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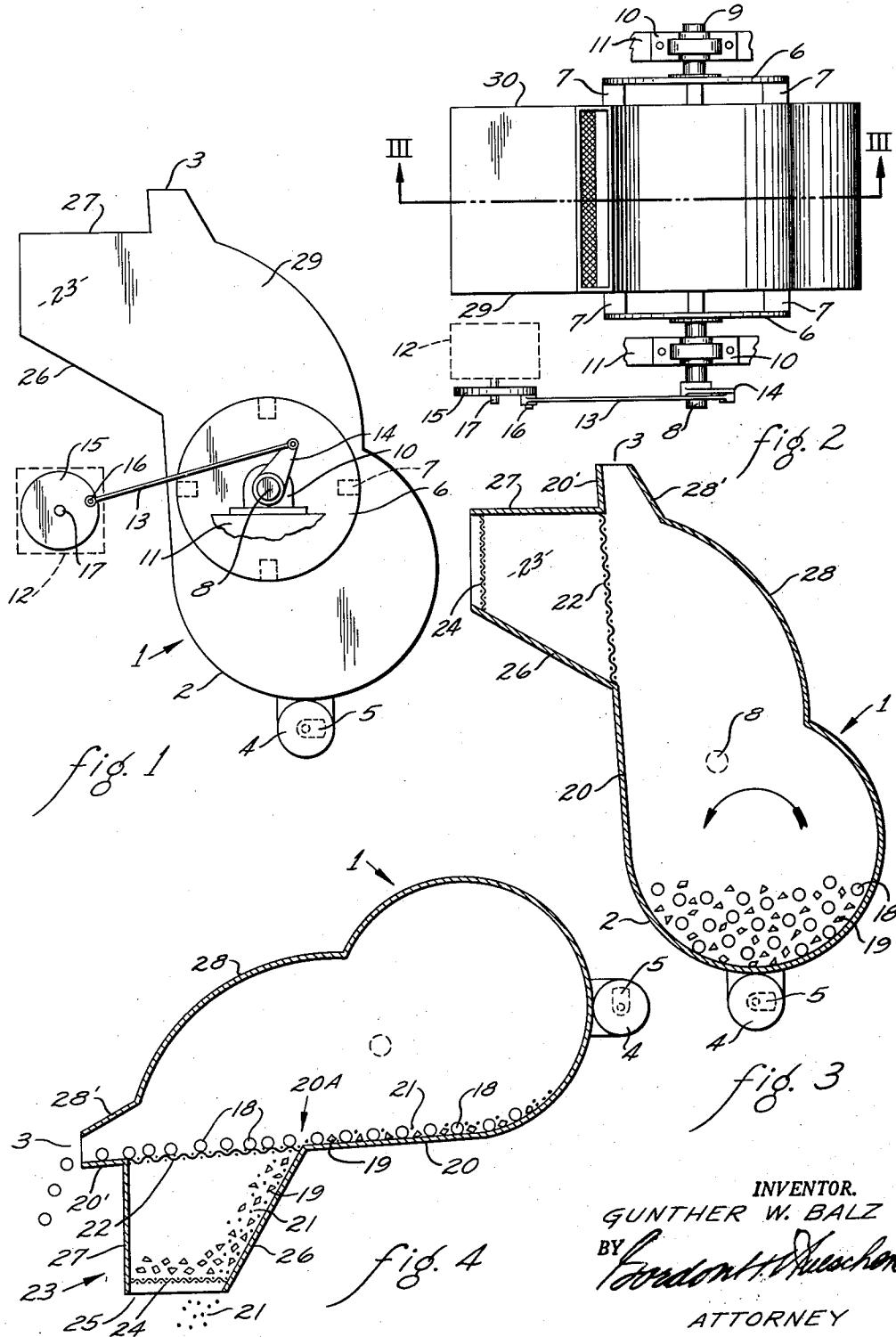
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3,073,078

SELF-SEPARATING FINISHING AND POLISHING MACHINE

Filed April 10, 1961

3 Sheets-Sheet 1



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SELF-SEPARATING FINISHING AND POLISHING MACHINE

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3 Sheets-Sheet 2

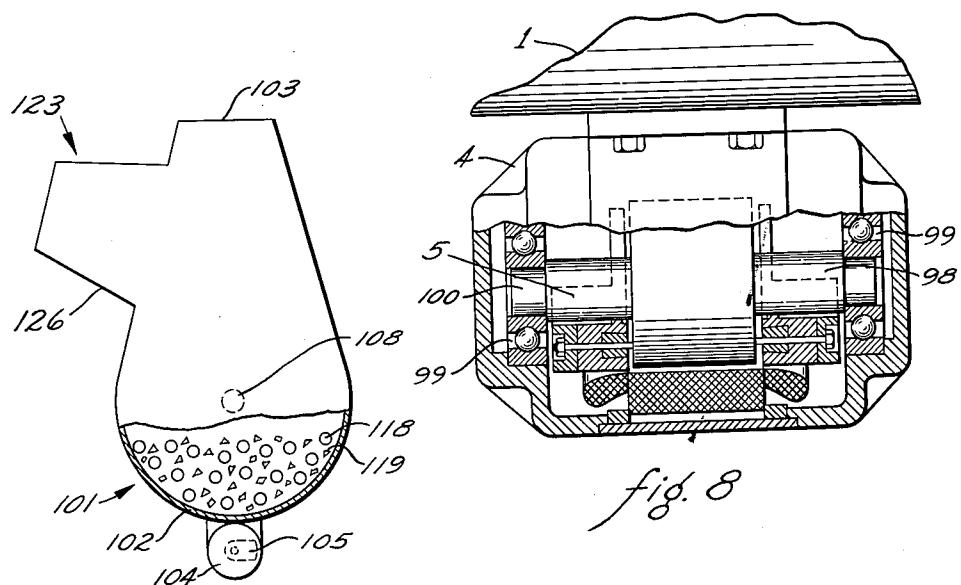


fig. 5

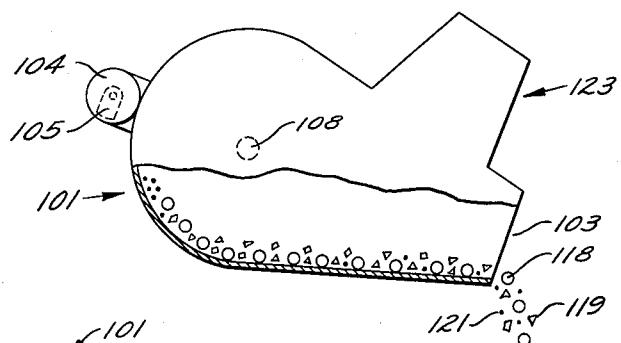


fig. 6

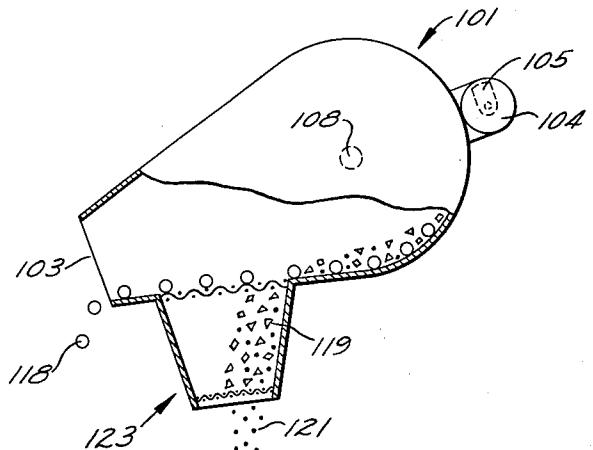


fig. 7

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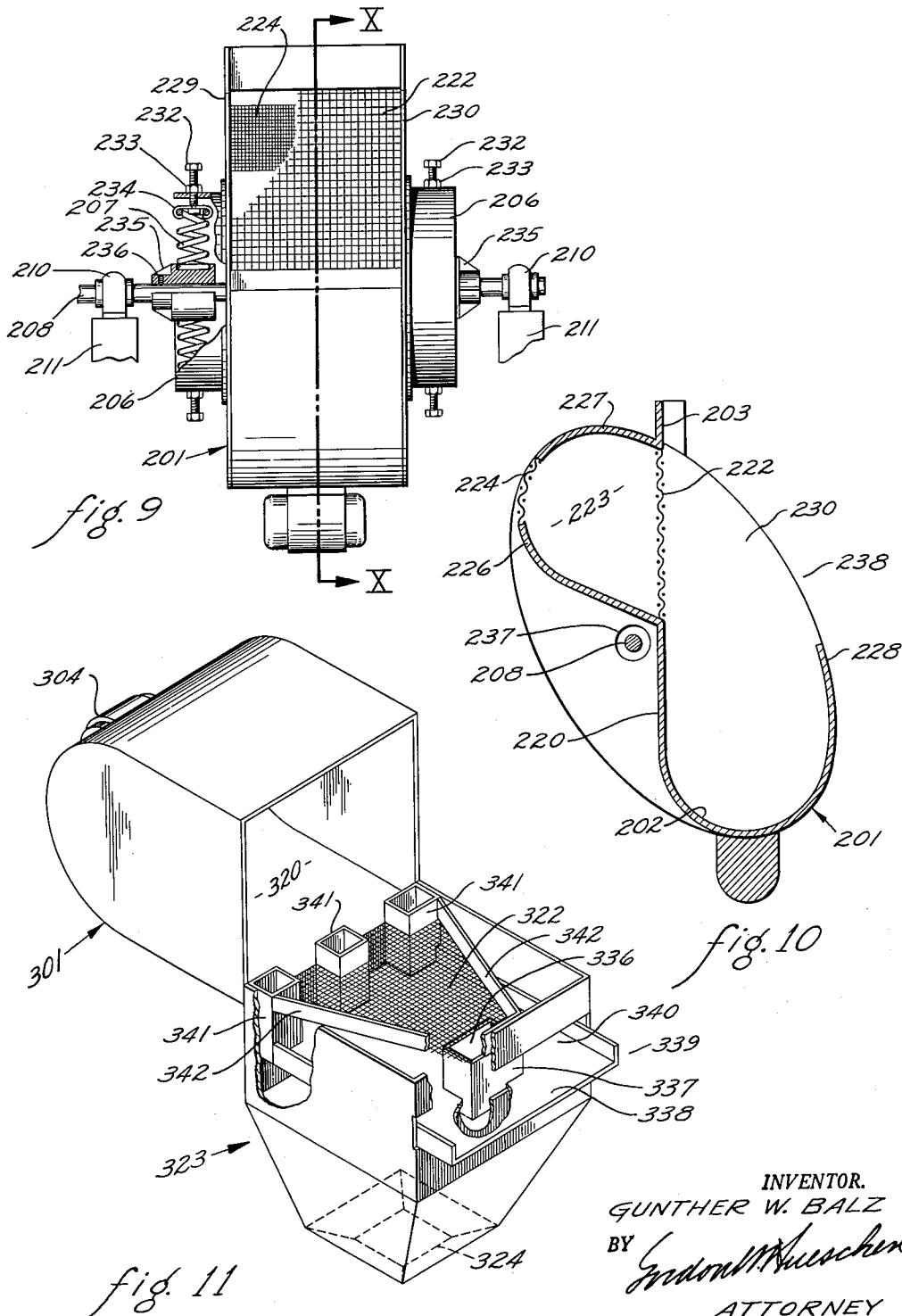
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SELF-SEPARATING FINISHING AND POLISHING MACHINE

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3 Sheets-Sheet 3



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3,073,078  
**SELF-SEPARATING FINISHING AND  
POLISHING MACHINE**

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This invention relates to finishing and polishing machines of the type in which the parts to be finished or polished may be combined with finishing or polishing material, such as stone chips or the like, and then vibrated.

Heretofore, in such machines, there have been provided a hopper or tub to receive pieces to be finished and finishing or polishing material which when mixed together could not be separated, one material from another, without emptying the machine. This necessitated refilling of finishing and/or polishing material for each batch of unfinished parts to be finished or polished. In such type of operation, after each separating cycle is complete, the abrasive media is usually lifted by an overhead traveling crane in a hoist pan in which collected and recharged into the vibrating hopper or tub, at which time additional parts to be finished and/or polished and appropriate cleaning or other chemical compounds are also added as appropriate.

One of the objects of this invention is to provide a finishing and polishing machine which obviates the foregoing requirements.

Another object of this invention is to provide such a device which eliminates the necessity of having a container for storing the finishing and/or polishing material, as well as maintaining a separator, as has been required with previous machines of this type for separating finished parts from said material.

An additional object of this invention is to provide such a device which allows discharge of undesirable grit or waste as the finished parts are discharged and separated from the finishing and polishing material.

A further object of the invention is to provide such a device which eliminates the need for an extraneous separating device, hoist pan or other receptacle, and overhead traveling crane, and thus allows considerable saving in capital equipment outlay, labor and time.

A still further object of the invention is to provide such a device which may be readily adapted to an automatic cycle by interconnecting the various components of the device with time-controlled actuating units, for example, in such a manner as to provide timed charging of pieces to be finished or polished, finishing and/or polishing material and appropriate cleaning or other chemical compounds, timed discharge of finished and/or polished parts and waste separation, and return of utilizable finishing or polishing material to the hopper for reuse with additional parts, et cetera, and finally, timed dumping of all of the contents of the hopper or tub in case such is desired as a part of the work cycle.

Still an additional object of the invention is to provide a finishing and polishing machine which readily lends itself to operation involving recirculation of parts to be finished or polished with a plurality of different cleaning or other chemical solutions.

Other objects and advantages of the invention will appear from the following specifications wherein preferred illustrative forms of the invention are shown and described, it being understood, however, that the instrumentalities there shown and described are merely illustrative and are not intended to limit the invention to the specific arrangements and organization described and shown.

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In the drawings:

FIGURE 1 is a side elevation of a machine embodying the invention;

FIGURE 2 is a top view of the machine shown in FIGURE 1;

FIGURE 3 is a side elevational view in section showing the machine on section III—III of FIGURE 2;

FIGURE 4 is the same as FIGURE 3 showing the machine rotated counter-clockwise approximately ninety degrees;

FIGURE 5 is a partially broken elevational view of another form of the invention;

FIGURE 6 is a partially broken elevational view of the machine in FIGURE 5 rotated clockwise approximately one hundred and ten degrees;

FIGURE 7 is a partially broken elevational view of the machine in FIGURE 5 rotated counter-clockwise approximately one hundred and ten degrees;

FIGURE 8 is a view of a vibrator employed in carrying out the invention;

FIGURE 9 is a partially broken elevational view of another form of the invention;

FIGURE 10 is a side elevational view in section showing the machine of FIGURE 9 on section X—X; and

FIGURE 11 is a partially broken isometric view of another form of the invention.

The invention consists generally of a tub for receiving finishing and/or polishing material and parts to be finished. In preferred forms of the invention, the tub has a rounded semi-cylindrical bottom, and may be elongated and substantially enclosed. A vibratory motor, having its axis parallel to the axis of the bottom, e.g., the semi-cylindrical bottom, and carrying an eccentric weight adapted to give rotary vibrations to the tub and its contents, is mounted directly to the tub in the preferred embodiments of the invention. The means for effecting vibration of the tube may take various forms, so long as it is operative to impart vibration to the tub in various positions of rotation, e.g., in both upright and tilted positions.

The sides of the tub are extended upwardly and in some instances preferably convergingly so as to form an opening for filling of refinishing and/or polishing material and parts to be finished when in a first or abrading position. In this position the tub is substantially upright or vertical.

The tub with attached vibratory motor is mounted on a stationary frame for free movement in space by means of any suitable conventional vibration isolating mounts such as springs or rubber shock mounts and tiltable to a second, or discharge, position by any suitable tilting means. In said discharge position, the finishing and/or polishing material, and parts when finished, are caused to approach the opening of said tub by movement along the surface of one wall of the tub, which preferably constitutes an extension of the semi-cylindrical bottom, by the influence of the vibratory motor and the force of gravity. In discharge position, the said surface is preferably slightly inclined toward the tub opening to allow the force of gravity to exert its effect. In the absence of vibration, this incline must be approximately thirty-five degrees for parts and materials to move along a substantially flat wall surface, which precludes effective separation for all practical purposes but, with employment of normally available vibration imparting motors, separation is extremely effective at an incline of only approximately three degrees from the horizontal toward the tub opening. When said incline is less than three degrees, the separation is accordingly less effective, although some separation is possible even with the tub wall in a completely horizontal position with no angle of incline toward the tub opening.

The wall, preferably constituting one extension of the semi-cylindrical bottom, on which the finishing and polishing material and parts are influenced to move by vibration while the device is in discharge position, includes as a part thereof a first classification or screen area comprising a screen of a suitable mesh so as not to interrupt finished parts in their movement toward the discharge opening and yet allow passage therethrough of finishing and/or polishing material as well as the smaller waste produced by the abrading action. This first screen area preferably extends from one side to the other of the wall in which located, or substantially so, so as to provide minimum area on which parts or polishing and/or finishing materials may lodge and pass by the screen area and thereby escape classification.

A separating or classifying compartment is so located with regard to the screen area as to receive the finishing and/or polishing material and waste which passes through said screen area in the tub wall which preferably constitutes an extension of the semi-cylindrical bottom. The one side of said separating or classifying compartment consists of a second screen area in which is mounted a screen of a mesh suitable to allow only the waste to be passed therethrough, while retaining the finishing and/or polishing material. This said second screen area, or side of the separating compartment, is generally vertical when the device is in an abrading position, but generally horizontal in the discharge position. It will be apparent that, when parts to be finished are smaller than the finishing and/or polishing materials, the finishing and/or polishing materials can be caused to continue past the first classification area and out the discharge opening, or if desired into a second classification area and compartment, while finished parts pass through the screen and into the first mentioned separation compartment for exit or for possible further classification.

For a typical product being worked in the device, said first screen may have one inch openings, and said second screen may have one-quarter inch openings. It is apparent, however, that the mesh sizes of said screens is optional depending upon size of finished parts and finishing and/or polishing materials as well as the relation of the size of finished parts to the size of finishing and/or polishing material, as well as the requirement of classification by passage therethrough of finishing and/or polishing material but exclusion of finished parts, or by passage therethrough of finished parts but exclusion of finishing and/or polishing material.

A further side of the separating or classifying compartment, or portion of such side, may be inclined with regard to the tub wall to assist emptying of retained finishing or polishing material into the tub when the entire device, as a unit, is tilted to or near the vertical loading or abrading position. In certain embodiments of the invention, such return to the tub is facilitated by including certain ducts, pipes, channels, or conduits, from the separating chamber bypassing the first screen area into the tub.

It is thus possible, by means of the present invention, to separate and discharge the finished parts and waste from the finishing and/or polishing material in a simple and facile manner without the removal of the finishing and/or polishing material from the machine.

The specific embodiment of the invention shown in FIGURE 1 of the drawings consists of an elongated substantially enclosed tub 1 which has a semi-cylindrical bottom 2 and an opening 3 generally oppositely positioned thereto through which the tub may be charged and through which finished parts may be discharged. Mounted directly on tub 1 is a motor 4 having an eccentric weight 5 mounted for rotation about the axis of the motor, which axis in the preferred form of the invention extends parallel to the axis of the semi-cylindrical bottom of the tub and the axis of the pivoted mounting of the tub, which will hereinafter be described.

Tub 1, as viewed in elevation and cross section in FIGURES 1 and 3, respectively, has a vertically extending flat wall portion 20 joining with the adjacent wall termination of the lower semi-cylindrical bottom 2, being an extension thereof. Wall portion 20 has an aperture formed therein adjacent its upper end to receive a separating or classifying screen 22 therein. Extending outwardly from the apertured portion carrying screen 22 is a separating chamber 23 having its upper and lower sides as there viewed defined by converging walls 26 and 27 (outwardly extending from wall 20). The outer end of separating chamber 23 has a second classifying screen 24 mounted therein and extending generally parallel to first classifying screen 22. Still referring to FIGURES 1 and 3 it will be noted that oppositely positioned to wall portion 20 is a convex wall portion 28 joining with the other upper edge of semi-cylindrical bottom 2, of which it is an extension, and extending in generally converging attitude toward opposite wall portion 20. Integrally formed at the upper end of the opposite wall portion 28 is a flat and converging portion 28' which, with the upper end 20', forms two oppositely positioned walls of the filling and part emptying opening 3. To complete the tube 1 there are oppositely positioned tub end plates 29 and 30 so best seen in FIGURE 2.

FIGURE 2 shows the tub mounted for substantial free movement in space by side plates 6 secured to tub 1 by rubber vibration isolating mounts 7 which permit such free movement in space. The side plates 6 have spindles or supporting shafts 8 and 9 rigidly secured thereon for purposes of tilting the machine for certain emptying and re-loading. Spindles 8 and 9 are assembled in bearings 10, which are mounted on a suitable stationary frame 11, for free rotating movement of tub 1, effected by any suitable tilting device through a rod such as 13 secured to crank 14 mounted on spindle 8. In FIGURES 1 and 2, the tilting device is a wheel 15 having an eccentrically located pin 16 for receiving the end of rod 13. A timing motor not shown rotates wheel 15 on shaft 17 of the motor, causing pin 16 to pull or push rod 13 which effects crank 14 to tilt tub 1 from one position to another position of approximately ninety degrees difference.

In FIGURE 3 the machine is shown in a relatively upright abrading position with parts 18 to be finished combined with finishing and/or polishing material 19 and confined in tub 1 by virtue of its upright position. The vibratory motor 4 is imparting the working action in the tub 1 and its contents, said working action being of the nature of rotation about the axis of the semi-cylindrical tub bottom 2.

FIGURE 4 shows tub 1 in tilted discharge position in which contents move toward a point 20A in wall 20 where begins separation of finished parts 18 from finishing and polishing material 19 and waste 21 by means of classifying screen 22. Parts 18 continue on to be discharged through opening 3. Finishing and polishing material 19 and waste 21 are directed into separating chamber 23 which has a second classifying screen 24 mounted over opening 25 for the purpose of confining the finishing and/or polishing material 19 while discharging the waste 21 from the machine. Screen 24 may be removed or opened when it is desired to discharge the finishing and/or polishing material 19.

In FIGURE 5 another form of the invention is shown in an upright abrading or loading position. Parts to be finished 118 and finishing and/or polishing material 119 are shown at bottom 102 of tub 101, having been charged through opening 103 and being unable to lodge in compartment 123 by virtue of its inclined side 124.

FIGURE 6 shows tub 101 in a dumping position rotated clockwise, about its axis 108, a sufficient angle to discharge all the contents thereof, including the combination of finished or unfinished parts 118, finishing and/or polishing material 119 and waste 121.

FIGURE 7 shows tub 101 in discharge or separating

position, comparable to that shown in FIGURE 4, rotated counter-clockwise, about the axis 108, a sufficient angle to separate and discharge finished parts 118, waste 121 and retain finishing and/or polishing material 119.

FIGURE 8, illustrating a preferred form of the invention, shows tub 1 with vibratory motor 4 directly mounted thereon, to be supported therewith as a unit by the vibration isolating mounts. This vibratory motor consists, as further shown in FIGURE 8, of a rotor 98 carrying an eccentric weight 5. The eccentric weight 5 is mounted between the bearings 99, but it will be understood that it might be outboard of the bearings. The rotor is mounted with its axis 100 extending generally parallel to the axis of the tub 1 so that the rotary vibrations imparted by the motor to the tub and its contents tend to impart a rotary or orbital motion to the contents of the tub around a generally horizontally extending axis, causing said contents to rotate generally about the axis of the tub.

In FIGURE 9 another form of the invention is shown in an upright abrading position. Tub 201 is mounted for substantially free movement in space by providing flanged side drums 206 rigidly adjoined to tub sides 229 and 230. In side drums 206 are provided a plurality of adjusting screws 232 equally spaced about the circumference of the drums 206. Each of said screws 232 carries a locking device in the form of a jam nut 233 and, at one end of each of said screws, a spring clamp 234 so mounted to said screw 232 as to be rotatable about the axis of the screw. Spring clamps 234 are rigidly secured to one end of springs 207. Opposite ends of said springs are rigidly secured and equally spaced circumferentially on shaft collars 235 so that springs 207 are caused to be radially mounted and adjustably under compression. Shaft collars 235, are shown secured to a through shaft 208, instead of the more conventional spindles, by means of set screws 236. Shaft 208 extends through openings 237, as seen in FIGURE 10, in both sides 229 and 230 of tub 201 and is mounted in bearings 210 which are in turn mounted on stationary frame members 211.

FIGURE 10 shows tub 201 having a vertically extending flat wall portion 220 joining with the adjacent wall termination of the lower semi-cylindrical bottom 202, being an extension thereof. Wall portion 220 has an aperture formed therein adjacent its upper end to receive a separating screen 222 therein. Extending outwardly from the aperture portion of wall 220 which carries screen 222 is a separating compartment 223 having its outer sides defined by curved walls 226 and 227 (outwardly extending from wall 220). A portion of side 227, at the point of contact with screen 222, is abruptly turned upward to form a discharge surface 203 which constitutes an extension of screen 222 and wall 220. It will be noted that elliptically shaped sides 229 and 230 (see FIGURE 9) form oppositely positioned end plates for both separating compartment 223 and tub 201. An upwardly extended portion 228 of semi-cylindrical bottom 202 of tub 201 terminates a substantial distance from discharge surface 203 to form an opening 238 through which parts and finishing and/or polishing materials may be introduced into tube 201.

FIGURE 11 shows another form of the invention in a discharge position rotated a sufficient angle to discharge all contents of tub 301, in which is provided one side wall 320 which extends externally of the tub 301, said extensions being in the form of separating and classifying screen 322. Guide rails 342 at the sides of the screen 322 converge toward opening 336 which is enclosed by chute 337 extending downwardly through a solid deck 338 and into separating compartment 323. Deck 338 is substantially parallel to but may be angled slightly from screen 322. Deck end 339, of deck 338, extends through opening 340 in compartment 323 to constitute a discharge trough. Chutes 341 extend through and to a point above screen 322 but are flush with underside of deck 338. A

second screen 324 forms the lowest portion of separating compartment 323.

In operation of this machine, when the parts to be finished are larger than the finishing and/or polishing material, the parts to be finished are charged into the tub 1 together with the finishing and/or polishing material 19 through opening 3 while tub 1 is in an upright or abrading position. Vibratory motor 4 and its vibrating eccentric weight 5 are energized. This imparts a rotary vibratory motion to the contents of the tub 1, which move orbitally in a continuous path generally following the contour of the bottom of the tub.

After the pieces 18 have been finished, the machine is tilted to approximately ninety degrees from its upright or abrading position by some desirable means effecting tub 1 and allowed to empty along one extended wall 20 of tub 1 by the influence of the vibratory motor and the force of gravity.

After the discharging of finished parts 18 and waste 21 from the machine, through openings 3 and 25 respectively, and their collection in separate suitable containers, and the confining of the finishing and/or polishing material within the machine, the machine is returned to the abrading position. The confined finishing and/or polishing material returns through classifying screen 22 to tub 1 and another cycle of operation is in order.

For total content discharge or "dumping," the machine is merely tilted clockwise from its abrading or discharge position to its dumping position and all contents discharged through the influence of vibration and the force of gravity, as shown in FIGURE 6. Obviously, discharge and dumping positions may be readily reversed by optional construction of the device.

In a typical operation of one version of the device of the present invention when parts to be finished are smaller than the finishing and/or polishing material, the parts to be finished are charged into tub 301, shown in FIGURE 11, together with finishing and/or polishing materials while tub 301 is in an upright abrading position.

After the pieces have been finished, resulting from the abrasive action as effected by the abrasive materials in tub 301 under the influence of vibratory motor 304, the machine is tilted approximately ninety degrees from its upright or abrading position by some desirable tilting means effecting tub 301 and allowed to empty along one extended wall 320 of tub 301, still under the influence of the vibratory motor 304 and preferably under the further influence of gravity.

Upon reaching the surface of screen 322, the finished parts are allowed to pass through screen 322 by virtue of their size, thus dropping onto solid deck 338 and being discharged from the machine into a suitable receptacle. Finishing and/or polishing materials, by virtue of their size, are excluded from passage through screen 322 and enter separating compartment 323 by means of dust or chute 337 and its opening 336.

Finishing and/or polishing materials remain in separating compartment 323 until tub 301 is returned to its upright abrading position, at which time said materials are allowed passage through ducts or chutes 341 which direct said materials for return to tub 301 and commencement of another work cycle.

It is thus seen that a novel apparatus is here provided for carrying out economically and in an easy manner within one machine an abrading operation which is readily followed by, firstly, the separation of the worked articles from the abrading material and, secondly, retention and repositioning of the abrading material for reuse and, thirdly, separation of the waste material abraded from the abrading material, and whereby all of the other objects of the invention hereinbefore set forth are accomplished.

It will be apparent 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 present embodiments be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than the foregoing description to indicate the scope of the invention, in which appended claims "polishing material" is to be understood as being one species of "finishing material" and "polishing" is to be understood as being one species of "finishing."

I claim:

1. A self-separating finishing device comprising in combination a tub having a bottom and side walls and at least one opening therein, said tub being supported for substantial free movement in space and having an abrading position and a discharge position and being tiltably mounted for rotation from one position to another, said tub being adapted to receive parts to be finished and finishing material when in one position of rotation and to discharge contents thereof when in said discharge position of rotation, a screen attached to said tub and rotatable with said tub whereby one of said finished parts and finishing material is separated from the other by passage through said screen while the other is retained on said screen when said tub is in a discharge position, said screen having a mesh selected to exclude passage therethrough of finished parts and allow passage therethrough of finishing material, said screen cooperating with an opening in said tub whereby finishing material passes through said screen while finished parts are retained on said screen and pass through said opening in said tub, a chamber cooperating with said screen for collection of finishing material which passes through said screen, means for return of finishing material collected in said chamber to said tub, and vibratory means operative to impart a vibratory motion to said tub in various positions of rotation.

2. A self-separating finishing device comprising in combination a tub having a bottom and side walls and at least one opening therein, said tub being supported for substantial free movement in space and having an abrading position and a discharge position and being tiltably mounted for rotation from one position to another, said tub being adapted to receive parts to be finished and finishing material when in one position of rotation and to discharge contents thereof when in said discharge position of rotation, a screen attached to said tub and rotatable with said tub whereby one of said finished parts and finishing material is separated from the other by passage through said screen while the other is retained on said screen when said tub is in a discharge position, said screen having a mesh selected to exclude passage therethrough of finished parts and allow passage therethrough of finishing material, said screen cooperating with an opening in said tub whereby finishing material passes through said screen while finished parts are retained on said screen and pass through said opening in said tub, said screen being generally inclined toward said opening in said tub when said tub is in a discharge position of rotation, a chamber and return means attached to said tub and cooperating with said screen for collection and return of finishing material passing through said screen to said tub, and vibratory means operative to impart a vibratory motion to said tub in various positions of rotation.

3. A self-separating finishing device comprising in combination a tub having a bottom and side walls and at least one opening therein, said tub being supported for substantial free movement in space and having an abrading position and a discharge position and being mounted for rotation from one position to another, said tub being adapted to receive parts to be finished and finishing material when in one position of rotation and to discharge contents thereof through an opening therein when in said discharge position of rotation, a screen attached to said tub and rotatable with said tub whereby one of said finished parts and finishing material is separated from the other by passage through said screen while the other is

retained on said screen when said tub is in a discharge position, said screen having a mesh selected to allow passage therethrough of finished parts and exclude passage therethrough of finishing material, a collection chamber for collection of finishing material which does not pass through said screen attached to said tub and rotatable therewith, duct means communicating between said chamber and said tub and bypassing said screen for return of finishing material to said tub, exit means for exit from said device of finished parts which pass through said screen, and vibratory means operative to impart a vibratory motion to said tub in various positions of rotation.

4. The device of claim 3, wherein said exit means is a solid deck mounted generally parallel to said screen and located so as to be generally beneath said screen when said tub is in discharge position of rotation.

5. A self-separating finishing machine, comprising in combination a tub having an opening therein and a semi-cylindrical bottom and side walls, said tub being adapted to receive finishing material and parts to be finished, said tub having an abrading position and a discharge position and being tiltable from said abrading position to said discharge position and mounted for substantial free movement in space in both of said positions, a vibratory motor mounted to said tub for imparting vibrations to said tub and its contents in both said positions, a screen attached to said tub and rotatable with said tub, said screen being of a mesh selected to permit passage therethrough of finished parts but to exclude passage therethrough of finishing material, said screen being provided with guide rails for channeling classified finishing material along the surface of said screen, a passageway at the end of the channel defined by said guide rails, a compartment communicating with said passageway and attached to said tub for receiving finishing material which is retained by said screen, a duct bypassing said screen, said compartment being in communication with said tub by means of said duct, whereby finishing material retained in said compartment is returned to said tub when said tub is returned to abrading position.

6. A self-separating finishing device comprising in combination a tub having a semi-cylindrical bottom and adapted to receive finishing material and parts to be finished, a vibratory motor mounted on said tub and adapted to impart vibrations to said tub and contents thereof, said tub and vibratory motor being supported as a unit for substantial free movement in space, said tub having an abrading position in which said semi-cylindrical bottom is in its normal position and a second or discharge position in which said bottom is rotated from its normal position, said tub being mounted for rotation from its abrading position to its discharge position, a first screen of a mesh selected to exclude passage therethrough of finishing material but to permit passage of finished parts attached to said tub and rotatable therewith, said first screen being provided with guide rails defining a channel for passage of finishing material of a size excluded from passage through said screen along the surface of said screen, a chamber attached to said tub, a first duct constituting the terminus of said channel in communication with said chamber, a second screen of mesh selected to allow passage therethrough of waste but to exclude passage therethrough of finishing material embodied in said chamber, a second duct bypassing said first screen, said chamber communicating with said tub by said second duct, whereby finishing material retained in said chamber is returned to said tub when said tub is returned to abrading position.

7. A self-separating finishing device provided with a parts discharge opening comprising a tub adapted to receive finishing material and parts to be finished, said tub being supported for substantial free movement in space and having an abrading position and a discharge position and being tiltable from one position to the other and

adapted to discharge finished parts when in discharge position, separating means attached to said tub and cooperating with said parts discharge opening for separation of finished parts from finishing material and exit of finished parts when said tub is in discharge position, means attached to said tub for collection of separated finishing material, and vibratory means for imparting a vibratory motion to said tub.

8. The device of claim 7, including means attached to said tub for return of said finishing material to said tub upon return of said tub to abrading position.

9. A self-separating finishing device comprising a tub supported for substantial free movement in space and having an abrading position and a discharge position and being mounted for rotation from one position to another, said tub being adapted to receive parts to be finished and finishing material when in one position of rotation and to discharge contents when in said discharge position of rotation, a parts exit for exit of parts from said device, means rotatable with said tub and cooperating with said parts exit for separation of finished parts from finishing material and concurrent exit of finished parts, means rotatable with said tub for retention of separated finishing material in said device, means rotatable with said tub for return of said retained finishing material to said tub, and vibratory means operative to impart a vibratory motion to said tub.

10. A self-separating finishing device comprising a tub having a bottom and side walls and at least one opening therein, said tub being supported for substantial free movement in space and having an abrading position and being tiltable from one position to another, said tub being adapted to receive parts to be finished and finishing material when in one position and to discharge contents thereof when in said discharge position, a foraminous member attached to said tub for separation of said finished parts and finishing material by passage of one through said member and retention of the other by said member, a chamber cooperating with said member for collection of said finishing material, a duct which bypasses said member for return of finishing material collected in said chamber to said tub, a parts exit for discharge of finished parts, and vibratory means operative to impart a vibratory motion to said tub.

11. A self-separating finishing device comprising in combination a tub having a bottom and side walls and at least one opening therein, said tub being supported for substantial free movement in space and having an abrading position and a discharge position and being mounted for rotation from one position to another, said tub being adapted to receive parts to be finished and finishing material when in one position of rotation and to discharge contents thereof when in said discharge position of rotation, a screen attached to said tub and rotatable with said tub whereby one of said finished parts and finishing material is separated from the other by passage through said screen while the other is retained on said screen, a parts exit for discharge of finished parts, means attached to and rotatable with said tube and bypassing said screen for collection and return of said finishing material to said tub upon return of said tub to abrading position, and vibratory means attached to said tub for imparting a vibratory motion thereto.

12. A self-separating finishing device comprising in combination a tub having a semi-cylindrical bottom and side walls and at least one opening therein, said tub being supported for substantial free movement in space and having an abrading position and a discharge position and being mounted for rotation from one position to another, said tub being adapted to receive parts to be finished and finishing material when in one position of

rotation and to discharge contents thereof through at least one opening therein when in said discharge position of rotation, exit means for exit of parts, a screen attached to said tub and rotatable with said tub whereby one of said finished parts and finishing material is separated from the other by passage through said screen while the other is retained on said screen when said tub is in a discharge position, said screen cooperating with said exit means for exit of finished parts, a chamber cooperating with said screen for collection of said finishing material separated from said finished parts, a duct which bypasses said screen for return of said finishing material collected in said chamber to said tub upon return of said tub to abrading position, and a vibratory motor mounted to said tub for imparting a vibratory motion to said tub in various positions of rotation.

13. A housing for a vibratory finishing machine comprising a tub adapted to be resiliently mounted for rotation from an abrading position to a discharge position and adapted to be loaded with finishing material and parts to be finished, a chamber communicating with said tub, a foraminous member interposed between said tub and said chamber for separating finishing material from parts, and a parts exit for exit of parts from said housing, said foraminous member cooperating with said parts exit for discharge of parts from said housing when said housing is mounted and rotated to a discharge position.

14. The housing of claim 13, including means for return of finishing material collected in said chamber to said tub.

15. The housing of claim 14, wherein the means for return of finishing material to the tub by-passes said foraminous member.

16. A vibratory finishing machine comprising a housing having a tub adapted to be loaded with finishing material and parts to be finished, said housing being resiliently mounted and tiltable from an abrading position to a discharge position, a chamber communicating with said tub, a foraminous member interposed between said tub and said chamber for separating finishing material from parts, a parts exit for exit of parts from said housing, said foraminous member cooperating with said parts exit for discharge of parts from said housing upon rotation of said housing to the discharge position, means for tilting said housing to the discharge position and to the abrading position, and vibratory means operative to impart a vibratory motion to said tub.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

228,803	Benson	June 15, 1880
965,813	Greist	July 26, 1910
1,048,026	Bates et al.	Dec. 24, 1912
2,118,227	Ransohoff	May 21, 1938
2,138,550	MacLellam	Nov. 29, 1938
2,143,610	Muller et al.	Jan. 10, 1939
2,290,036	Davis	July 14, 1942
2,319,391	Davis	May 18, 1943
2,332,701	Dowsett	Oct. 26, 1943
2,359,944	Schummer	Oct. 10, 1944
2,519,060	Manley	Aug. 15, 1950
2,739,427	Ransohoff	Mar. 27, 1956
2,831,576	Webner	Apr. 22, 1958
2,843,979	Lupo	July 22, 1959
2,918,926	Behnke	Dec. 29, 1959
2,933,861	Bintzler	Apr. 26, 1960
2,973,606	Brandt	Mar. 7, 1961
2,997,813	Brandt	Aug. 29, 1961
2,997,814	Brandt	Aug. 29, 1961

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,073,078

January 15, 1963

Gunther W. Balz

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 37, for "tube" read -- tub --; line 43, for "refinishing" read -- finishing --; column 3, line 28, for "posiiton" read -- position --; line 60, for "sepaarte" read -- separate --; column 4, line 24, for "tube" read -- tub --; line 25, for "so" read -- as --; line 69, for "124" read -- 126 --; column 5, line 60, for "tube" read -- tub --; lines 64 and 65, for "extensions" read -- extension --; column 6, line 55, for "dust" read -- duct --; column 7, line 8, for "fiinishing" read -- "finishing" --; column 9, line 12, for "comprisinng" read -- comprising --; line 59, for "tube" read -- tub --; column 10, line 55, for "May 21, 1938" read -- May 24, 1938 --.

Signed and sealed this 20th day of August 1963.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents