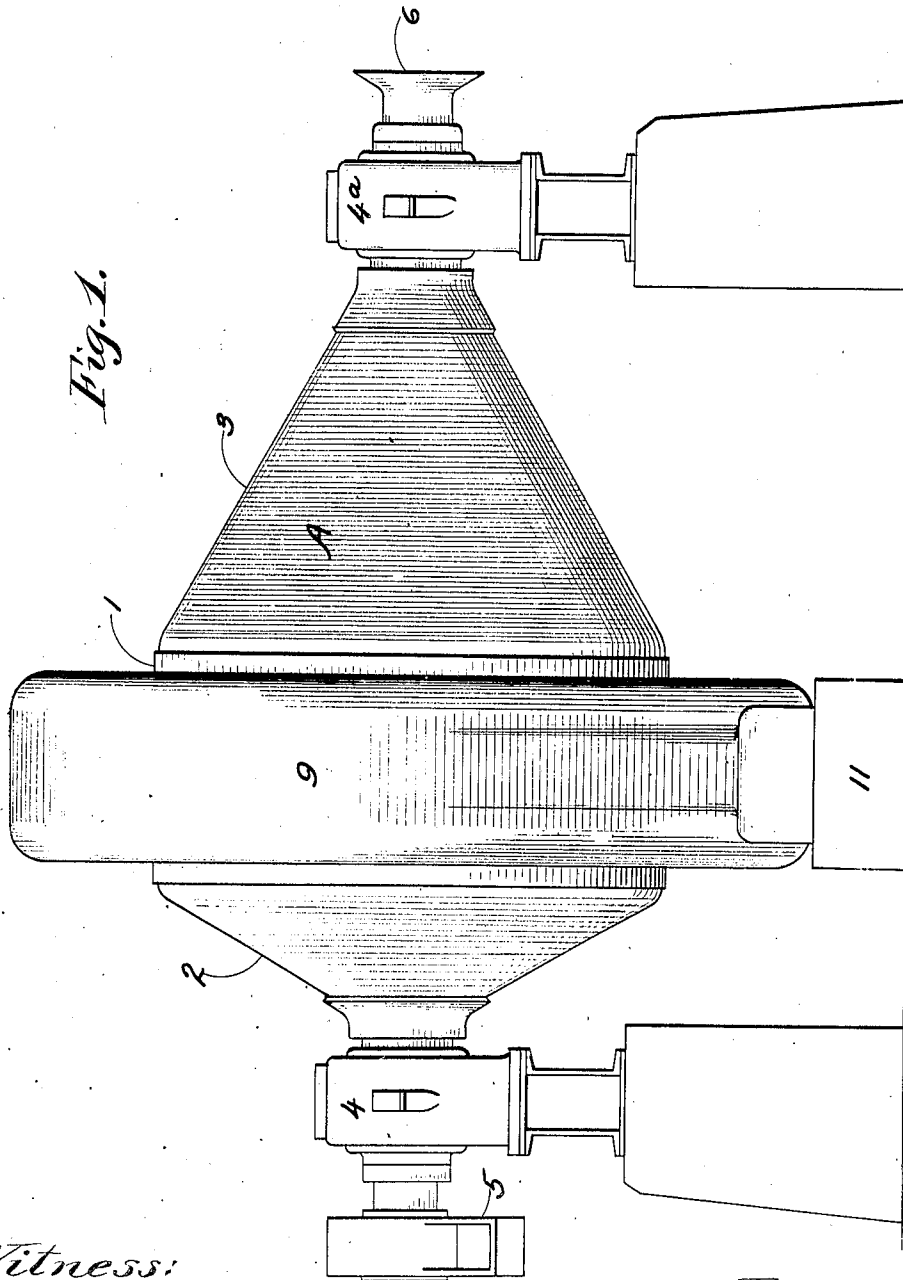


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ROTARY MILL.
APPLICATION FILED JUNE 17, 1916.

1,224,933.

Patented May 8, 1917.
2 SHEETS—SHEET 1.



Witness:

C. C. Burnap

By

Fred Allen Jordan

Sheridan Wilkinson

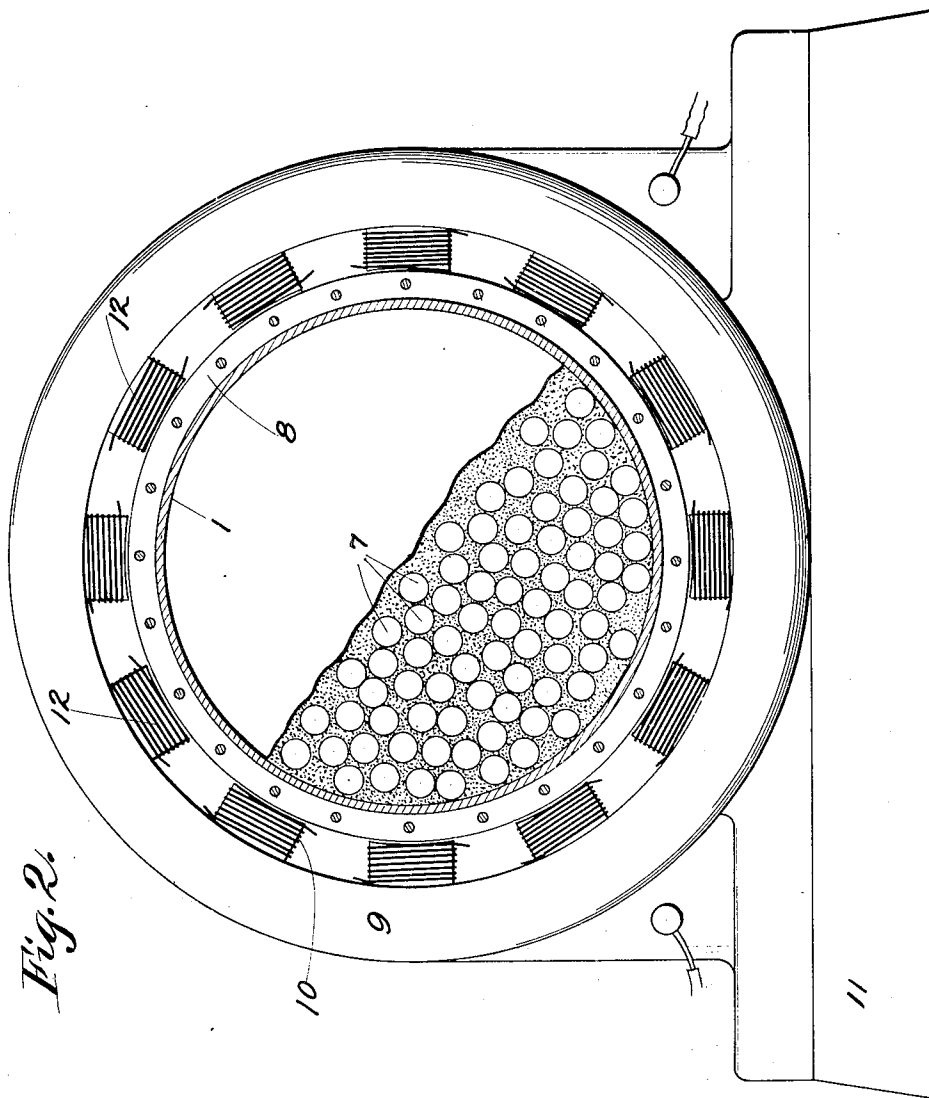
Inventor:

Scott M. G. S.

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Sheridan, Wilkinson & Scott, Attys.

UNITED STATES PATENT OFFICE.

FRED ALLEN JORDAN, OF DULUTH, MINNESOTA, ASSIGNOR OF ONE-HALF TO WALTER G. SWART, OF DULUTH, MINNESOTA.

ROTARY MILL.

1,224,933.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed June 17, 1916. Serial No. 104,241.

To all whom it may concern:

Be it known that I, FRED ALLEN JORDAN, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Rotary Mills, of which the following is a specification.

The object of my invention is to improve the operation of certain types of apparatus in which receptacles of varying forms are rotated in the treatment of substances contained therein. Illustrations of the type of apparatus to which my invention is applicable are the ordinary tube mills and ball mills used in grinding ores. These mills take a variety of forms, some being cylindrical, others such as the Hardinge mill having conical ends, and still others having hemispherical ends and corrugated ends. Other instances of the type of apparatus to which my invention is applicable are receptacles of the kind referred to used for the purpose of roasting ore, cooling ore, burning cement, mixing cement, and a variety of other purposes. All of the machines of this type are used in cases where it is necessary that a certain amount of movement or agitation, varying in different cases, be imparted to the contents of the receptacle, such movement being utilized for various purposes, as the grinding of ores by means of balls or pebbles contained in the receptacle, exposing the contents of the receptacle to air, other gases, or flame for the purpose of bringing about the desired object, such as cooling, heating, or chemically altering the contents of the receptacle, thoroughly mixing the contents or bringing the constituents of a mixed charge into contact and intimate relation with each other. My invention has to do with the means of imparting rotation to such receptacles.

In an apparatus of the kind referred to the receptacle is sometimes constructed to revolve on trunnions and sometimes the receptacle rests upon rollers or wheels which permit of its being rotated upon its axis. Power is generally applied by means of spur or herring-bone gearings. It is one purpose of my invention to provide means for rotating such receptacles without the use of gearings, thus avoiding the wear and loss of efficiency incident to their use, and furthermore providing a structure more economical in its first cost.

According to my invention I make of the rotatable receptacle the rotor of an electric motor and supply the necessary stator element. According to the type of motor adopted the field windings may either be upon the rotor, that is the receptacle, or upon the stator. Assuming that alternating current is to be used, the apparatus will take the form of an induction motor with the armature windings applied directly to and mounted upon the rotating receptacle, together with appropriate field windings constituting the stator element and surrounding the receptacle. In using direct current the windings would be adapted thereto, but in all events the rotating receptacle becomes the rotor of an electric motor in that the windings are applied directly thereto. By this means I apply electric power directly to the rotating element of the mill without the intervention of gearing or other means of transmission. For convenience I use the word "mill" with reference to any of the types of apparatus indicated above. By such direct application of power the highest efficiency in operation is obtained and the initial cost of the plant is materially reduced by dispensing with independent motors and transmission means between the motors and the mills.

By way of illustrating my invention I have shown its application to a conical or Hardinge mill used for ore grinding. The selection of this particular apparatus, however, is merely for the purpose of illustration and for the purpose of indicating the mode of application of my invention in connection with any of the types of apparatus above referred to.

In the drawings—

Figure 1 represents a conical grinding mill constructed according to my invention; and

Fig. 2 is a transverse section of the mill, the section being adjacent the field and armature windings.

Inasmuch as my invention resides in the broad idea of applying power to a mill in the manner above described, and inasmuch as the selection of the proper type of motor winding is a matter within ordinary electrical engineering design, I have not illustrated the same in detail.

The conical mill A may be of the usual construction prevailing in this type of mill,

having a central cylindrical part 1, and conical ends 2 and 3 resting in suitable bearings 4 and 4^a. The ore pulp may be supplied to the mill in any usual or preferred manner. In the present instance I have shown a rotating scoop, 5, at the head of the mill, and a discharge spout 6 at the outlet end. In the sectional view I have shown balls or pebbles 7, such as are ordinarily used in mills of this type. Surrounding the central cylindrical part of the mill, and fixed thereto, is an armature 8, provided with suitable windings. The field magnet 9 of the motor comprises suitable pole pieces 10, and rests upon suitable foundations 11, and is provided with suitable windings 12. In the present instance I have illustrated diagrammatically an induction motor in which the armature rotates and the field magnet is stationary, but in some instances, particularly where the cylindrical part 1 is sufficiently heavy to serve as a field magnet, the pole pieces may be mounted on the part 1, and the armature windings placed on the stationary element of the motor surrounding the pole pieces, so that the field magnets of the motor will rotate and the armature will be held stationary, but in any instance the hollow element 1 is attached to and arranged to rotate with the rotor of the electric motor. However, it will be understood, as above stated, that the invention is not limited to any particular type of motor, or of windings used thereon, and the type and form of motor may be selected to suit the particular use to which the mill is put.

While I have herein illustrated one particular form of rotating mill, it will be obvious that my invention is not confined in its application to the particular form of mill illustrated.

I claim:

1. In a rotary mill, a rotatable receptacle, means for treating material in said receptacle while the same is being rotated, an electric motor having armature windings and field windings, one of said windings being fixed to said receptacle and the other winding being stationarily mounted, whereby said receptacle is the rotor of the electric motor so formed.

2. In a rotary grinding mill, an electric motor comprising a rotor and a stator, said rotor comprising a hollow rotatable element, grinding means within said element, and means for supplying ore to and discharging the same from said hollow rotatable element.

3. In a rotary mill, a motor comprising a stator and a rotor, said rotor having a relatively fixed hollow receptacle, means for treating material in said receptacle while the same is rotated, and means for feeding material to and discharging material from said receptacle.

In testimony whereof, I have subscribed my name.

FRED ALLEN JORDAN.

Witnesses:

R. M. ELLWOOD,
H. S. MACGREGOR.