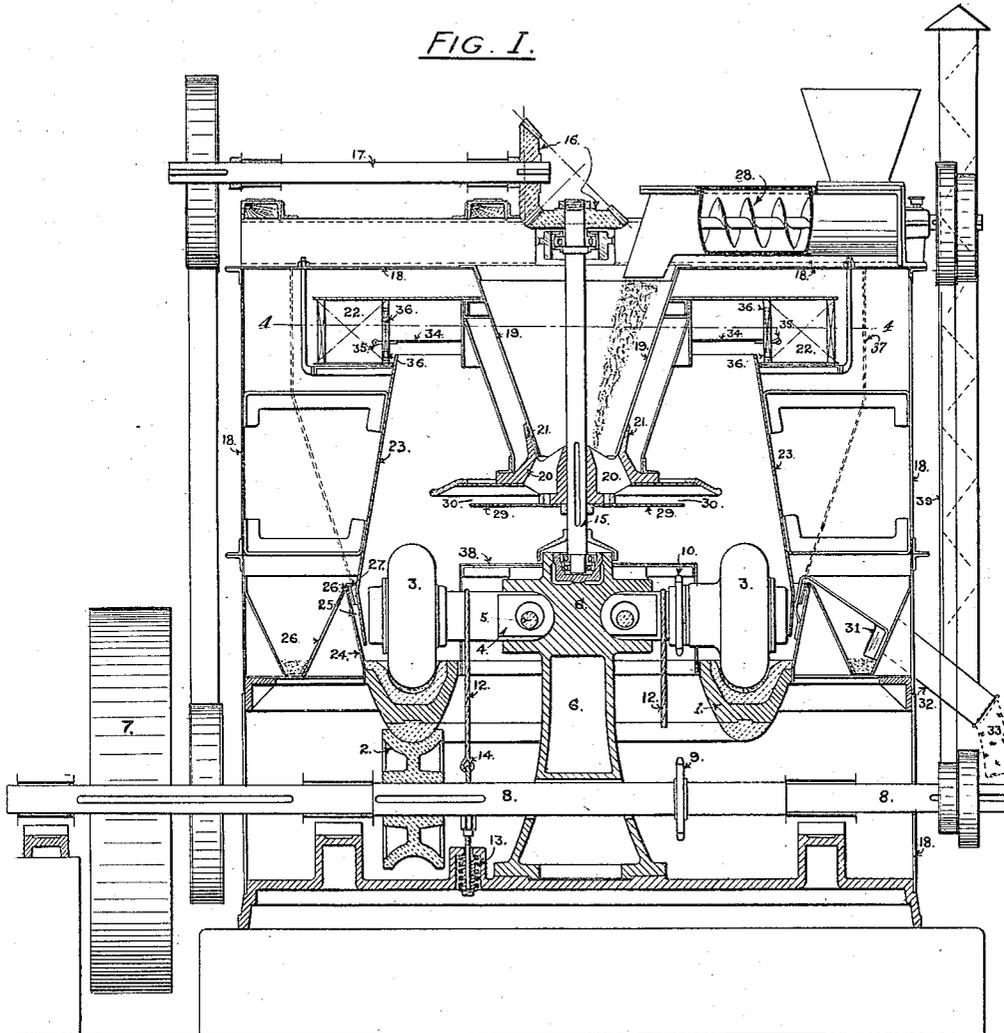


A. H. MOSS.  
GRINDING OR CRUSHING MACHINERY.  
APPLICATION FILED FEB. 8, 1915.

1,154,532.

Patented Sept. 21, 1915.  
3 SHEETS—SHEET 1.



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*Arthur H. Moss*

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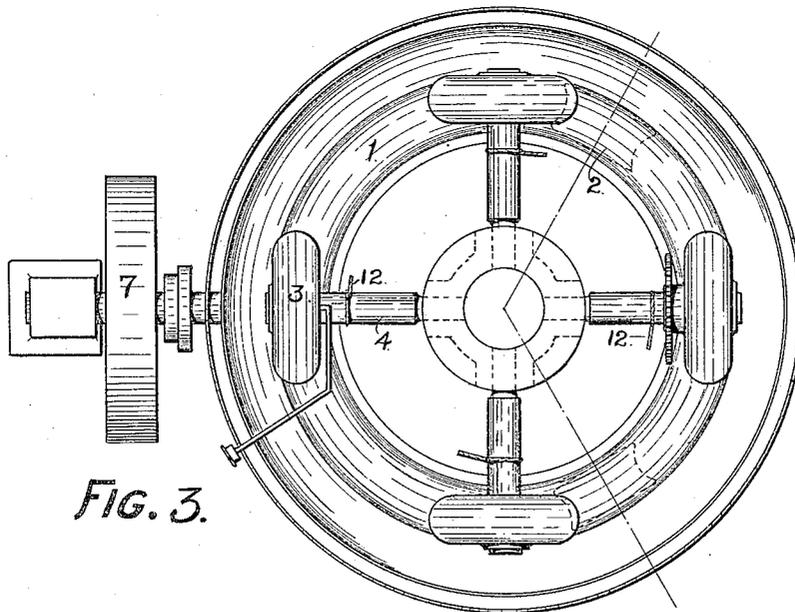
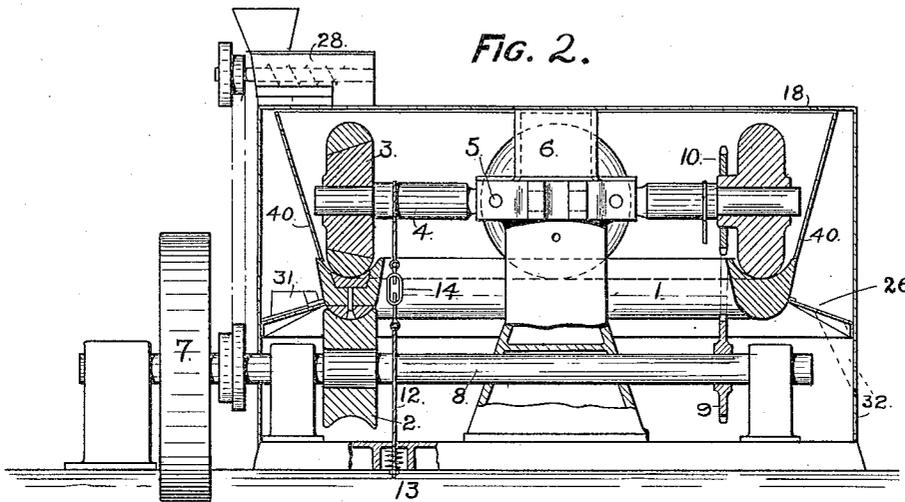


FIG. 3.

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FIG. 4.

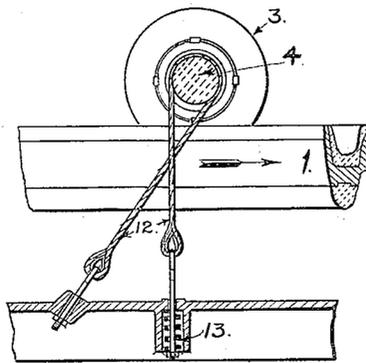
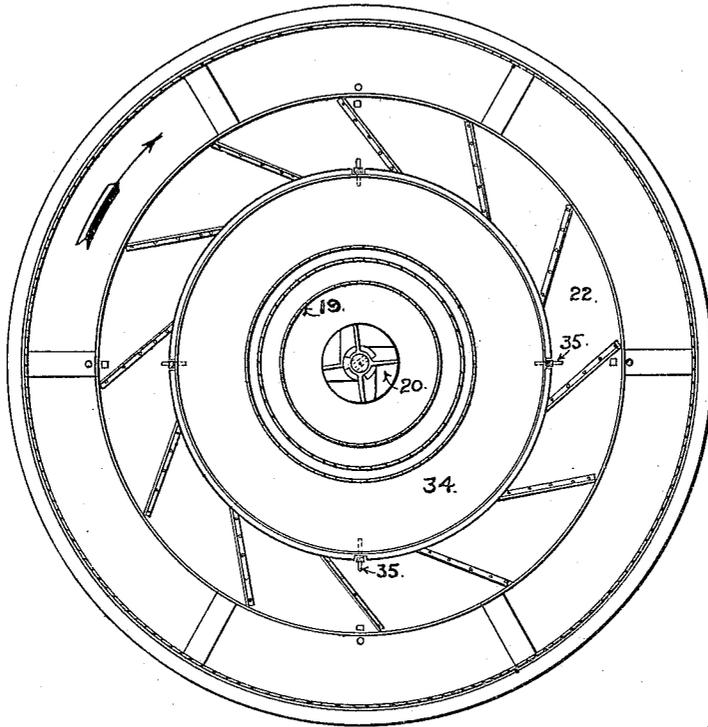


FIG. 5.

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# UNITED STATES PATENT OFFICE.

ARTHUR HARRIMAN MOSS, OF MISTERTON, GAINSBOROUGH, ENGLAND.

GRINDING OR CRUSHING MACHINERY.

1,154,532.

Specification of Letters Patent. Patented Sept. 21, 1915.

Application filed February 8, 1915. Serial No. 6,834.

To all whom it may concern:

Be it known that I, ARTHUR HARRIMAN MOSS, a subject of the King of England, residing at Myrtle Villa, Misterton, Gainsborough, in England, have invented certain new and useful Improvements in or Relating to Grinding or Crushing Machinery, of which the following is a specification.

This invention relates to grinding or crushing machinery of the kind in which rollers on swiveling shafts work in a hollow faced horizontal rotating ring to which they may be pressed by springs or weights, the object of the invention being to provide improvements in the construction and operation whereby a simple machine of great efficiency is provided, which may be combined with a pneumatic separator, so that the one machine will grind material and deliver it at the desired degree of fineness.

In the accompanying drawings:—Figure 1 is a sectional elevation of a grinding machine according to this invention; Fig. 2 is a sectional elevation of a slightly modified form of the invention; Fig. 3 is a plan of the upper portion being removed, of the embodiment of the invention shown in Fig. 2; Fig. 4 is a horizontal section substantially on the line 4—4 of Fig. 1; Fig. 5 is a detail view.

Like reference figures indicate like parts throughout the drawings.

In carrying out this invention a grinding ring 1 is mounted in a horizontal position on three or more supporting rollers 2, (of which only one is shown in Fig. 1 of the drawings). The upper face of the grinding ring 1 is concave or hollow, as shown, and one or more, but conveniently four, grinding rollers 3 rest in this concave face. The rollers 3 are rotatably mounted on swiveling shafts 4 which are preferably disposed radially in relation to the ring 1, although the position of the shafts 4 and the shape of the rollers 3 may be varied according to requirements. The shafts 4 are pivoted at 5 to a central pedestal 6 to provide the required swiveling thereof to enable the grinding rollers to ride over the material to be ground, which is fed into the hollow upper face of the grinding ring 1.

The grinding surfaces of the ring 1 and of the rollers 3 may be renewable by any convenient construction, such as that indicated in the drawings.

One of the supporting rollers 2 is driven by a pulley 7 on its shaft 8 and thus the ring 1 will be caused to rotate, the grinding rollers 3 also revolving by frictional contact with the ring or its contents. If desired one of the grinding rollers 3 may be positively driven from the driven supporting roller shaft 8. Any suitable driving means, such as belts, gear wheels, etc., may be employed to connect one of the rollers 3 with the shaft 8. In the preferred construction however the driven supporting roller shaft 8 is extended beyond the center of the machine and fitted with means for driving a grinding roller 3 on that side, which would conveniently be disposed above the extended shaft 8. Thus the grinding roller may be driven by an uncrossed belt, or a chain drive may be used, chain wheels 9 and 10 being illustrated respectively on the extended shaft 8 and on the grinding roller 3 above it. The drawings show a construction in which four of the grinding rollers 3 are provided, although if desired three only may be used, but in that case in order that one may be above the extended part of the shaft 8 none of them would be immediately above any of the supporting rollers 2 as it is desirable for the rollers to be equally spaced from one another.

Means are provided for pressing the grinding rollers 3 to the ring 1. The chain or belt drive 9 and 10 gives an extra pressure beyond the weight of the rollers 3 and shaft 4 due to the added tension of the chain or belt caused by the material to be ground fed under the roller and thereby increasing slightly the distance between the shaft centers. Other means for pressing the rollers 3 to the grinding ring 1 may be employed, such as wire ropes 12 passing over or secured to the shafts 4 and connected to weights or springs 13 to give the desired tension. Turnbuckles 14 are preferably provided to adjust the amount of this extra pressure and a graduated scale may also be furnished to indicate the amount thereof. The wire ropes or the like 12 may be inclined to the vertical, sloping down from the shaft 4 in a direction opposite to that in which the adjacent part of the ring 1 moves (as shown more particularly in Fig. 5). In this manner the wire ropes or the like will also reduce the twisting stress on the pivots 5 of the shafts 4.

The grinding machine described above may be used with any desired screening apparatus, but it is preferred to combine there-with a pneumatic separator as illustrated in Fig. 1, for which purpose a vertical shaft 15 is stepped on the pedestal 6 and is driven by bevel gears 16 from a counter-shaft 17, itself rotated by a band or the like from the shaft 8. The machine is inclosed by a dust proof casing 18 having a central conical feed opening or hopper 19 surrounding the shaft 15. A centrifugal spreader 20 is fixed on the shaft 15 and overlaps the fixed hopper 19, as shown at 21. The spreader 20 carries a fan 22 arranged near the upper part of the casing 18 around the hopper 19, and a conical or annular guide plate 23 extends from the fan downward toward the grinding ring 1. Another conical or annular guide plate 24 is secured to the grinding ring 1 and surrounds the plate 23 leaving an annular passage 25 between them. Surrounding the guide plate 24 is an annular channel 26 (supported by the casing 18) the inner side of which overlaps the guide plate 24 as shown at 27.

The material to be ground is fed into the hopper 19 by any convenient means such as by the conveyer screw 28 and, the machine being set in motion by power applied to the pulley 7, the material falling through the spreader 20 on to its base plate 29 will be delivered therefrom through the openings 30 by the centrifugal force developed on to the guide plate 23 and about the grinding rollers 3 whence it falls into the grinding ring 1 and will be ground therein under the rollers 3. Meanwhile a current of air will be set up within the casing 18 by the fan 22. This current, starting from the periphery of the fan will pass downward between the casing 18 and the guide plate 23, through the passage 25 to the grinding ring 1, and thence upward inside the guide plate 23 and through the fan 22. In its upward passage this current of air will carry all the finer particles of material being ground up into the fan 22 and as these particles issue from the periphery of the fan they will strike against the adjacent wall of the casing 18 and fall down into the channel 26 whence they may be removed by a scraper 31 attached to and revolving with the grinding ring 1 to be finally discharged at 32. This discharge is preferably provided with an air seal in any known manner, as by a flexible sleeve 33, which with the ground material contained thereby and in the discharge will usually be sufficient. The degree of fineness of the particles thus delivered will of course depend on the strength of the air current and with a given speed of revolution this may be varied by adjusting the position of a damper 34 in the fan 22, such adjustment being effected by any desired means

such as by supporting pegs 35 which may be placed in different holes 36 formed in the fan structure.

If desired, the air current may be assisted in its separation of the ground material by a surrounding screen, indicated in dotted lines at 37.

In order to prevent the current of air from circulating below the grinding ring 1 and totally to inclose the shafts and chain a casing 38 is secured to the central pedestal 6 extending toward the ring 1.

A ventilating pipe 39 may, if desired, be arranged in the discharge outlet 32 leading to a dust chamber or to the atmosphere in order to take away any excess of air or dust.

As an alternative to the pneumatic separator described above the arrangement illustrated in Figs. 2 and 3 may be used, where the grinding ring 1 is surrounded by a screen 40 which may be stationary but is preferably fixed to the ring and rotates therewith. This screen extends above the grinding ring at a suitable angle and it will be seen that as successive portions of the circumference of the grinding rollers 3 leave the face of the ring 1 the material being treated will be lifted up by the centrifugal force developed and carried on to the screen 40. The tailings will fall back into the hollow of the grinding ring 1 to pass under the rollers 3 again while the fines will pass through the screen on to the channel 26 surrounding the screen. In the construction illustrated this channel is stationary being formed on the casing 18 which incloses the machine and prevents dissipation of dust, or it may be separately made and suitably supported. A scraper or scoop 31 is fixed to the ring 1 and traveling therewith around the channel 26 carries the fines to the discharge 32. As a modification the channel 26 may be fixed to the ring 1 the scraper 31 being stationary and fixed in proximity to the outlet 32. If desired the screen 40 may be caused to vibrate by any suitable means, especially when it does not revolve with the ring 1.

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

1. In a grinding or crushing mill, the combination with a substantially horizontal grinding ring having a concaved upper face, and means for rotating said ring, of grinding rollers rotatable on swiveling shafts and resting in the depression in the upper face of the grinding ring, and tension means acting on the swiveling shafts to vary the pressure of the grinding rolls against the grinding ring, said means acting in a direction inclined to the vertical and opposite the direction of rotation of the adjacent portion of the grinding ring.

2. In a grinding or crushing mill, the combination of three or more supporting roll-

ers, a substantially horizontal grinding ring supported directly and solely on said rollers, means for driving one of the supporting rollers to rotate the grinding ring including  
5 a shaft on which the supporting roller is mounted and that extends past the axis of the grinding ring, grinding rollers cooperating with the grinding ring, and connections between one of the grinding rollers  
10 and the section of the aforesaid driving shaft of the supporting roller that extends beyond the axis of the grinding ring for positively rotating the grinding roller.

3. In a grinding or crushing mill, the combination with a grinding ring and coating  
15 grinding rollers, of an inclosing casing, a guide plate dividing the interior of the casing above the grinding means into an inner and an outer chamber, an exhaust fan for  
20 creating a current of air from the inner to the outer chamber, a second guide plate extending up from the periphery of the grinding ring and to a point above the lower edge  
25 of the first said guide plate, and separated from the first said plate by an annular space,

and means for feeding material to be ground to the grinding ring.

4. In a grinding or crushing mill, the combination with a grinding ring and coating  
30 grinding rollers, of an inclosing casing, a guide plate dividing the interior of the casing above the grinding means into an inner and an outer chamber, an exhaust fan for  
35 creating a current of air from the inner to the outer chamber, a second guide plate extending up from the periphery of the grinding ring and to a point above the lower edge  
40 of the first said guide plate, a receptacle for ground material within the outer chamber of the casing adjacent the grinding ring and having its inner wall extended over said second  
45 guide plate into the space between the guide plates, and means for feeding material to be ground to the grinding ring.

In testimony whereof I have affixed my  
signature in presence of two witnesses.

ARTHUR HARRIMAN MOSS.

Witnesses:

ARTHUR H. GREENWOOD,  
EDITH A. PORTEUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."