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UNIDIRECTIONAL SELF-SEPARATING FINISHING MACHINE

Filed July 2, 1962

2 Sheets-Sheet 1

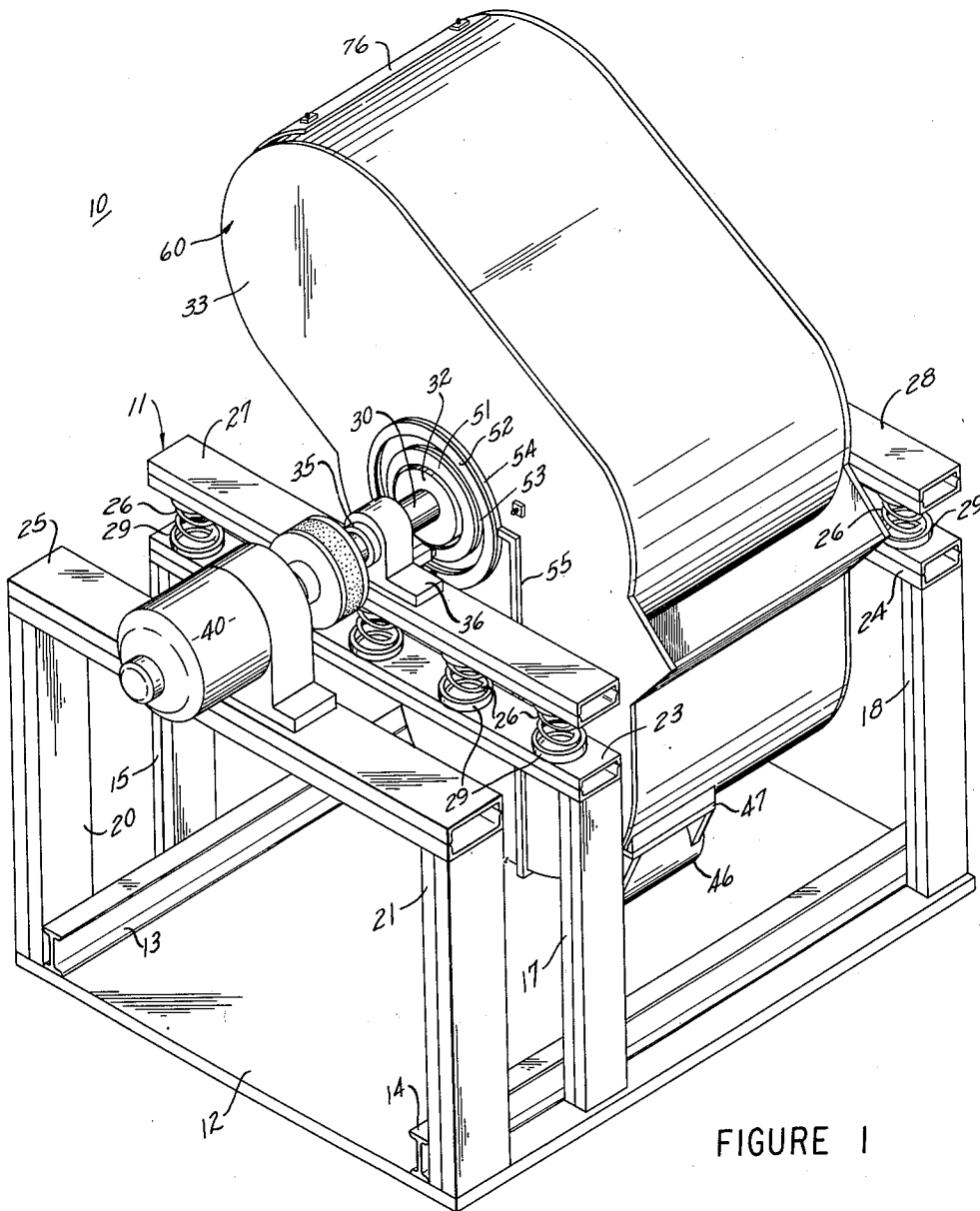


FIGURE 1

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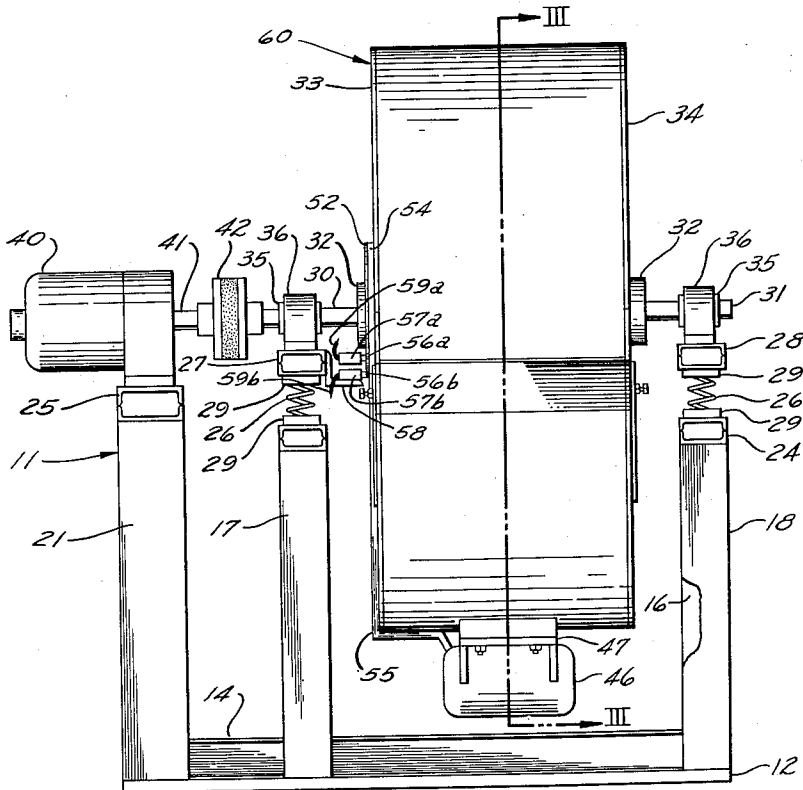


FIGURE 2

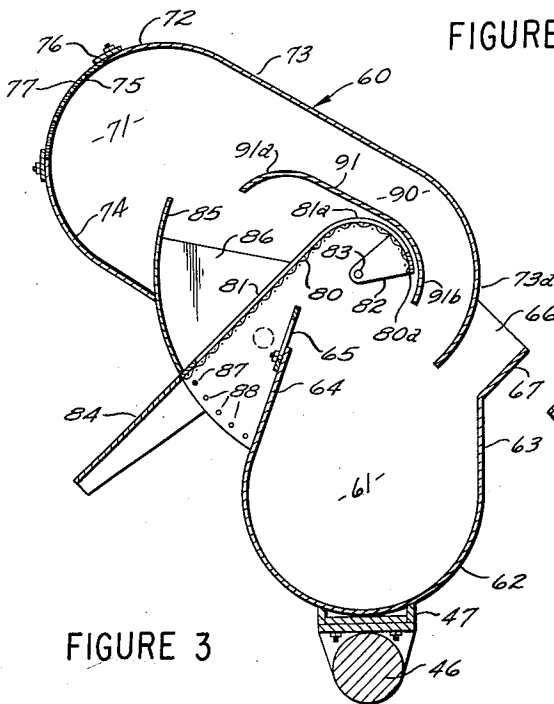


FIGURE 3

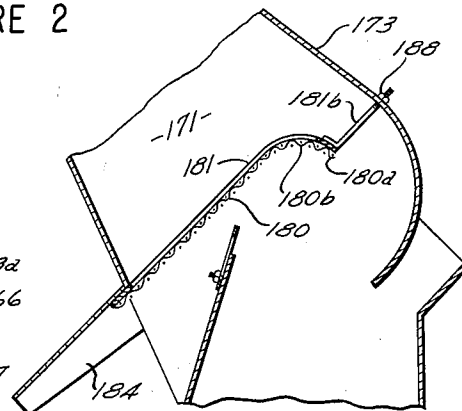


FIGURE 4

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3,073,082

UNIDIRECTIONAL SELF-SEPARATING FINISHING MACHINE

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23 Claims. (Cl. 51-163)

The present invention relates to finishing machines, and is more particularly concerned with a unidirectional self-separating finishing machine of the vibratory type in which unfinished parts are commingled with finishing material in an abrading chamber, vibrated until the parts have a desired finish, and then discharged therefrom.

A number of advantages are associated with surface finishing of parts by controlled vibrations. For instance, a substantial increase in efficiency is realized by vibrating a mass of unfinished parts and finishing material in a substantially orbital motion instead of rotating or tumbling the mass in a drum type finishing machine. Moreover, the surfaces of frangible parts may be finished efficiently without incurring a high incidence of damaged parts as usually results when such parts are tumbled in a drum type finishing machine. Furthermore, the present trend toward automation often makes it desirable to employ vibratory finishing machines since such machines may be quickly and readily combined with a transfer line for removing burrs, flash, surface irregularities, and the like from the parts as well as for improving the finish thereof. Because of these advantages, a steadily increasing industrial demand has developed for vibratory finishing machines.

Recently self-separating finishing machines of the vibratory type have been made available, a specific example of which is that disclosed and claimed in my co-pending application Serial No. 142,701, filed October 3, 1961. In essence, such a machine comprises a housing having an abrading chamber, a storage chamber, and a foraminous member mounted therebetween and communicating with a discharge opening. The abrading chamber is charged with finishing material and unfinished parts and vibrated until the parts have the desired finish. The housing is then rotated from an abrading position to a transfer position for depositing the parts and finishing material on the foraminous member mounted in the housing. The parts move down the foraminous member and are discharged from the housing while the finishing material passes through openings in the foraminous member and is transferred into the storage chamber of the housing. After the parts are discharged from the housing, the housing is rotated in reverse from the transfer position to the abrading position for return of the finishing material from the storage chamber to the abrading chamber thereof. Since the foraminous member is interposed between the chambers, one or more ducts are usually employed for returning the finishing material to the abrading chamber. Otherwise, the finishing material would have to pass back slowly through the openings in the foraminous member.

The employment of one or more ducts in such a self-separating vibratory finishing machine has been highly satisfactory, even though it somewhat increases the overall cost of the machine, since the utility of the machine is thereby greatly increased. For some operations, however, it would be desirable to have available a finishing machine which could be operated in a unidirectional manner while at the same time retaining the high degree of utility and convenience available in prior finishing machines, and which would preferably not require ductwork. Accordingly, it is an object of the present invention to

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provide such an improved self-separating vibratory finishing machine.

Another object is to provide an improved self-separating finishing machine employing a unidirectional housing for transferring finishing material from an abrading chamber in the housing to a storage chamber therein and then back to the abrading chamber.

A further object is to provide a self-separating finishing machine with a unidirectional housing having an unobstructed passageway for return of finishing material from a storage chamber to an abrading chamber therein.

A still further object is to provide a unidirectional self-separating finishing machine with a pivotal separating and parts discharge means.

Additional objects and advantages will be apparent to one skilled in the art and still other advantages will become apparent hereinafter.

To the accomplishment of the foregoing and related ends, the present invention comprises the features hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, being indicative, however, of but several of the ways in which the principles of the invention may be employed.

Briefly, the present invention is concerned with a unidirectional self-separating finishing machine having an abrading chamber provided with an opening for receiving finishing material and unfinished parts. A vibratory motor is associated with the abrading chamber for imparting alternating waves of energy or controlled vibrations to the mass of unfinished parts and finishing material therein. When the parts have the desired finish, the abrading chamber is rotated to a transfer position for depositing the finishing material and finished parts on a foraminous member. The parts move down the foraminous member with the assistance of gravity and the vibrations imparted thereto, and the finishing material passes through the openings in the foraminous member and is deposited in a storage chamber of the housing. After the parts are discharged from the housing, the housing is rotated through an additional angle in the same direction to transfer the finishing material back to the abrading chamber. The finishing material flows along the forward wall of the storage chamber, through an unobstructed passageway partially defined by the inner end of the foraminous member and the forward wall, and then into the abrading chamber as the housing is rotated to the abrading position. The housing of the finishing machine is then properly oriented to receive another batch of unfinished parts. If it is necessary to discharge the finishing material from the housing, this may be accomplished in a simple and facile manner by merely rotating the housing in the opposite direction starting from the abrading position. The finishing material then flows out of the housing through the same opening provided in the abrading chamber for receiving the unfinished parts and finishing material.

For a better understanding of the present invention, reference may be had to the accompanying drawings in which all of the parts are numbered, the same numbers are used to refer to corresponding parts throughout, and wherein:

FIGURE 1 is an isometric view of a unidirectional self-separating finishing machine embodying the present invention;

FIGURE 2 is a front elevational view of the finishing machine of FIGURE 1;

FIGURE 3 is a vertical section taken on line III-III of FIGURE 2 to show the internal construction of the housing of the finishing machine; and

FIGURE 4 is a fragmentary vertical section similar to FIGURE 3 showing another form of the invention.

Referring now particularly to FIGURE 1 of the drawings, there is illustrated a finishing machine, generally indicated at 10. A housing 60 is journaled on a frame 11 for rotation about a substantially horizontal axis from an abrading position to a transfer position and then to the abrading position.

Considering first frame 11, and specifically the stationary portion thereof, a base plate 12 is mounted on a supporting surface and provided with a pair of I-beams or rails 13 and 14 welded thereto in spaced parallel relationship. Vertical frame members 15, 16, 17, and 18 are welded at their respective end portions to base plate 12, and to rails 13 and 14. More specifically, the lower portions of frame members 15 and 16 are welded to rail 13, and the lower portions of frame members 17 and 18 are welded to rail 14. Two additional vertical frame members 20 and 21 are welded at their lower end portions respectively to rails 13 and 14 and to base plate 12 for supporting a reversible gear motor 40.

For supporting housing 60 on frame 11, lower cross members 23 and 24 are welded to the upper ends of vertical frame members 15 and 17, and 16 and 18, respectively. To support the reversible gear motor 40, cross member 25 is welded to the top portions of vertical frame members 20 and 21. Each of the vertical frame members and cross members comprises a pair of channel iron beams welded together. The securing together of the base plate 12, the rails 13 and 14, the vertical frame members 15, 16, 17, 18, 20, and 21, and the cross members 23, 24, and 25 by welding or other suitable means, completes the stationary portion of frame 11.

As shown in FIGURES 1 and 2, a plurality of coiled helical springs 26 are employed for isolating the orbital vibrations of the housing 60 from frame 11. Springs 26 are suitably disposed between lower cross member 23 and upper cross member 27, and between lower cross member 24 and upper cross member 28. Suitable cup-shaped members 29 are secured to the top sides of lower cross members 23 and 24 and to the bottom sides of upper cross members 27 and 28 for supporting the coiled helical springs 26. Various other types of resilient members may be employed for isolating the vibrations of housing 60 from frame 11. In the illustrated arrangement, the housing is resiliently supported by a plurality of coiled helical springs and thereby supported for substantial free movement in space.

For rotatably supporting the housing 60, as illustrated in FIGURES 1 and 2, a pair of spindles or shaft ends 30 and 31 are employed. More specifically, cylindrical members 32 are mounted to end plates 33 and 34 of the housing 60 by suitable means, and the spindles 30 and 31 are suitably secured to cylindrical members 32. Spindles 30 and 31 are journaled in bearings 35 secured in bearing support members 36 which are suitably mounted to upper cross members 27 and 28.

In order to rotate or reposition the housing 60 from the abrading position to the transfer position, the reversible gear motor 40 is employed. The electrical connections to the gear motor 40 are not shown since they are conventional. The gear motor 40 is provided with a shaft 41, the end of which is connected to one side of a flexible coupling 42. The other side of the flexible coupling 42 is connected to the spindle 30. Thus the vibrations of the housing are isolated from the gear motor 40. Depending upon the manner of operation, the gear motor may be electrically connected to a conventional not shown electrical control panel, or the motor may be energized manually.

As illustrated, a vibration generating means, such as a vibratory motor 46 is fixedly secured to the housing 60 by means of a motor mounting bracket 47 and suitable bolts and nuts. The vibration generating means may comprise any power means including an electric as well as a fluid motor. For example, the motor may be of the rotatory type, the vibratory type, the hydraulic

or pneumatic type, or a prime mover. If the motor is of the rotatory type, conventional eccentric weights are mounted to the motor shaft for generating orbital vibrations which are imparted to the housing 60. Alternatively, the eccentric weights can be secured to the housing and rotatable therewith while the motor is operatively engaged with the eccentrics but not secured to the housing, although such method and means for vibration are not preferred. Greatest efficiency of the orbital vibrations is achieved by disposing the vibratory motor 46 with respect to the housing so each alternating wave of energy moves the mass of finishing material therein in a substantially orbital motion normal to the rotational axis of the housing 60 or normal to a longitudinal axis of the housing. Satisfactory orbital vibrations may also be imparted to the housing 60 so long as a major component of each alternating wave of energy is normal to the longitudinal axis thereof.

By imparting orbital vibrations to the housing, the mass of finishing material and unfinished parts therein moves in an orbital motion from the front to the rear thereof or vice versa. These orbital vibrations or alternating waves of energy substantially increase the action between the finishing material and the surface of the unfinished parts, much more than if the finishing material and unfinished parts were tumbled.

Preferably and as illustrated in FIGURE 3, the housing 60 comprises an abrading chamber 61 and a storage chamber 71 partially opposed thereto. The abrading chamber 61 is defined by a semi-cylindrical bottom 62, portions of end plates 33 and 34, and forward and rear walls 63 and 64 extending upwardly which are extensions of the semi-cylindrical bottom 62. The end plates 33 and 34 are secured to the sides of semi-cylindrical bottom 62 and walls 63 and 64 by welding or the like.

The storage chamber 71 is defined by a semi-cylindrical top 72, portions of end plates 33 and 34, and forward and rear walls 73 and 74 which are extensions of the semi-cylindrical top 72. The sides of the semi-cylindrical top 72 and walls 73 and 74 are also secured by welding or the like to the end plates.

An opening 75 having a detachable cover plate 76 secured thereover is optionally provided in the central portion of the semi-cylindrical top 72 for removing finishing material from the storage chamber when the housing is rotated to the transfer position. A foraminous member 77 is optionally disposed in the cover plate 76 for removing fines, scraps, burrs, or the like from finishing material by selective passage therethrough when the housing is rotated to or is in the transfer position.

The housing is in the abrading position when it is in the position shown in FIGURE 3 of the drawings. The abrading position is equivalent to the loading position. It is in this position that the abrading chamber of the housing 60 is charged with unfinished parts and finishing material and then vibrated until the parts have the desired finish. The housing is in the transfer position when it is rotated counter-clockwise from the abrading position (see FIGURE 3) through an angle of approximately 105 degrees. A larger angle will transfer the parts and finishing material at a greater rate out of the abrading chamber, and a smaller angle will decrease the transfer rate. In any event, the parts are finished when the housing is in the abrading position and, when the housing is rotated to the transfer position, the finishing material is transferred to the storage chamber and the parts are discharged from the housing. Obviously, the direction of rotation of the housing is reversed if the elements in the housing are transposed.

For the purpose of separating the finished material from the parts when the housing 60 is rotated to the transfer position, a foraminous member 80 is suitably mounted in the housing 60 between the abrading chamber 61 and the storage chamber 71 by means of a pivotal frame 81. As illustrated in FIGURE 3, the inner end

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80a of the foraminous member 80 is provided with an arcuate portion so as to prevent the parts from dropping into the storage chamber 71 when the housing is rotated to or is in the transfer position. In order to pivot the frame 81, a pair of ears 82 are secured to the sides of the inner end 81a of the frame 81 by welding or the like. Each ear 82 is provided with an aperture for receiving a shaft end 83 suitably supported in an aligned aperture in each of the end plates 33 and 34 of the housing 60. Fasteners engaged on the ends of the shaft ends 83 prevent longitudinal movement thereof.

A discharge chute 84 extends from the other end of the frame 81 for directing the parts out of the housing 60 as they move down the foraminous member 81 with the assistance of gravity and the orbital vibrations. Since frame 81 is pivotally secured to the housing 60, the foraminous member 80 and the discharge chute 84 may be pivoted or rotated through an angle for altering the opening between the foraminous member 80 and the end of the lower rear wall 64 for changing the discharge rate of parts leaving the housing. When the housing 60 is in the transfer position and when the outer end of the foraminous member is pivoted toward the storage chamber 71, the discharge rate of parts is increased. Conversely, when the outer end of the foraminous member 80 is pivoted toward the lower rear wall 64, the discharge rate of parts is reduced. Suitable means such as a spring biased pin 87 received by one of a plurality of spaced holes 88 provided in the end plates are employed for repositioning the foraminous member and the discharge chute to prevent inadvertent pivotal movement. An adjustable baffle 65 is movably secured to the end of the lower rear wall 64, to allow further variation in the parts discharge rate.

To assure that all of the finishing material is deposited in the storage chamber 71 after it passes through the openings or apertures in the foraminous member 80 when the housing is in the transfer position regardless of the angular position of the foraminous member, an arcuate member 85 is mounted to the frame 81 by suitable means. The arcuate member 85 provides a sliding enclosure between the end of the upper rear wall 74 and the frame 81 supporting the foraminous member 80 and directs the finishing material into the storage chamber 71. By securing gussets 86 to the arcuate member 85 and the frame 81, the distal end of the arcuate member is stiffened.

After the finishing material is deposited in the storage chamber 71 and the parts are discharged from the housing 60, further rotation of the housing in the same direction to the abrading position transfers the finishing material back into the abrading chamber. As illustrated in FIGURE 3 of the drawings, the housing is provided with an unobstructed passageway 90 between the inner end 80a of the foraminous member 80 and the inner surface of the upper forward wall 73 for rapid transfer of finishing material from the storage chamber 71 to the abrading chamber 61. In order to direct the finishing material into the abrading chamber by means of the unobstructed opening 90, a baffle 91 having arcuate ends 91a and 91b is disposed in the housing in spaced relationship to the inner surface of the upper forward wall 73. The sides of the baffle 91 extend to the end plates 33 and 34 and are suitably secured thereto as by welding or the like. Thus, as the finishing material flows along the inner surface of the forward wall 73, the baffle aids and directs the finishing material into the abrading chamber. The terminus 73a of forward wall 73 is also turned inwardly to assure that the finishing material is directed into the abrading chamber 61. Sufficient clearance is provided between the baffle 91 and the frame 81 supporting the foraminous member 80 to permit free pivotal movement of the foraminous member 81.

For charging the abrading chamber 61 of the housing 60 with finishing material and unfinished parts, the front of the housing is provided with an opening 66 communi-

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cating with the abrading chamber 61. The opening 66 is defined by the outer surface of the terminus 73a of the upper forward wall 73, the inner surfaces of end plates 33 and 34, and an outward extension 67 of lower forward wall 63. Opening 66 may also be employed for discharging finishing material from the abrading chamber 61 by rotating the housing in a clockwise direction when viewed as in FIGURE 3.

Inasmuch as the housing 60 and the motor 46 attached thereto rotate through one revolution for each cycle of the finishing machine, i.e., from the abrading position to the transfer position (for discharging the parts from the housing 60) and then from the transfer position to the abrading position (for returning the finishing material to the abrading chamber 61), means must be provided for delivering a source of voltage to the vibratory motor 46. To this end, as best seen in FIGURES 1 and 2, a pair of slip rings 51 and 52 are concentrically mounted around cylindrical member 32 and to end plates 33. Slip rings 51 and 52 are insulated from the end plate 33, by insulating rings 53 and 54. A conduit 55 is employed for supplying the proper voltage from the rings 51 and 52 to the motor 46. When a three-phase motor is employed for imparting vibrations to the housing, three rings are employed instead of two. If the vibration generating means comprises a prime mover or equivalent equipment, then it is not necessary to employ slip rings 51 and 52.

Moreover, to eliminate the use of the slip rings, the vibration generating means may be readily supported by the base plate 12 and operatively engaged with the housing 60 when in the abrading position or in the transfer position but not rotatable therewith. By such means, when the abrading operation is halted, the vibration generating means may be operatively disengaged from the housing and, after the housing is rotated to the transfer position, the vibration generating means may again be operatively engaged with the housing to impart vibrations thereto.

As clearly shown in FIGURE 2 of the drawings, electrical brushes 56a and 56b biased by not shown springs against slip rings 51 and 52 respectively transfer the current thereto. The brushes are slidably disposed in brushholders 57a and 57b, and both of the brushholders are supported on a bracket 58 mounted to the side of upper cross member 27. Pigtails 59a and 59b respectively secured to brushes 56a and 56b are connected to a suitable source of voltage. From the above description and particularly from FIGURES 1 and 2 of the drawings, it will be apparent that the source of voltage is delivered to the motor 46 by means of brushes 56a and 56b, rings 51 and 52, and conduit 55 regardless of the angular position of the housing 60. A not shown protective cover encloses the brushes and rings.

The construction of the housing shown in FIGURE 4 is similar to the housing shown in FIGURE 3 of the drawings. The main difference is that the frame 181 supporting the foraminous member 180 extends beyond the inner end 180a thereof and is secured to the forward wall 173 of the storage chamber 171 by suitable means such as nuts 188. An unobstructed opening is defined by the inner end 180a of the foraminous member 180, the inner surface of the forward wall 173, and the frame extensions 181b for return of the finishing material to the abrading chamber. Obviously, as the arcuate section 180b of the foraminous member 180 flattens and becomes more nearly or completely coplanar therewith, the degree of control of the rotational speed necessary for discharge of parts without finishing material tends to increase. The foraminous member need not have its inner end spaced from the inner surface of the forward wall 173 so long as a suitable opening therein provides an unobstructed passageway along at least a portion of the width of the inner surface of the forward wall. Since the opening along the inner surface of the forward wall 173 is opposite to the discharge chute 184, an unobstructed passageway is provided in the housing and extends from the storage chamber side of

the foraminous member 180 along the inner surface of the storage chamber, through the unobstructed opening, and along the inner surface of the abrading chamber to the other side of the foraminous member 180.

In operation, finishing material and unfinished parts are inserted into the abrading chamber of the housing when oriented in the abrading position. The vibratory motor is then energized for imparting alternating waves of energy to the resiliently mounted housing and to the finishing material and unfinished parts therein. After a predetermined period, i.e., when the parts have the desired finish, a gear motor is energized for rotating the housing from the abrading position to the transfer position for discharging the parts out of the housing. Simultaneously, the finishing material passes through the openings in the foraminous member and is deposited in the storage chamber of the housing. To assure that all of the finishing material passes through the foraminous member and that none flows through the discharge chute, the angle of the foraminous member may be altered with respect to the housing, or the rotation may be effected more slowly. After the parts are discharged from the housing, the housing is rotated through an additional angle in the same direction for transferring the finishing material from the storage chamber back to the abrading chamber. Accordingly, the finishing material flows along the inner surface of the forward wall of the storage chamber, through the unobstructed passageway connecting the storage chamber to the abrading chamber, and into the abrading chamber. If it is desired to discharge the finishing material from the abrading chamber, the housing is rotated in the reverse position. The finishing material then flows along the inner surface of the forward wall of the abrading chamber and through the opening in front of the housing. The finishing material may also be discharged from the housing by removing the closure member which is secured to the storage chamber.

If the finishing machine is of the multi-stage type such as disclosed and claimed in my copending application Serial No. 142,708, filed October 3, 1961, the parts are transferred to a succeeding stage by transfer means and discharged from the last stage of the multi-stage housing. An embodiment of the present invention may be employed in each stage of such device for return of finishing material from each storage chamber to its respective abrading chamber, which also allows the multi-stage device to be operated in a unidirectional manner.

From the foregoing description, it is apparent that a simple and economical unidirectional self-separating finishing machine of the vibratory type has been provided which rapidly transfers finishing material into the abrading chamber and discharges parts from the housing upon rotation without the use of ducts.

It is to be understood that the term "finishing material" is used generically herein to designate materials used to impart all types of finishes including those finishes acquired with abrading material as well as with polishing material and that "polishing" is as usual one species of "finishing." Moreover, the term "foraminous member" as used herein denotes a member having apertures or perforations for classification of parts and finishing material, for example, a grate or screen of any type, illustratively having wires or rods either parallel or at an angle to each other, whether or not reticulated.

It will be apparent to one skilled in the art that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof. It is, therefore, desired and intended that the several embodiments herein specifically set forth be considered in all respects as illustrative and not restrictive, reference being made to the appended claims rather than the foregoing description and drawings to indicate the scope of the invention, which is to be understood as limited only by the scope of the appended claims.

I claim:

1. A finishing machine comprising an abrading chamber provided with an opening adapted to receive finishing material and unfinished parts, a storage chamber associated with said abrading chamber for receiving finishing material therefrom, said abrading chamber and said storage chamber being rotatable as a unit and resiliently mounted for substantial free movement in space, a foraminous member disposed between said chambers for separating finishing material from parts, said storage chamber also communicating with said abrading chamber by means of an unobstructed passageway along the inner surface of the wall of said storage chamber, vibration generating means for imparting vibrations to the finishing material and unfinished parts in said abrading chamber, and means for rotating said chambers from an abrading position to a transfer position whereby the finishing material passes through said foraminous member and into said storage chamber while the parts are discharged from said machine and whereby upon further rotation of said chambers in the same direction the finishing material is transferred through said unobstructed passageway back into said abrading chamber.

2. The machine of claim 1, wherein a baffle is disposed between the inner end of said foraminous member and said unobstructed passageway for directing the finishing material.

3. A finishing machine comprising a housing mounted for substantial free movement in space and rotatable about a substantially horizontal axis, means for rotating said housing from an abrading position to a transfer position, an abrading chamber in said housing provided with an opening adapted to receive finishing material and unfinished parts, a storage chamber in said housing communicating with said abrading chamber for receiving finishing material therefrom when said housing is rotated to the transfer position, a foraminous member disposed in said housing for separating finishing material from parts, said housing being provided with an unobstructed opening between the inner surface of the forward wall of said storage chamber and the end of said foraminous member for return of finishing material from said storage chamber to said abrading chamber when said housing is rotated to the abrading position, and means for imparting alternating waves of energy to said housing and to the finishing material and unfinished parts therein for finishing the surface of said parts.

4. In a vibratory finishing machine, the combination comprising a housing mounted for rotation about a substantially horizontal axis, a foraminous member mounted in the central portion of said housing, vibration generating means for imparting vibrations to said housing, and means operatively connected to said housing for rotating said housing from an abrading position to a transfer position, the improvement which comprises means associated with said foraminous member and disposed in spaced relationship to the inner surface of one wall of said housing to define an unobstructed opening between said last mentioned means and the inner surface of said wall whereby upon rotation of said housing in one direction from the abrading position to the transfer position finished parts are discharged from said housing and finishing material is transferred to the other end of said housing and upon further rotation of said housing in the same direction the finishing material is transferred through said unobstructed opening and back to the bottom of said housing.

5. The machine of claim 4, wherein said housing is provided with means for transferring finishing material out of said housing when said housing is rotated in the other direction from the abrading position.

6. In a finishing machine, the combination of a housing resiliently mounted for vibratory movement and rotatable about a substantially horizontal axis, vibration generating means associated with said housing for impart-

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ing alternating waves of energy thereto, a foraminous member disposed in said housing for separating finishing material from parts, the anterior portion of said foraminous member being in spaced relationship to the forward wall of said housing to define an unobstructed passageway, and means for rotating said housing from an abrading position to a transfer position whereby the parts are discharged from said housing and the finishing material passes through said foraminous member into one side of the housing and upon further rotation of said housing in the same direction said finishing material is returned to the other side of said housing by passage through the unobstructed passageway.

7. A vibratory finishing machine comprising a housing mounted for rotation about a substantially horizontal axis, an abrading chamber in said housing provided with an opening adapted to receive finishing material and unfinished parts, a storage chamber in said housing for receiving finishing material from said abrading chamber when said housing is rotated to a transfer position, a foraminous member disposed in said housing for separating finishing material from parts when said housing is rotated to a transfer position, said housing being provided with means at the interiorly disposed end of said foraminous member for return of finishing material from said storage chamber to said abrading chamber when said housing is rotated through an additional angle in the same direction, vibration generating means for imparting vibrations to said housing, and means for rotating said housing about said axis.

8. A finishing machine comprising a housing resiliently supported for substantial free movement in space and mounted for rotation about a substantially horizontal axis, said housing being provided with a first opening adapted to receive finishing material and unfinished parts and a second opening adapted to discharge parts therefrom, a foraminous member mounted in said housing for separating finishing material from parts, a first end portion of said foraminous member communicating with said second opening for discharge of parts, the second end portion of said foraminous member being in spaced relationship to the inner surface of a wall of said housing to define a passageway for passage of finishing material, a baffle associated with the second end portion of said foraminous member for directing finishing material around said foraminous member, vibratory means for imparting alternating waves of energy to the finishing material and parts in said housing, and means for rotating said housing to a transfer position and to an abrading position by rotation in the same direction.

9. The machine of claim 8, wherein the second end portion of said foraminous member is upwardly inclined when said housing is in the transfer position to direct the parts out of said second opening.

10. The machine of claim 8, wherein a discharge chute extends from the first end portion of said foraminous member and is pivotal therewith for altering the discharge rate of parts when said housing is rotated to the transfer position.

11. In a vibratory finishing machine, the combination comprising a housing mounted for rotation about a substantially horizontal axis, an abrading chamber in said housing provided with an opening adapted to receive finishing material and unfinished parts, a storage chamber in said housing for receiving the finishing material from said abrading chamber, a foraminous member mounted in the central portion of said housing for separating the finishing material from the parts, vibration generating means for imparting vibrations to said housing, and means operatively connected to said housing for rotating said housing from an abrading position to a transfer position, the improvement which comprises means associated with said foraminous member and disposed in spaced relationship to the inner surface of one wall of said housing to define an unobstructed opening between

the last mentioned means and the inner surface of said wall whereby upon rotation of said housing in one direction from the abrading position to the transfer position the finished parts are discharged from said abrading chamber of said housing and the finishing material is transferred to said storage chamber of said housing and upon further rotation of said housing in the same direction the finishing material is transferred through said unobstructed opening and back into said abrading chamber of said housing.

12. A finishing machine comprising a housing resiliently supported for substantial free movement in space and mounted for rotation about a substantially horizontal axis, said housing being provided with a first opening for receiving finishing material and unfinished parts and a second opening for discharging the parts therefrom, an abrading chamber in said housing communicating with said first opening, a foraminous member mounted in said housing for separating the finishing material from the parts when said housing is rotated to a transfer position, a storage chamber in said housing for receiving the finishing material passing through the apertures in said foraminous member, said abrading chamber and said storage chamber being disposed on opposite sides of the substantially horizontal axis, one end of said foraminous member communicating with said second opening for discharge of parts, the other end of said foraminous member being in spaced relationship to the inner surface of the forward wall of said housing to define a passageway for return of the finishing material from the storage chamber to the abrading chamber when said housing is rotated through an additional angle from the transfer position to an abrading position, a baffle disposed adjacent to said other end of said foraminous member for directing the finishing material into said passageway, vibratory means for imparting alternating waves of energy to the finishing material and parts in said housing, and means for rotating said housing to the transfer position and to the abrading position by rotation in the same direction.

13. In a vibratory finishing machine, the combination comprising a housing mounted for rotation about a substantially horizontal axis, vibration generating means for imparting vibrations to said housing, and means operatively connected to said housing for rotating said housing to a transfer position and to an abrading position, the improvement which comprises a foraminous member disposed centrally in said housing, at least a portion of one end of said foraminous member being spaced from the inner surface of the forward wall of said housing to define an opening within said housing whereby upon rotation of said housing to the transfer position the finished parts are separated from the finishing material by said foraminous member and discharged from said housing while the finishing material passes through the apertures in said foraminous member and is deposited in a storage chamber of said housing and whereby upon further rotation of said housing in the same direction to the abrading position said finishing material moves along the inner surface of the wall of said housing through said opening and into an abrading chamber of said housing.

14. A finishing machine comprising a resiliently suspended housing mounted for rotation about a substantially horizontal axis, an abrading chamber in said housing provided with an opening for receiving unfinished parts when in an abrading position, a vibratory motor associated with said housing for imparting alternating waves of energy to said abrading chamber and to the unfinished parts and finishing material therein, a foraminous member disposed in said housing for separating parts from finishing material when said housing is rotated to a transfer position, a storage chamber in said housing for receiving the finishing material passing through said foraminous member when said housing is in the transfer position, at least a portion of the inner end of said foraminous member being spaced from the inner surface of

a wall of said housing to define an unobstructed passageway between said abrading chamber and said storage chamber, and means operatively connected to said housing for rotation thereof whereby upon rotation of said housing in one direction from the abrading position to the transfer position finished parts are discharged from said housing and finishing material is transferred to the storage chamber and upon further rotation of said housing in the same direction from the transfer position to the abrading position the finishing material moves along the inner surface of the wall and passes through said unobstructed passageway and is deposited in said abrading chamber.

15. A finishing machine as in claim 14, said wall having its terminus interposed between said unobstructed passageway and the opening to said abrading chamber for directing the finishing material into said abrading chamber.

16. In a finishing machine including vibratory generating means, the combination of a housing resiliently mounted for vibratory movement and rotatable about a substantially horizontal axis, an abrading chamber in said housing for receiving finishing material and unfinished parts when said housing is in an abrading position, a foraminous member disposed in said housing for separating the parts from the finishing material when said housing is rotated to a transfer position, a storage chamber in said housing for receiving the finishing material passing through the apertures in said foraminous member when said housing is in the transfer position, said foraminous member being provided with an opening in a terminal portion thereof extending to the inner surface of the forward wall of said housing for recirculation of finishing material, said opening providing a portion of an unobstructed passageway from one side of said foraminous member to the other side of said foraminous member along the inner surfaces of the walls of said storage chamber and said abrading chamber, and means for rotating said housing, whereby upon rotation of said housing from the abrading position to the transfer position the finished parts are discharged from said housing and the finishing material passes through the apertures in said foraminous member and is deposited in said storage chamber and whereby upon further rotation of said housing in the same direction from the transfer position to the abrading position the finishing material moves along the unobstructed passageway through the opening in said foraminous member and is returned to said abrading chamber.

17. In combination, an abrading chamber provided with an opening for receiving finishing material and unfinished parts, a storage chamber cooperating with said abrading chamber for receiving finishing material therefrom, means for rotating said chambers from an abrading position to a transfer position and to a storage position, a foraminous member disposed between said abrading chamber and said storage chamber for separating finishing material from parts when said abrading chamber is rotated to a transfer position, said chambers being at least partially opposed to each other, exit means at one end of said foraminous member for discharge of parts, said chambers being provided with an unobstructed passageway along the inner surfaces of the walls thereof from one side of said foraminous member to the other side thereof, the opening in said abrading chamber cooperating with said unobstructed passageway whereby upon rotation of said chambers in one direction the parts are discharged from said exit means and the finishing material is transferred into said storage chamber and upon continued rotation of said chambers in the same direction the finishing material moves along said unobstructed passageway back into said abrading chamber without flowing out of said opening in said abrading chamber, and whereby upon partial rotation of the abrading chamber in the opposite direction the contents of

said abrading chamber are discharged from said opening in said abrading chamber.

18. The combination of claim 17, wherein a portion of the wall of said storage chamber at least partially defines the opening in said abrading chamber and cooperates with the wall of said abrading chamber for directing the finishing material from said storage chamber into the abrading chamber or out of the opening of said abrading chamber depending upon the direction of rotation.

19. The combination of claim 17, wherein the opening in said abrading chamber is partially defined by a terminus of the wall of said abrading chamber, said terminus being in spaced relationship to the terminus of the wall of said storage chamber.

20. A vibratory type finishing machine comprising a frame, a housing resiliently supported on said frame, an abrading chamber and a storage chamber disposed in said housing, a foraminous member partially interposed between said chambers for separating finishing material from finished parts, a wall defining a portion of said storage chamber terminating in said abrading chamber for directing the finishing material back into said abrading chamber, vibration generating means for imparting vibrations to said housing, and means for unidirectionally rotating said housing from an abrading position to a transfer position and then to the abrading position.

21. A self-separating finishing machine of the vibratory type for finishing parts comprising a frame, a housing resiliently supported on said frame, a foraminous member disposed in said housing for separating finishing material from the parts when the housing is rotated to a discharge position, exit means communicating with said foraminous member, a passageway in said housing opposed to said exit means for returning the finishing material to the bottom of said housing when the housing is rotated to an abrading position, vibration generating means for imparting vibrations to said housing, and means for rotating said housing from the abrading position to the discharge position.

22. A housing for a vibratory finishing machine, adapted to be resiliently mounted for rotation from an abrading position to a transfer position, said housing comprising an abrading chamber, a storage chamber communicating with the abrading chamber, exit means for parts, a foraminous member interposed between said chambers for separating finishing material from parts, and a wall extending from the storage chamber and having a terminus in the abrading chamber, said foraminous member incompletely blocking the area between said compartments immediately adjacent said walls, whereby upon mounting of said housing and rotation of the housing from the abrading position to the transfer position the parts are discharged from the housing and the finishing material is transferred into the storage chamber and upon further rotation of the housing in the same direction to the abrading position the finishing material flows down said wall and into the abrading chamber.

23. A housing for a vibratory finishing machine, adapted to be resiliently mounted for rotation from an abrading position to a transfer position, said housing comprising an abrading chamber and a storage chamber at least partially opposed to said abrading chamber, a foraminous member disposed in said housing between said abrading chamber and said storage chamber for separating finishing material from parts, exit means communicating with said foraminous member, and a passageway in said housing opposed to said exit means and adjacent the housing wall for returning the finishing material from the storage chamber to the abrading chamber, whereby upon mounting of said housing and rotation of the housing from the abrading position to the transfer position the parts are discharged from the housing and the finishing material is transferred into the storage chamber and whereby upon further rotation of the housing in the same

direction to the abrading position the finishing material flows down said wall and into the abrading chamber.

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