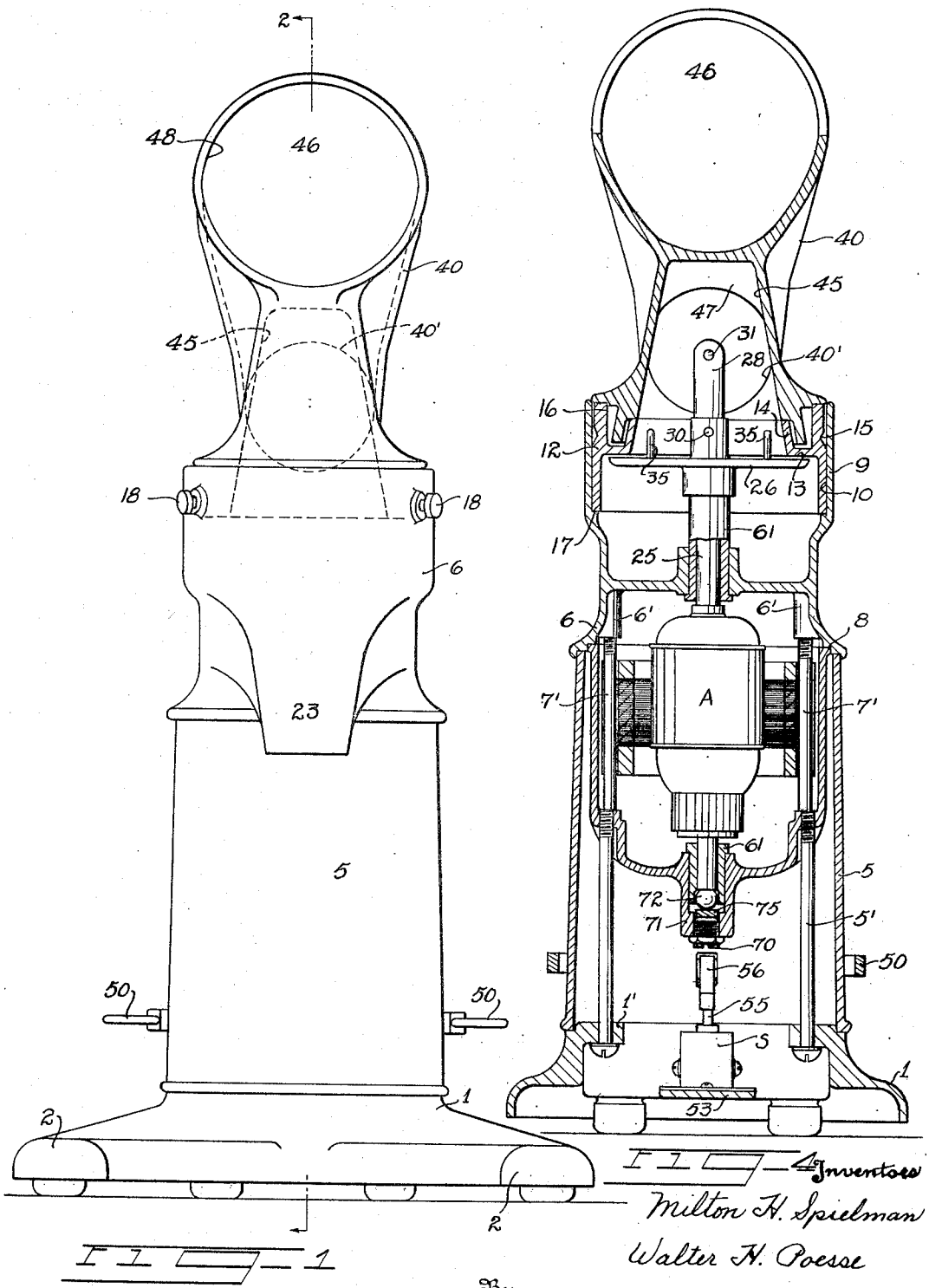
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MATERIAL TREATING MACHINE

Filed March 28, 1928 2 Sheets-Sheet 1



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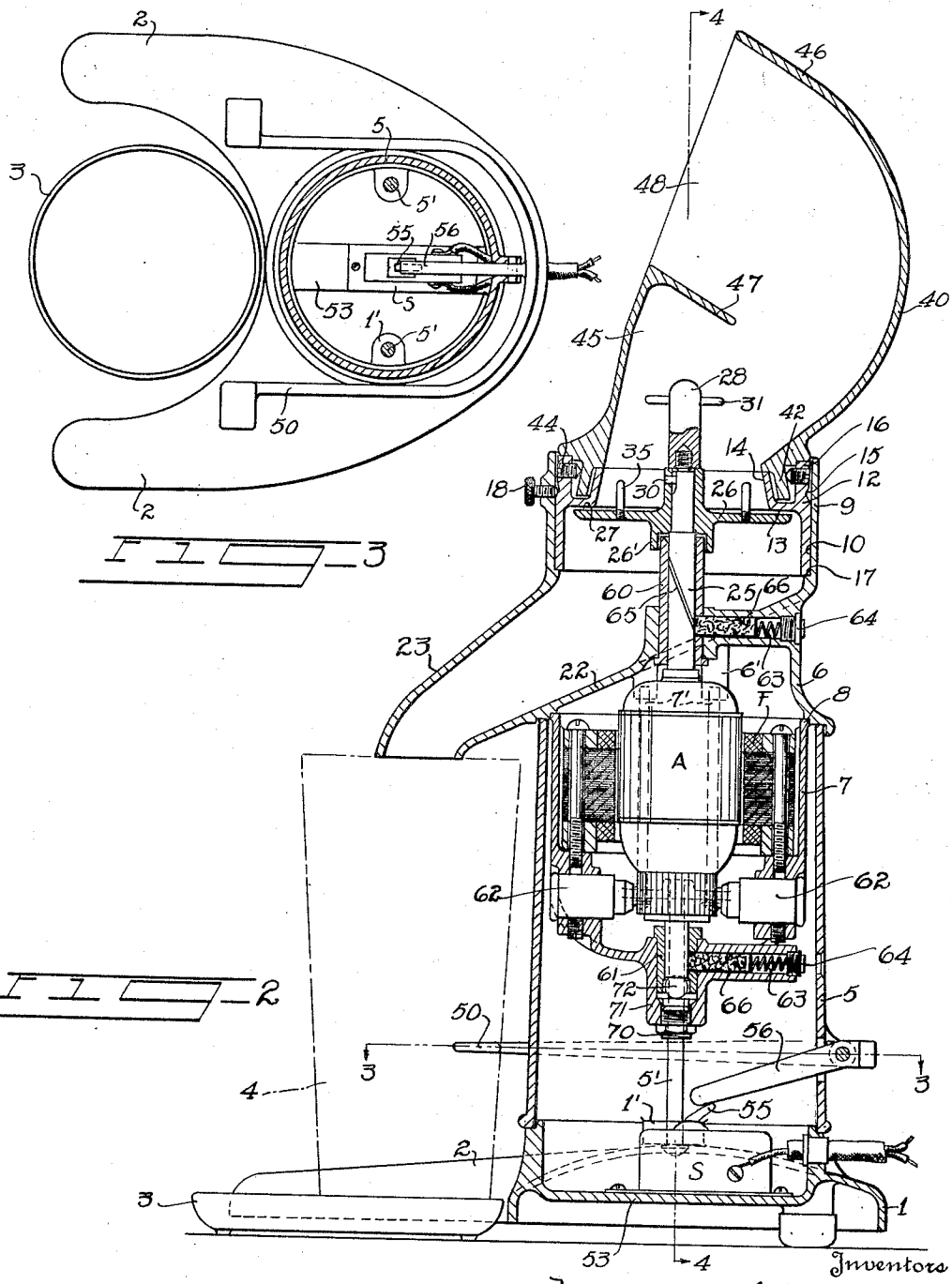


FIG. 3

FIG. 2

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UNITED STATES PATENT OFFICE

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MATERIAL-TREATING MACHINE

Application filed March 28, 1928. Serial No. 265,305.

The general object of this invention is to provide an improved and simplified material mixing, disintegrating or emulsifying machine. The machine in the form shown, is of the general type shown, described and claimed in the prior application of J. W. Macklin et al Serial No. 244,802 filed Jan. 6, 1928.

The present machine has, in common with the disclosure of the above named application, a hollow upright base forming a housing for an electric motor, the armature shaft of which projects upwardly and carries one of the primary material treating elements, hereinafter called the rotor. The base also supports the cooperating treating element which has a surface in close non-contacting relation to the rotor and which will be hereinafter called the stator. The rotor and stator are surmounted by a charging chamber for containing the raw material. Material placed in the charging chamber is fed by gravity to the rotor and stator surfaces and from there the treated material enters a discharge chamber from which it is conducted through a laterally extending spout. Before the raw material reaches the rotor and stator it is subjected to a preliminary treatment carried out by projections, extending above the rotor and arranged to subject the material, while in the lower part of the charging chamber, to sufficient agitation to partially comminute solid material and to preliminarily mix liquids of different character.

Further objects of the present invention include the provision of an improved charging device, whereby charging is rendered easy and whereby material is maintained in the charging chamber against being thrown out by the force of the preliminary treatment, such as above mentioned. A further object is to provide an improved and simplified device for separating and readjusting the rotor and stator surfaces for cleaning purposes. Another object is to provide a simple device for supporting the rotor driving shaft by reason of which oil leakage along the shaft is prevented while affording a rigid support for the shaft, close to the rotor. A still further object is to provide a simple effective device for minutely adjusting the distance between the rotor and stator surfaces. A further object is to provide an improved device for controlling the operation of an electric motor for driving the rotor, whereby the more delicate parts of the control are adequately protected against likelihood of damage.

Further objects and features of the invention will become apparent from the following description relating to the accompanying drawings, wherein is shown the preferred form. The eseential characteristics are summarized in the claims.

In the drawings, Fig. 1 is a front elevation of the entire machine; Fig. 2 is a central longitudinal cross sectional view taken along the line 2—2 on Fig. 1; Fig. 3 is a cross sectional plan view showing the base parts of the machine and the control arrangement, and Fig. 4 is a central cross sectional view through the entire machine taken at right angles to Fig. 2.

Referring in detail to the drawing, the main housing comprises in part a base section 1, having forwardly extending portion 2 in the nature of feet adapted to straddle a saucerlike receptacle or stand 3 for supporting a convenient receiving container 4 for the treated material. Surmounting the section 1 is a substantially cylindrical hollow section 5 encasing the motor parts and which supports a third casing section 6. The motor is suspended from the section 6 by bolts 7′ passing through the motor housing 7 into boss portions 6′ of the section 6. The motor axis is located by the double shouldered joint 8. Bolts 5′ extending from lugs 1′ of the base section into threaded engagement with the motor housing thus hold all the sections, above mentioned, together.

The upper end of the section 6 is cylindrical as at 9, the interior periphery of the cylindrical portion being machined as at 10 to slidably receive an annular member 12, which supports the stator surface 13. This surface, as shown, is flat and is afforded by on inwardly extending flange, the flange be-

yond the surfaces converging upwardly as at 14. The portion 14 of the flange forms part of the charging chamber, as will be apparent from Fig. 2.

The annular member 12 is machined on its outer peripheral surface to slidably fit the surface 10 and in order to securely lock the member 12 in place we provide an annular groove 15 on the member 12 adapted to be engaged by set screws 18 carried by the casing section 6. Two of such screws are shown, the working ends of which engage a downwardly and outwardly inclined surface of the groove so as to cam the member 12 downwardly against a shoulder 17, formed adjacent the surface 10.

The motor has the usual armature A and field F and the armature shaft 25 extends upwardly through a comparatively steeply inclined partition 22 separating the motor containing portion of the housing from the discharge chamber. This chamber comprises the lower portion of the member 12 and the adjacent recess in the section 6, together with a discharge spout 23 whose lower surfaces form continuations of the partition 22. The rotor 26 is carried rigidly on the armature shaft and is held thereby with its upper, or "rotor" surface as hereinafter termed, indicated at 27, in close relation to the stator surface 13. The hub of the rotor engages a shoulder on the shaft and is held there against by a nut-like member 28 threaded on the top of the shaft and bearing on the top portion of the rotor hub. Relative rotation between the rotor and shaft is prevented by a key 30. The nut-like member 28 is in effect an extension of the shaft and carries projections 31 which, in conjunction with upright pins 35 carried by the rotor, form the preliminary mixing and disintegrating means as will be later discussed.

One of the difficulties encountered in the operation of machines of this character has been that the preliminary mixing and disintegrating process causes the material to be thrown out of the receiving opening of the charging chamber. An important feature of the present invention is the device for preventing this escape of agitated material. The charging chamber as shown comprises a shell 40, the lowermost inner surfaces of which continue upwardly from the flange 14. As shown, the shell is separate from the stator member 12 but securely attached thereto so that the shell may serve as a handle to raise the member 12 and thus separate the rotor and stator surfaces. The joint between the shell 40 and member 12 comprises a recess formed between the flange 14 and outer rim 16 of the member 12 into which extends a diverging flange 42 on the shell. Adjacent this flange 42 the shell is shouldered to abut the flange 14 and rim 16. To hold the shell 40 tightly against the flange and rim, a series of set screws 44 are employed having their inner ends engaging the outwardly inclined surface of the flange 42. Ordinarily these screws are concealed by the casing portion 9, as in Fig. 2.

It will be noted that by reason of the clearance between the flange 42 of the shell 40 and the adjacent parts of the ring 12, a great deal of variation in size of the flange may be permitted. This is of great advantage in case it is desired to form the charger shell of porcelain or like material such as will not be subject to corrosion and which may be more easily cleaned than metal.

The upper structure of the charging chamber forming shell 40 comprises a cowl-like portion 46 forming a receiving channel, circular in shape but of diminishing cross sectional area. The receiving opening 48 is inclined rearwardly somewhat from the vertical, and the channel is formed in part by a downwardly and rearwardly inclined partition portion 47 of the shell. It will be noted that the channel gradually curves downwardly and forwardly and, at its smallest diameter, (see 40′ Fig. 4) enters a somewhat enlarged conical recess 45 surrounding and substantially concentric with the rotor shaft extension 38. Within this recess the projections 28 and 35 operate to strongly agitate the material and, by throwing the same outwardly toward the conical walls, urge it downwardly toward the rotor. During this process the partition 47 prevents any direct splashing of the material out of the charging shell, and the steep sides and rear surfaces of the channel overcome any indirect splashing by simply conveying the splashed material back into the recess 45.

The projections 35 act, in part, to throw the material into the gap between the rotor and stator and the latter elements which are moving past each other at very high speed completely comminute and mix the various ingredients and deliver the thus treated material into the discharge chamber.

The arrangement for controlling the motor comprises a pair of arms 50 extending from a rock shaft 51 supported on the back side of the casing section 5, as by reason of a bracket 52. The motor controlling switch is disposed inwardly of the shell 5 and rests on a floor portion 53 of the base member 1. The switch designated generally at S has an operating arm 55 engaged by an arm 56 virtually rigid with the arms 50. The switch arm 55 is normally urged upwardly (to "off" position) by the usual spring means (not shown), thus normally holding the arms 50 raised. Starting the motor is simply a matter of depressing either one of the arms 50, which as will be seen are in a

very advantageous position, since the operator must first place the receptacle 4 underneath the spout and, in doing so, his hand is brought close to one or the other of the operating arms 50.

The armature and field of the motor may be of any type, but we preferably use a special construction of bearings including the bushing 60 for the upward extension of the armature shaft and a bushing 61 for the lower extension of the shaft, beyond the brushes 62. Such bushing bearings may be oiled by wick members 66 pressing directly on respective extensions of the shaft. These wicks are fed by oil contained in recesses 63 respectively, arranged to be charged by the usual ball oilers 64. By feeding oil to the shaft in this manner only sufficient lubricant is carried to the shaft to make it turn easily, but there is not enough to cause any overflow as at the upper shaft section, which would ordinarily foul the material being treated.

The upper extension of the armature shaft has an inclined groove as at 65 which, in the normal rotation of the shaft, tends to urge the oil fed by the wick 66 downwardly all the time the shaft is turning, to thus insure that no oil will creep up the shaft to beyond the bushing 60. Suitable means for preventing the discharged treated material from getting into the upper bearing comprises the formation of a skirt 26', which overlaps the top of the bushing 60 and which as shown is part of the rotor member 26.

Ordinarily when the machine is used for a purpose such as mixing drinks a single setting of the rotor and stator surfaces for distance is sufficient, that is to say, no adjustment is necessary for drinks of quite widely different character. However, for some uses it is desirable to place the surfaces very close together, say 5/1000 of an inch, whereas ordinarily a varying distance of about 10/1000 is sufficient. When adjustment is necessary this may be done by reason of an adjusting screw 70 carried within a projection 71 of the motor housing. This adjusting screw supports a hardened plate 75 at its upper end to receive a hardened ball. The ball in turn supports the lower end of the armature shaft. When once adjusted, the screw may be maintained in position by reason of a lock nut 73 carried on the screw.

It will be noted that the armature bars are offset from the pole portions of the field. This results in a magnetic unbalance of the motor while operating; the screw 70 and ball 72 preventing the armature from being lowered to the point where it would be magnetically held against axial movement in either direction. Thus the rotor and stator surfaces are forcibly held apart a definite distance depending on the setting of the screw 70.

We claim:

1. A material treating machine, having in combination, rotary means for disintegrating and mixing material, a material receiving shell disposed above said means and formed to provide a tortuous passageway first leading entirely away from and then toward the axis of the rotary means, for preventing material from being splashed out of the shell during the operation of the machine.

2. In a material treating machine, hollow means providing a material receiving chamber having a receiving opening, and providing a discharge chamber, rotary disintegrating means disposed between the two chambers, the receiving chamber being formed to provide a tortuous passageway, there being a partition disposed above said rotary means and adjacent the receiving opening, said partition functioning to prevent material from splashing out of the chamber during the operation of the machine.

3. In a machine of the class described, a rotor and stator having oppositely positioned material treating surfaces, means for driving the rotor, means for agitating the material before it reaches the rotor and stator, a charging shell having a receiving opening, and an enlarged recess surrounding the agitating means, said shell being formed to provide a passageway communicating from the opening to the recess, the passageway opening into the recess from a direction substantially opposite to that in which the raw material enters the first mentioned opening.

4. In a material treating machine, rotary means for preliminarily disintegrating material, rotary means adjacent thereto for receiving the product of the first rotary means and acting on it to further disintegrate and mix the material, a shell forming an enlarged recess, open at one side and within which the first rotary means operates, said shell having a charging duct communicating with the recess and having a receiving opening for raw material leading into the duct from a direction substantially opposite to the direction of communication from the duct to the recess.

5. In a machine of the class described, a rotor and stator having closely positioned circular material treating surfaces, means for driving the rotor, and means forming a charging chamber for conveying raw material to the said surfaces, comprising a shell having a curved passageway arranged to initially convey the material transversely to the axis of the rotor and away from said axis and then back to said axis.

6. In a machine of the class described, means for mixing and disintegrating mate-

rial, including a pair of members adapted to be relatively rotated at high speed and between which the material is treated, a shell forming a charging chamber disposed above the members, said shell having a receiving opening disposed forwardly and at an angle to the axis of rotation, said shell being formed to constrain the material to travel rearwardly from the opening, then downwardly and forwardly to the said surfaces.

7. In a machine of the class described, two members having oppositely positioned material treating surfaces, means for driving one of the members relative to the other at high speed, and means forming a charging chamber for supplying material between said surfaces, said means comprising a shell having an opening for receiving the raw material, the walls of the shell being formed to provide a curved channel of diminishing cross section, the shape of the channel being such as to initially carry the material away from the axis of the rotor, and then back to said axis.

8. In a machine of the class described, a casing, an annular member providing a stator surface, a rotor, and means carried by the casing for driving the rotor, said rotor having a surface closely adjacent the stator surface, and a shell carried by said annular member and projecting upwardly therefrom, and forming a material receiving chamber, said shell having an opening in a plane at an oblique angle to the rotor axis, a partition below the opening and disposed above the rotor, said partition being joined to the wall of the shell below the opening and free from the shell at its opposite edge, the wall of the shell beyond the free edge of the partition being curved downwardly and then forwardly toward the rotor, whereby material poured into the opening is constrained to move toward the rotor in a substantially curved path.

9. In a machine of the class described, a rotor and stator having closely adjacent and separated material treating surfaces, an annular member supporting the stator and having skirt portions projecting above and below the stator for conveying material thereto and leading it therefrom, there being a shell continuing upwardly from the upper skirt portion and supported by said annular member, said shell having a partition member extending inwardly and disposed above the rotor, there being an opening in the shell above the partition and disposed in a plane at an oblique angle to the rotor axis.

10. In a material treating machine of the class described, a substantially upright housing, a rotor and stator carried by the housing and having closely positioned non-contacting material treating surfaces, means for driving the rotor, agitating and preliminary disintegrating means above the rotor and driven thereby, and means forming a charging chamber comprising a hollow shell surmounting the housing and providing an enlarged recess surrounding the agitating means, said shell having a partition member extending inwardly toward the interior thereof and forming a roof for said recess, there being a charging opening in the shell above the partition, whereby material placed in the opening is constrained to approach the agitating means from a direction substantially opposite to that of its insertion into the shell.

11. In a machine of the class described, a hollow housing having an annular portion near one end thereof, an annular member in axial sliding engagement with said annular portion, a stator surface supported by said annular member, a rotor having a cooperating surface in close relation to the stator surface, and means for driving the rotor, there being movable means carried by the housing and arranged to cam against the annular member to force the same into a definite position with respect to the rotor while clamping the annular member in place.

12. In a machine of the class described, an upright hollow housing having an annular portion near the top thereof, an annular member in sliding engagement with said annular portion, a stator surface supported by said annular member, a rotor having a cooperating surface in close relation to the stator surface, and means for driving the rotor, said annular member having a peripheral groove, and movable means carried by said annular portion for engaging the groove to hold the stator surface in predetermined relation to the rotor surface and to permit axial movement of said stator surface for cleaning purposes.

13. In a material treating machine of the class described, a shaft, a rotor member driven by the shaft and having a material treating surface, bearing means for laterally supporting the shaft, tubular means forming a charging and discharge chamber at respective sides of the rotor, a stator carried by the tubular means and having a material treating surface adjacent the said rotor surface, electro magnetic means arranged to act on the shaft to normally draw the same in a direction to separate said surfaces, and axially adjustable means abutting one end of the shaft and arranged to act on the shaft in a direction to force the said surfaces toward each other.

14. In a machine of the class described, means forming a stator surface, a rotor having a cooperating surface in close non-contacting relation thereto, an electric motor having an armature and field and an armature shaft connected to the rotor for driving it, the armature being magnetically offset from the field to cause the shaft to be mag-

netically and longitudinally biased in one direction, and an adjusting screw having an operative connection with the shaft to oppose the magnetic bias.

15. In a machine of the class described, a substantially upright housing, means surmounting the housing and providing a charging chamber, a stator at the base of the charging chamber, a discharge chamber below the stator, a rotor having a material treating surface in close relation to the stator surface, a motor having an armature and field carried by the housing and disposed below the discharge chamber, the armature being magnetically offset upwardly from the field, the armature shaft of the motor being rigid with the rotor, and an adjusting screw carried below the lower extremity of the shaft and having a point contact connection therewith to raise the shaft against the magnetic action of the armature and field to thereby maintain a normally constant distance between the rotor and stator.

16. In a machine of the class described, a housing, a rotor and stator carried thereby, means for driving the rotor, said stator comprising an annular member removably and slidably fitting the top of the housing, and a hollow charging chamber member in abutting relation to said stator, the stator and charging chamber having mutually overlying flanges adjacent the plane of abutment, there being removable means in threaded engagement with the stator for engaging the flange of the charging chamber to hold the same rigid with the stator, whereby the charging chamber and stator may be removed from the housing as a unit.

In testimony whereof, we hereunto affix our signatures.

MILTON H. SPIELMAN.
WALTER H. POESSE.