32. The gear-wheel 31—that is to say, the pitch-circles of the teeth thereof—are contracted to an arc described about the point

24 of suspension, whereby a uniformly deep engagement of the teeth is insured for each position of the pendulums. The central gear-wheel 32 is either rigidly connected with the shaft 8 by means of a set-screw 33 or is set in rotation by means of clutch-jaws 35 from a second belt-pulley 34. If it be desired that the mill shall grind the grist into grains, the mechanism 31, 32, 33, 34, and 35 can be dispensed with. Also a set-screw 36, serving as a stop, can be arranged on the belt-pulley B, against which set-screw the pendulum-sleeve 23 rests, so that the grinding-roller 21 is kept at a minimum distance from the grinding-ring 1, corresponding to the desired size of the grains.

As an inlet arrangement C any known construction serving for the supply of the material can be employed. Below the inlet-tube 37 is a shaking-shoe 38, which is operated by stops 39, an eccentric 40, a shaft 41, a ratchet-wheel 42, and a cam 43. The cam 43 is rigidly connected with the sleeves 23 of the pendulum. If too much material is supplied to the mill, so that the rollers 21 are forced away from the grinding-ring 1 or the distance regulated by the set-screws is increased, the cam 43, following the movements of the pendulum, comes out of gear. The shoe 38 stops then till the mill has worked the surplus of material.

What I claim is—

1. In a pendulum-mill for wet or dry grinding to flour or grains, a main driving-pulley, a pendulum-roll suspended therefrom, gear-wheels arranged in operative relation with respect to said pulley and said pendulum and inclosed in said pulley in a dust-tight manner, a grinding-vat in which operates the said pendulum, a hollow column arranged centrally in said vat and provided with openings for the entrance of air or water, a main shaft carrying the pulley and secured in said hollow column, and a hopper arranged below the column.

2. In a pendulum-mill, for wet or dry grinding to flour or grains, a grinding-vat, a hollow column arranged centrally therein and provided with openings for the entrance of air or water, a main shaft fixedly secured in said hollow column, a hopper arranged below the column and a deflector located within the hopper and at a distance from the lower end of said hollow column.

3. In a pendulum-mill, for wet or dry grinding to flour or grains, a grinding-vat, a hollow column arranged centrally therein and provided with openings for the entrance of air or water, a main shaft fixedly secured in said hollow column, a hopper arranged below the column, a deflector located within the hopper and at a distance from the lower end of said hollow shaft, and a suction-pipe having its mouth interposed between the deflector and the end of said shaft.

4. In a pendulum-mill for wet or dry grinding to flour or grains, a grinding-vat, a hollow column arranged centrally therein and provided with openings for permitting the entrance of air or water, a deflector located below and at a distance from the lower end of said column, a hollow frusto-conical deflector surrounding said first-named deflector at a distance therefrom, a hopper surrounding said latter deflector, a shaking-screen interposed between said hopper and said deflectors, and a discharge-pipe extending through said hopper and adapted to receive material passing off of said screen.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EMIL BARTHELMESS.

Witnesses:

WILLIAM ESSENWEIN,

PETER LIEBER.