

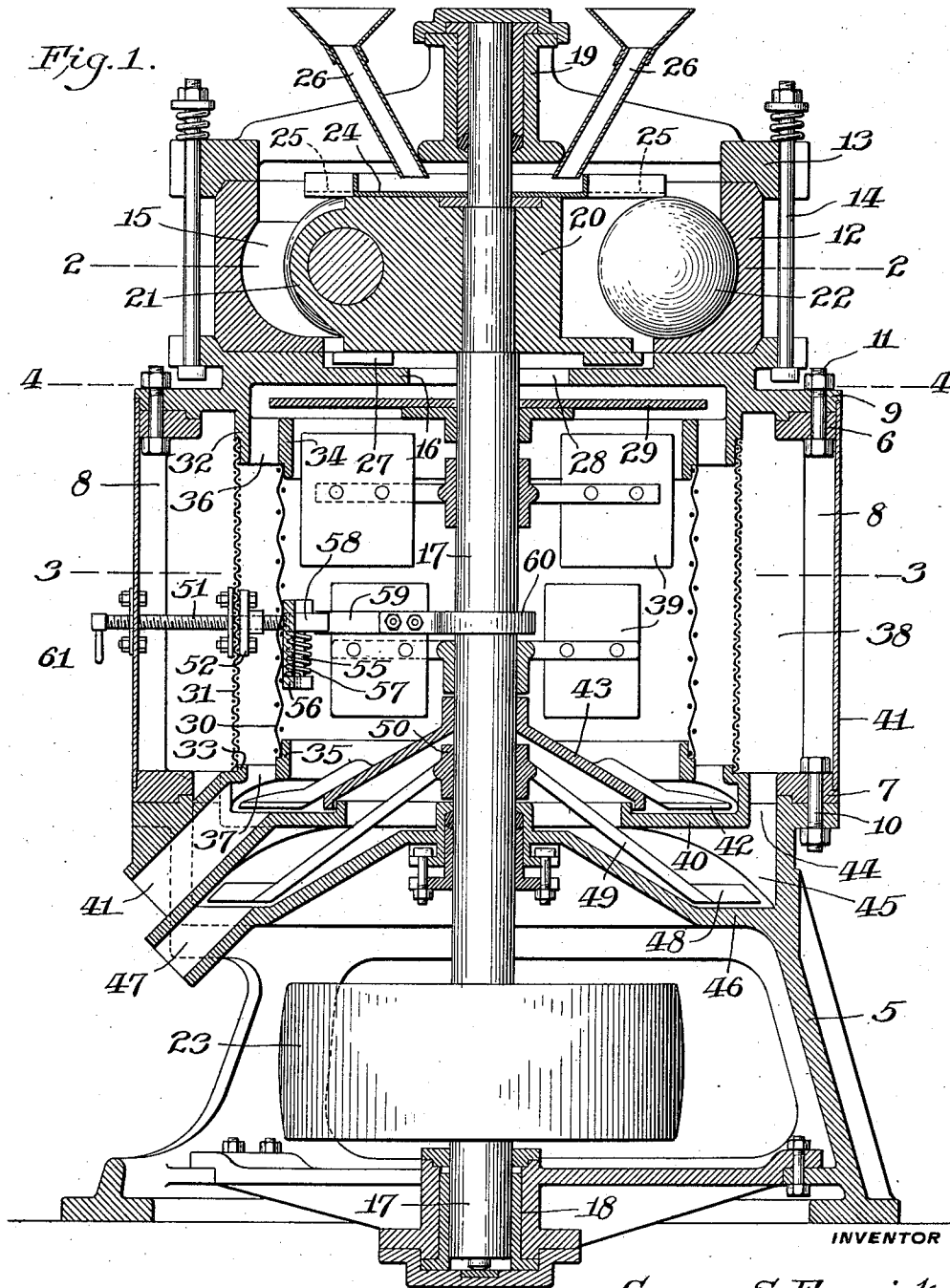
G. S. EMERICK.
GRINDING MILL.

APPLICATION FILED JUNE 27, 1910.

Patented June 11, 1912.

3 SHEETS-SHEET 1.

1,028,867.



INVENTOR

George S. Emerick

BY

A. V. Jones
ATTORNEY

WITNESSES

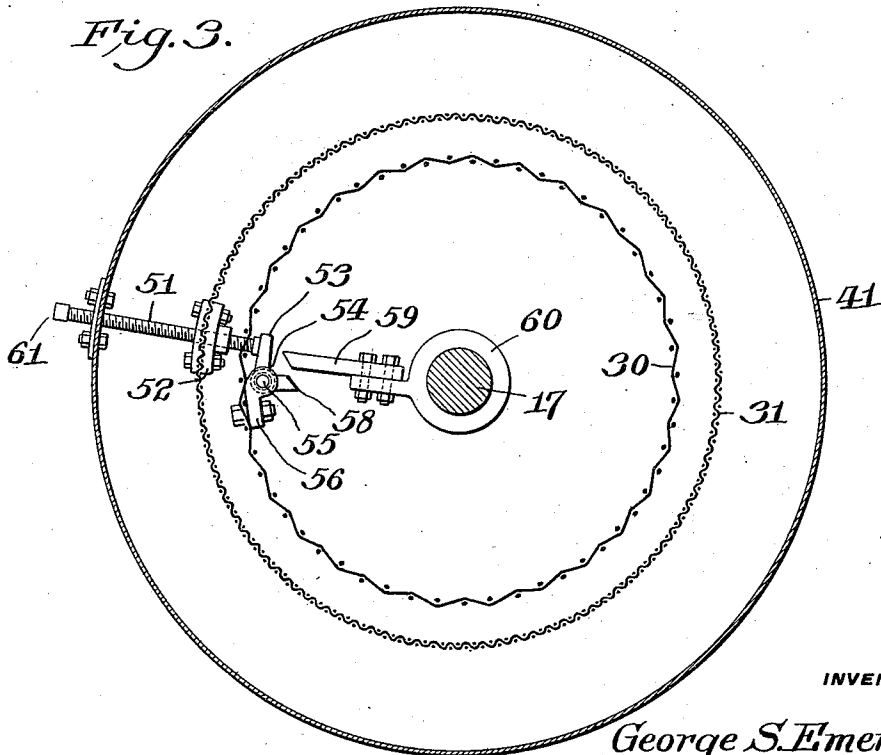
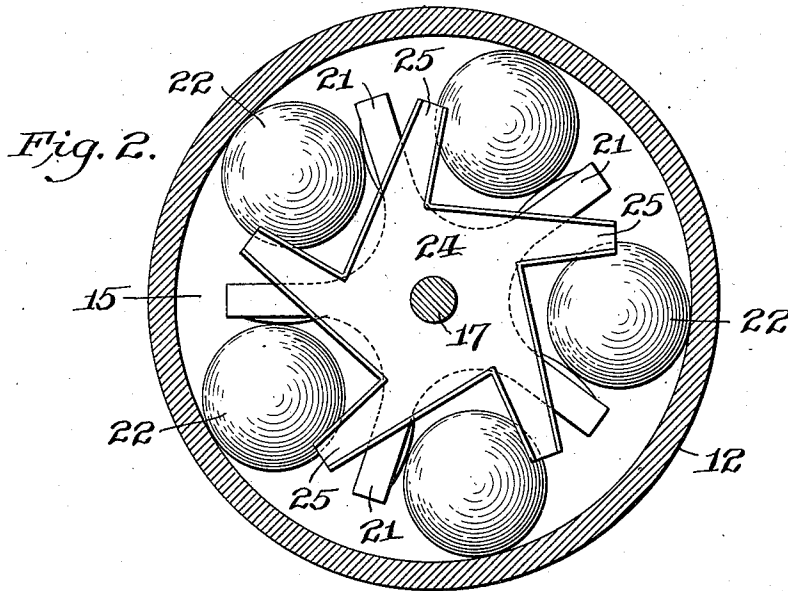
Flora E. Tunney
[Signature]

1,028,867.

G. S. EMERICK.
GRINDING MILL.
APPLICATION FILED JUNE 27, 1910.

Patented June 11, 1912.

3 SHEETS—SHEET 2.



INVENTOR

George S. Emerick

BY

A. V. Jones

ATTORNEY

WITNESSES

Florence E. Tunney
W. H. Summell

1,028,867.

G. S. EMERICK.
GRINDING MILL.
APPLICATION FILED JUNE 27, 1910.

Patented June 11, 1912.

3 SHEETS—SHEET 3.

Fig. 4.

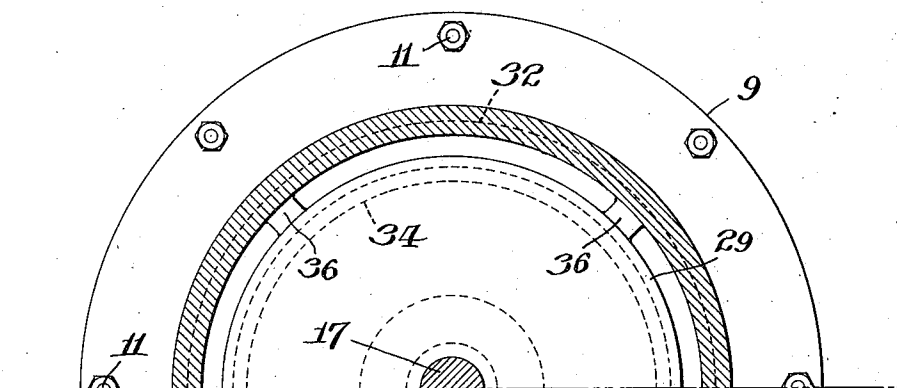
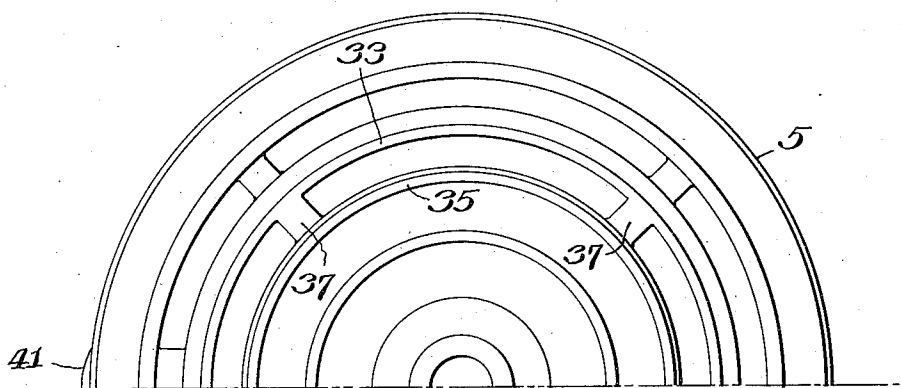


Fig. 5.



WITNESSES

Florence E. Tunney
W. J. Finkle

INVENTOR

George S. Emerick

BY

A. V. Grant

ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE S. EMERICK, OF NAZARETH, PENNSYLVANIA.

GRINDING-MILL.

1,028,867.

Specification of Letters Patent.

Patented June 11, 1912.

Application filed June 27, 1910. Serial No. 568,956.

To all whom it may concern:

Be it known that I, GEORGE S. EMERICK, a citizen of the United States, residing at Nazareth, Northampton county, State of Pennsylvania, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

The object of my invention is to provide a grinding and separating machine of novel, simple and efficient construction having provision whereby, first, the material to be ground may be properly fed to the grinding devices; secondly, whereby the ground material may be transferred from the grinding devices to a separating screen; thirdly, whereby the separating screen may be jarred or agitated to dislodge ground material therefrom; and, fourthly, whereby ground material may be discharged from the machine.

With the object thus generally stated, the invention consists in the novel construction and combinations of parts which will be hereinafter fully described and particularly claimed.

In the drawings: Figure 1 is a central vertical section through my improved grinding and separating machine. Fig. 2 is a horizontal section on line 2—2 of Fig. 1. Fig. 3 is a horizontal section on line 3—3 of Fig. 1. Fig. 4 is a horizontal section on line 4—4 of Fig. 1. Fig. 5 is a plan view of the top or base portion of the main frame of the machine.

The main frame of the machine comprises a lower or base portion 5, a casting resting upon the base portion and comprising upper and lower rings 6 and 7, respectively, connected by vertical standard 8 and a casting 9 resting upon the upper ring 6, the lower ring 7 being secured to the base portion 5 by bolts 10 and the casting 9 being secured to the upper ring 6 by bolts 11. Resting upon the casting 9 is the grinding ring 12 which is secured thereto by a top frame 13 resting upon the ring 12 and bolts 14 extending between the casting 9 and top frame 13 as shown. The grinding ring 12 incloses a grinding chamber 15 which is provided with a floor portion 16 formed by the casting 9.

Extending centrally through the machine is a vertically-arranged driving shaft 17, the lower end of which is supported in a suitable bearing 18 on the base portion 5 of the main frame and the upper end of which is journaled in a suitable bearing 19

on the top frame 13. The shaft 17 extends centrally through the grinding chamber 15 and secured to the shaft 17 within the grinding chamber is a driving member 20 provided with radially projecting arms 21 between which are arranged the grinding balls 22 which, during the rotation of the shaft 17 and therewith the member 20, are adapted to be driven around the interior of the grinding ring 12 to effect the grinding operation in the usual well known manner, the material being ground between the balls 22 and grinding ring 12. The driving shaft 17 is provided with a suitable pulley 23, by means of which it may be rotated.

Secured to the top of the driving member 20 is a feed pan 24 provided with tangentially-arranged, outwardly extending feed channels 25, one channel for each ball 22. The outer end of each feed channel 25 is open, as shown, and arranged above a ball 22, a slight distance in advance of the center thereof, whereby material to be ground in being delivered from the outer end of each feed channel will be deposited upon the underlying ball in a manner to cause such material to pass down over the ball to and between the place of contact of the ball with the grinding ring. The tangential arrangement of the feed channel 25 prevents the too rapid outward feed of the material to be ground from the central portion of the feed pan 24 due to centrifugal action. Suitable feed pipes 26 are provided, supported by the top frame 13, through which material to be ground may be delivered to the central portion of the feed pan 24.

As rapidly as the material acted upon by the machine is ground between the grinding ring 12 and grinding balls 22, the ground material falls from the grinding ring 12 upon the floor portion 16 of the grinding chamber 15. The ground material upon the floor portion 16 is moved inwardly thereon by suitably-arranged scrapers 27 secured to the bottom of the driving member 20 and moving through the space between said member and the floor portion 16. The ground material thus moved inwardly by the scrapers 27 is discharged through a central opening 28 in the floor portion 16, said opening surrounding the shaft 17. It will be observed that the inner ends of the scrapers 27 terminate outwardly of the opening 28 which is made circular, thus leaving a space between the top of the floor portion

16 and the bottom of the driving member 20 which is always occupied by a ring of ground material forming in effect a seal closing the opening 28 from the grinding chamber 15 for a purpose hereinafter explained. The ring of ground material forming this seal is constantly being pushed off of the inner edge of the floor portion 16 and discharged through the opening 28 while other ground material is pushed into its place by the action of the scrapers 27. As the ground material is discharged from the grinding chamber 15 through the opening 28, it falls upon the inner portion of a horizontally-arranged disk 29 carried by the shaft 17 a slight distance below the floor portion 16. The outer edge of this disk 29 is arranged above the space between inner and outer screens 30 and 31 respectively, which surround the shaft 17 in spaced relation to each other, as shown. The ground material as rapidly as it is received upon the disk 29 moves outwardly thereon by centrifugal action, and falls from the outer edge of the disk down through the space between the screens 30 and 31.

The upper and lower ends of the outer screen 31 surround and are supported by rings 32 and 33 respectively, formed on the parts 9 and 5 respectively, of the main frame of the machine; and the upper and lower ends of the inner screen 30 surround and are supported by rings 34 and 35 respectively, which are arranged in spaced relation to the rings 32 and 33, to permit the ground material in falling from the disk 29 to fall through the space between the rings 32 and 34 in passing to the space between the screens 30 and 31, and to permit said material to fall through the space between the rings 33 and 35 in passing from the space between the screens 30 and 31. The ring 34 is supported by arms 36 extending inwardly from the ring 32 in spaced relation to each other, and the ring 35 is supported by arms 37 extending inwardly from the ring 33 in spaced relation to each other.

As the ground material descends through the space between the screens 30 and 31, the ground material which is fine enough to pass through the screen 31, is blown there-through and into a chamber 38 by suitable fans 39, while the material not ground sufficiently fine to pass through the screen 31 continues to descend through the space between said screens, and falls upon a floor portion 40 formed on the base 5, as shown. The chamber 38 is inclosed by a cylinder of thin metal 41 which surrounds and is secured to the rings 6 and 7 of the main frame of the machine; and the fans 39 are secured to an actuated shaft 17 within the inner or coarse screen 30.

The purpose in providing the inner, coarse screen 30 between the fan blades 39

and the outer fine screen 31 is to prevent any lumps of hard substances, etc., that may descend through the space between the screens 30 and 31 from being struck by the fan blades 39 and projected through the fine screen 30 with the consequent injury thereto.

The space between the screens 30 and 31 is separated from the chamber 38 by the parts 5 and 9 of the main frame; and the floor portion 40 of the part 5 is provided with a suitable discharge opening 41 for the discharge of the coarser material deposited upon the floor portion 40. Suitable scrapers 42 are provided for moving the material over the floor portion 40 and discharging it through the opening 41. These scrapers 42 are carried by a cone-shaped head 43 which is secured to the shaft 17, and the scrapers 42 are arranged directly above the floor portion 40 and beneath the arms 37 and spaced between the screens 30 and 31.

The lower portion of the chamber 38 communicates through openings 44 with a space or chamber 45 below the floor portion 40 and provided with a floor portion 46. The finely ground material entering the chamber 38 falls through the openings 44 and on to the floor portion 46 and is discharged through a suitable discharge opening 47. The material upon the floor portion 46 is moved to and discharged through the opening 47 by suitable scrapers 48 located directly above the floor portion 46 and carried by the outer ends of arms 49 projecting from a collar 50 which is fixed to the driving shaft 17.

In order to prevent clogging of the screen 31 by the ground material being blown therethrough by the action of the fans 39, I provide the following:—Extending through the outer wall 41 of the chamber 38 is a screw-threaded rod 51 which is screwed into and through a bracket 52 secured to the screen 31. The inner end of the screw or rod 51 extends through the inner screen 30 and is engaged by one arm 53 of a tappet 54 which is pivoted as at 55 to a bracket 56 secured to the inner screen 30. The arm 53 of the tappet 54 is held normally in engagement with the inner end of the screw 51 by the action of a spring 57 surrounding the pivot stud 55 of the tappet 54, and having one end engaged with the bracket 56 and the other end engaged with the tappet 54. The tappet 54 is provided with an inwardly extending arm 58, which is adapted to be struck by an arm 59 projecting from a collar 60 secured to the shaft 17. The arms 53, 58 and 59 are so located with relation to each other that during the rotation of the shaft 17, the arm 59 will strike the arm 58 and move the tappet 54 against the action of the spring 57 to move the arm 53 inwardly a slight distance from the inner end of the screw 51, whereupon the arm 59 frees

the arm 58 and permits the spring 57 to actuate the tappet 54 in a manner to cause the arm 53 to strike the screw 51 and thereby jar or vibrate the screen 31 in a manner to dislodge any ground material that may be retained by the screen. The outer end of the screw 51 is provided with a suitable handle 61 by means of which the screw 51 may be turned or adjusted; and by adjusting the screw 51, the tappet 54 may be adjusted so that in its normal position with its arm 53 against the screw 51, its arm 58 may occupy a position either inwardly or outwardly of the position shown in Fig. 3 with respect to the path traversed by the arm 59 to vary the strength of the blows struck by the tappet 54 and consequently vary the jarring action upon the screen 31.

I claim:—

1. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; said chamber having a floor portion extending beneath said member and having a discharge opening therein adjacent said shaft; a horizontally-arranged disk carried by said shaft beneath said opening; a fan carried by said shaft beneath said disk; and a screen surrounding said fan outwardly of said disk.
2. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; said chamber having a floor portion extending beneath said member and having a discharge opening therein adjacent said shaft; a horizontally-arranged disk carried by said shaft beneath said opening; a fan carried by said shaft beneath said disk; and a pair of screens arranged in spaced relation to each other and surrounding said fan, the space between said screens being beneath the outer edge of said disk.
3. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; said chamber having a floor portion extending beneath said member and having a discharge opening therein adjacent said shaft; a scraper carried by the bottom of said member above said floor portion and having its inner end terminating outwardly of said opening; a fan carried by said shaft below said floor portion; and a screen surrounding said fan outwardly of said opening.
4. In a grinding mill, the combination of

a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; said chamber having a floor portion extending beneath said member and having a discharge opening therein adjacent said shaft; a scraper carried by the bottom of said member above said floor portion and having its inner end terminating outwardly of said opening; a horizontally-arranged disk carried by said shaft beneath said opening; a fan carried by said shaft beneath said disk; and a screen surrounding said fan outwardly of said disk.

5. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; said chamber having a floor portion extending beneath said member and having a discharge opening therein adjacent said shaft; a scraper carried by the bottom of said member above said floor portion and having its inner end terminating outwardly of said opening; a horizontally-arranged disk carried by said shaft beneath said opening; a fan carried by said shaft beneath said disk; and a pair of screens arranged in spaced relation to each other and surrounding said fan, the space between said screens being beneath the outer edge of said disk.

6. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; a fan carried by said shaft below said grinding chamber; a pair of substantially vertically-arranged screens arranged in spaced relation to each other and surrounding said fan; means for directing ground material from said chamber to the space between said screens; means for supporting the upper ends of said screens; a part supported by said frame and supporting the lower end of the outer screen; and arms extending inwardly from said part in spaced relation to each other and provided with means for supporting the lower end of the inner screen.

7. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; a fan carried by said shaft below said grinding chamber; a pair of substantially vertically-arranged screens arranged in spaced relation to each other and surrounding said fan; means for directing ground material

from said chamber to the space between said screens; means for supporting the upper ends of said screens; a part supported by said frame and supporting the lower end of the outer screen; arms extending inwardly from said part in spaced relation to each other and provided with means for supporting the lower end of the inner screen; a floor portion beneath the space between said screens and beneath said arms and having a discharge opening therein; and a scraper carried by said shaft above said floor portion and beneath said arms.

8. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; walls forming a grinding chamber surrounding the axis of said shaft; grinding mechanism within said chamber, including a member carried by said shaft; said chamber having a floor portion extending beneath said member and having a discharge opening therein adjacent said shaft; a fan carried by said shaft below said grinding chamber; a pair of screens arranged in spaced relation to each other and surrounding said fan; a part supported by said frame and supporting the upper end of the outer screen; arms extending inwardly from said part in spaced relation to each other and provided with means for supporting the upper end of the inner screen; and a horizontally-arranged disk carried by said shaft beneath said opening and above the inner screen supporting means and having its outer edge arranged above the space between said screens.

9. In a grinding mill, the combination of a supporting frame, a vertically-arranged driving shaft; a grinding ring surrounding the axis of said shaft; a driving member carried by said shaft and arranged within said ring and provided with radially extending arms; grinding balls arranged between said arms and within said ring; and a feed pan carried by said member above said balls and provided with an open top and tangentially arranged feed channels having their inner ends communicating with each other positioned to direct material to be ground and deliver said material above said balls and within said ring, and a feed pipe supported by said frame and having a lower open end before said pan.

10. The combination of a supporting frame, a vertically-arranged driving shaft, a horizontally-arranged disk carried by said shaft and having an uninterrupted upper face, a fan carried by said shaft beneath said disk, and a screen surrounding said fan outwardly of said disk.

11. The combination of a supporting frame, a vertically-arranged driving shaft, a horizontally-arranged disk carried by said shaft, a fan carried by said shaft beneath said disk, and a pair of screens arranged in

spaced relation to each other and surrounding said fan, the space between said screens being beneath the outer edge of said disk.

12. The combination of a supporting frame, a vertically arranged driving shaft, a floor having an opening therein through which said shaft extends in spaced relation thereto, a member carried by said shaft above said floor, a scraper carried by said member above said floor and having its inner end terminating outwardly of said opening, a fan carried by said shaft beneath said floor, and a screen surrounding said fan outwardly of said opening.

13. The combination of a supporting frame, a vertically arranged driving shaft, a floor having an opening therein through which said shaft extends in spaced relation thereto, a member carried by said shaft above said floor, a scraper carried by said member above said floor and having its inner end terminating outwardly of said opening, a horizontally arranged disk carried by said shaft beneath said floor, a fan carried by said shaft beneath said disk, and a screen surrounding said fan outwardly of said disk.

14. The combination of a supporting frame, a vertically arranged driving shaft, a floor having an opening therein through which said shaft extends in spaced relation thereto, a member carried by said shaft above said floor, a scraper carried by said member above said floor and having its inner end terminating outwardly of said opening, a horizontally arranged disk carried by said shaft beneath said floor, a fan carried by said shaft beneath said disk, and a pair of screens arranged in spaced relation to each other and surrounding said fan, the space between said screens being beneath the outer edge of said disk.

15. The combination of a supporting frame, a vertically-arranged driving shaft, a fan carried by said shaft, a pair of substantially vertically-arranged screens arranged in spaced relation to each other and surrounding said fan, means for directing ground material to the space between said screens, means for supporting the upper ends of said screens, a part supported by said frame and supporting the lower end of the outer screen, and arms extending inwardly from said part in spaced relation to each other and provided with means for supporting the lower end of the inner screen.

16. The combination of a supporting frame, a vertically-arranged driving shaft, a fan carried by said shaft, a pair of substantially vertically-arranged screens arranged in spaced relation to each other and surrounding said fan, means for directing ground material to the space between said screens, means for supporting the upper ends of said screens, a part supported by said

frame and supporting the lower end of the
outer screen, arms extending inwardly from
said part in spaced relation to each other
and provided with means for supporting the
5 lower end of the inner screen, a floor por-
tion beneath the space between said screens
and beneath said arms and having a dis-
charge opening therein, and a scraper car-
ried by said shaft above said floor portion
10 and beneath said arms.

17. The combination of a supporting
frame, a vertically-arranged driving shaft,
a fan carried by said shaft, a pair of screens
arranged in spaced relation to each other
15 and surrounding said fan, a part supported

by said frame and supporting the upper end
of the outer screen, arms extending inwardly
from said part in spaced relation to each
other and provided with means for support-
ing the upper end of the inner screen, and 20
a horizontally-arranged disk carried by said
shaft above the inner screen supporting
means and having its outer edge arranged
above the space between said screens.

In testimony whereof I affix my signa- 25
ture in the presence of two witnesses.

GEORGE S. EMERICK.

Witnesses:

MATTHE M. WOODRING,

WILSON E. BECK.

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