Jan. 10, 1933. O. J. LEHRACK 1,894,106

CRUSHING AND MIXING MACHINE

Filed April 29, 1929

FIG. 1.

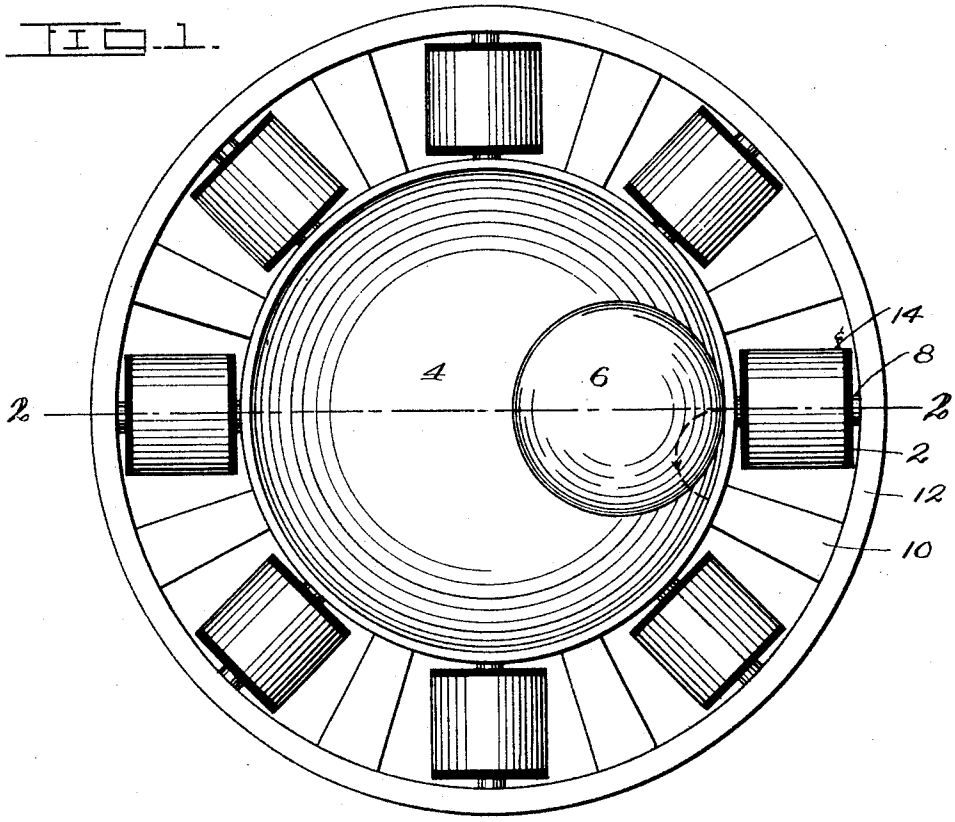


FIG. 2.

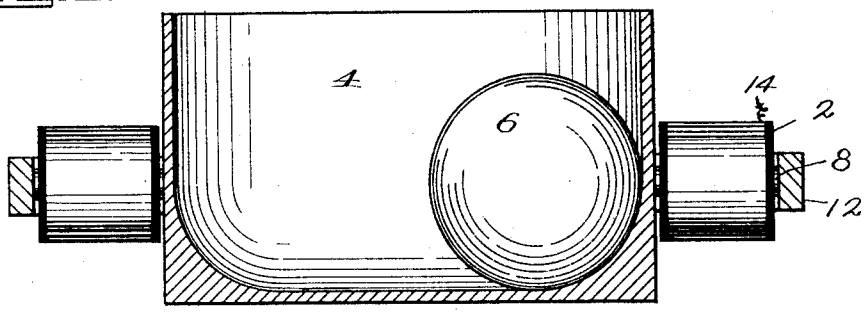


FIG. 3.

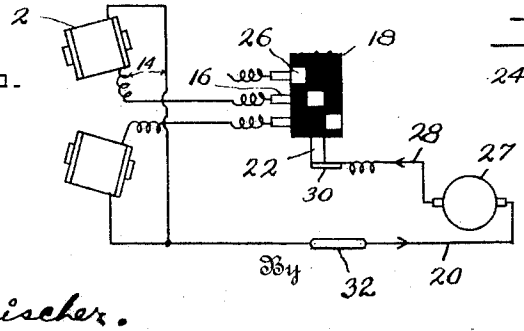
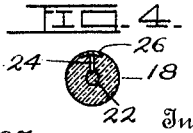


FIG. 4.



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UNITED STATES PATENT OFFICE

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CRUSHING AND MIXING MACHINE

Application filed April 29, 1929. Serial No. 358,862.

My invention relates to crushing and mixing machines and one object is to provide a relatively simple machine of this character in which the number of moving parts have been reduced to a minimum, to the end that loss of power through friction will be greatly reduced and thus leave a larger percentage of the power available for useful work.

Another object is to reduce the number of parts employed to a minimum and to apply the power used in the operation of the machine as directly as possible so that there will be no loss such as occurs from friction in gears and bearings subjected to heavy pressure and necessitating the use of an elaborate lubricating system.

A further object is to provide a machine which may be employed to advantage for a variety of purposes such, for instance, as mixing different kinds of materials, or for crushing cement-clinker, coal, sand, grain, etc.

Briefly stated the invention includes means for progressively generating lines of forces around a member having a suitable coefficient of magnetic induction for the purpose of causing said member to travel in or on a diamagnetic or other suitable body, and in order that the invention may be fully understood, reference will now be had to the accompanying drawing, in which:

Fig. 1 is a plan view of the machine.

Fig. 2 is a cross section on line 2—2 of Fig. 1 with the electromagnets and the member attracted thereby in elevation.

Fig. 3 is a diagram of a portion of the circuits.

Fig. 4 is a cross section of a rotary switch for controlling the flow of current to the electromagnets.

In carrying out the invention I employ suitable means for generating lines of force consisting in the present instance of a number of electromagnets 2 which are arranged around a centrally disposed receptacle 4 containing the crushing member 6 which is in the nature of a rolling armature or rotor and is of sufficient weight to crush and mix materials placed in the receptacle 4.

The electromagnets 2 may be of the horseshoe or other suitable type, in which the core 8 may be considered the north pole, the element 10 the south pole, the annulus 12 the yoke connecting the north and south poles 8 and 10, respectively, and 14 the winding. High efficiency is obtained by locating the electromagnets 2 on the same, or approximately the same horizontal plane as the center of the member 6.

The receptacle 4 may be made of copper, manganese or other suitable nonmagnetic material, while the member 6 consists of iron or other material in which magnetism can be readily induced. The member 6 occupies a large portion of the receptacle 4 so that said member 6 will be unable to pass out of the magnetic field even though it roll to the center of the receptacle. One end of the winding 14 is connected to the brush 16 bearing against a rotary switch 18, while the opposite end of said winding 14 is connected to a wire conductor 20.

The rotary switch 18 is mounted upon a suitably journaled and driven shaft 22 from which radial conductors 24 lead to segmental contacts 26 arranged around the periphery of the switch 18. The contacts 26 are arranged so that the rear end of one terminates approximately on a line with the front end of the following contact so that electrical impulses will be transmitted to the electromagnets 2 in such manner as to progressively energize the latter and set up a rotary magnetic field. Current from a suitable source, such as a generator 27, is brought in over a lead wire 28 which is connected to a brush 30 bearing against one end of the shaft 22. A manual switch 32 is connected to the wire 20 for controlling the flow of current through the circuit.

With the parts arranged as shown and described it is apparent that when the switch 32 is closed current will flow from the generator 27 through the lead wire 28, the brush 30, the shaft 22, one of the radial conductors 24, the contact 26 which happens to be in engagement with its respective brush 16, the winding 14 connected to said brush 16, and back to the generator 27 through the conductor 20 and the switch 32. Passage of the

current through the winding 14 magnetizes the poles 8 and 10 and that portion of the yoke 12 connecting said poles, thereby causing lines of force to flow from the north to the south pole, a single line of force being shown on Fig. 1. The lines of force induce magnetism in the member 6 and cause it to travel in the direction of said lines, and as the electromagnets are progressively energized and deenergized the member 6 will travel around in the receptacle 4 and mix or crush the materials therein until the circuit is interrupted by opening the switch 32.

From the foregoing it will be understood that the number of moving parts have been reduced to a minimum, so that there will be but little loss from friction and approximately the full force of the current will be utilized in the propulsion of the member 6. It is also apparent that the shape and location of the parts may be changed without departing from the spirit and scope of the invention, as for instance, the receptacle 4 may be oval or some other shape than circular, the member 6 instead of being spherical as shown may be pentagonal or some other configuration that will permit it to roll and spin freely when attracted by the lines of force, while the electromagnets may be arranged above or below the receptacle 4, or other body whereby the member 6 is supported.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A machine of the character described consisting of a receptacle having a bottom portion and an endless wall extending upwardly from said bottom portion, a crushing member free to travel upon the bottom portion and against the wall of said receptacle, and means for setting up a rotary magnetic field around said wall of the receptacle for actuating said crushing member.

2. A machine of the character described consisting of a receptacle having a bottom portion and an endless wall extending upwardly from said bottom portion, a crushing member free to travel upon the bottom portion and against the wall of said receptacle, a plurality of electromagnets arranged around said wall of the receptacle and having their axes on approximately a horizontal plane with the center of said crushing member, and means for successively energizing said electromagnets.

3. A machine of the character described consisting of a bowl-shaped receptacle of dielectric material, a spherical crushing member occupying a large portion of and free to travel in said receptacle and consisting of magnetic material, and means for setting up a magnetic field around said receptacle for actuating said crushing member and including a plurality of electromagnets arranged with their axes on a horizontal plane with the center of said crushing member.

In testimony whereof I affix my signature.

OTTO J. LEHRACK.