United States Patent [19]

Funk

[11] **3,813,816**

[45] **June 4, 1974**

[54] **POLISHING APPARATUS**

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[22] Filed: **Dec. 12, 1972**

[21] Appl. No.: **314,344**

[52] **U.S. Cl.** **51/7,** 51/163

[51] **Int. Cl.** **B24b 19/00,** B24b 31/06

[58] **Field of Search** 51/7, 6, 163; 241/175; 259/72, 54

[56] **References Cited**

UNITED STATES PATENTS

3,191,348	6/1965	Rampe	51/163
3,449,869	6/1969	Rampe	51/163
3,635,446	1/1972	Kurosawa et al.	259/54

FOREIGN PATENTS OR APPLICATIONS

240,603	10/1925	Great Britain	51/6

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[57] **ABSTRACT**

A polishing apparatus for polishing particulate material including rocks, stones, gems, and the like by effecting an oscillating and vibrating movement of a platform with at least one container supported thereabove and having the material to be polished therein. The platform is resiliently supported and suspended within a support frame with drive mechanism on said platform for imparting vibratory motion thereto.

6 Claims, 5 Drawing Figures

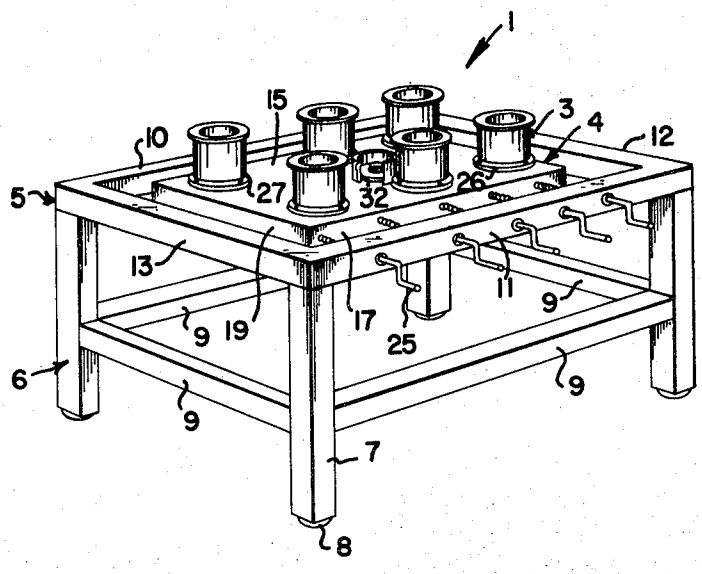


Fig. 1.

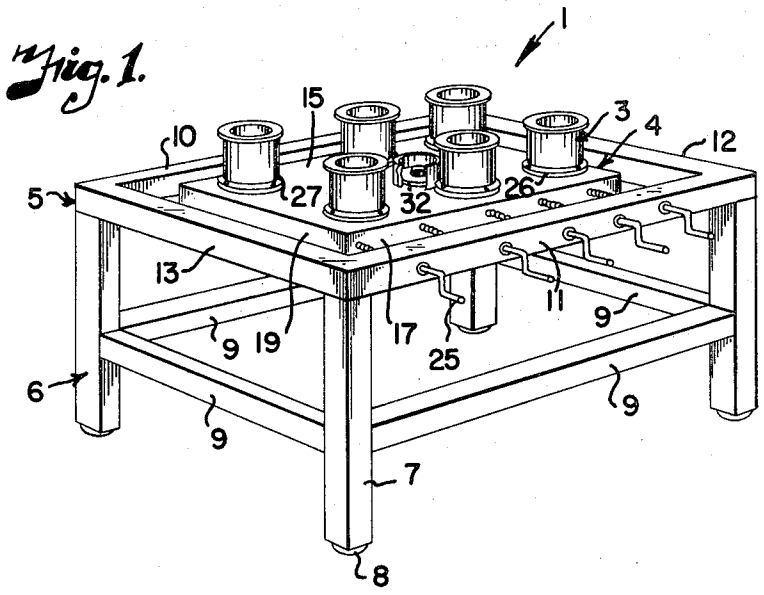

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Fig. 2.

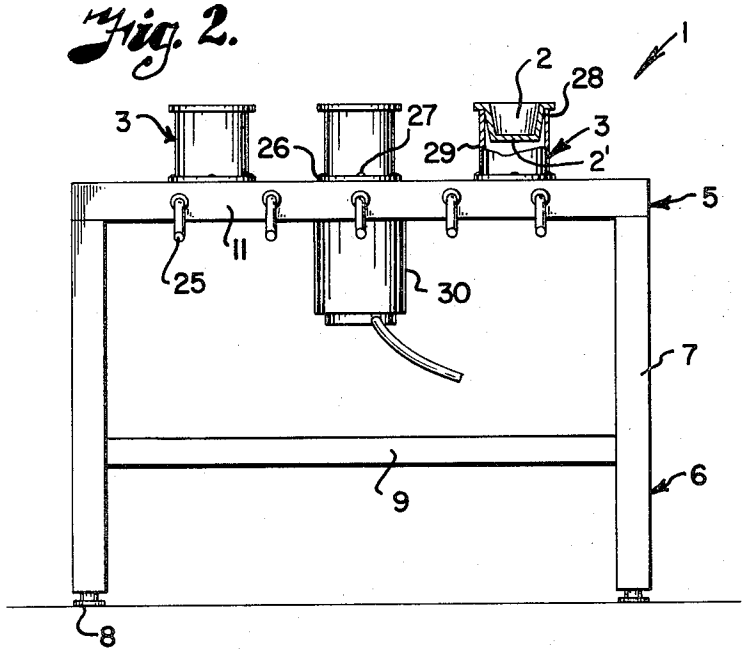

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Fig. 3.

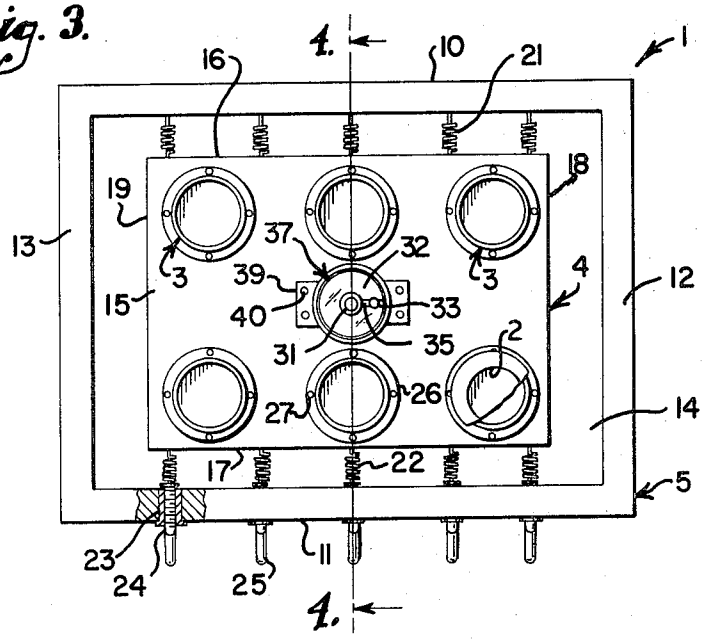


Fig. 4.

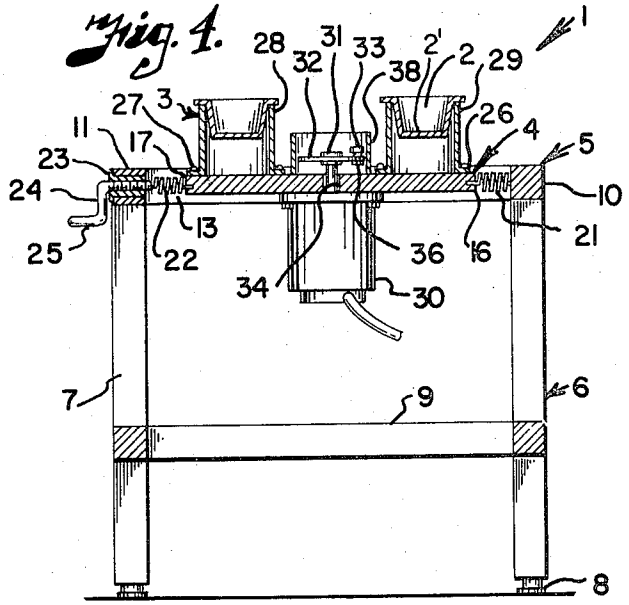
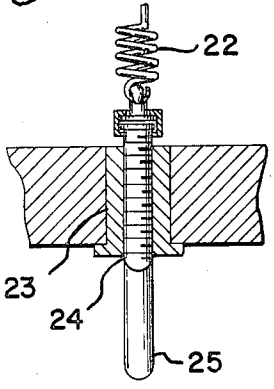


Fig. 5.



POLISHING APPARATUS

The present invention relates to polishing apparatus and more particularly, to polishing apparatus operative to effect an oscillating and vibrating movement of a container having particulate items therein to be polished.

Heretofore, polishing apparatus used for polishing rocks, stones, gems, and the like have been relatively expensive and required long operating periods. Rock loss or breakage of rocks, stones, and the like has been a substantial problem with the prior type apparatus using a rolling action, particularly for tear drop shaped stones. Such polishing apparatus were difficult to service and required substantial time for cleanup of the apparatus and particulate items for each washing and exchange of grit.

The principal objects of the present invention are: to provide a polishing apparatus which polishes particulate items including rocks, stones, gems, and the like by effecting an oscillating and vibrating movement of a container having the material to be polished therein; to provide such a polishing apparatus particularly adapted for polishing non-flat items; to provide such a polishing apparatus wherein rock loss or breakage is substantially less than in prior apparatus and particularly for apache tear drops (obsidian) and the like; to provide such a polishing apparatus particularly adapted for polishing items in a container positioned above a platform which is resiliently suspended and supported; to provide such an apparatus wherein the container is removably supported in an open top holder and easily lifted therefrom for servicing; to provide such a polishing apparatus wherein only a minimum amount of water is used with grit and polishing powder whereby cleanup is relatively easy; and to provide such a polishing apparatus which is economical to manufacture, durable in construction, positive in operation, polishes the items in a relatively short time, and particularly well adapted for the proposed use.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

The drawings constitute a part of this specification and include an exemplary embodiment of the present invention and illustrate various objects and features of the polishing apparatus.

FIG. 1 is a perspective view of a polishing apparatus embodying features of the present invention.

FIG. 2 is a side elevational view of the polishing apparatus.

FIG. 3 is a top plan view of the polishing apparatus with portions broken away to better illustrate component parts.

FIG. 4 is a transverse sectional view taken on line 4—4, FIG. 3 and showing means for suspending and vibrating a platform having the items to be polished supported thereabove.

FIG. 5 is an enlarged sectional view through a portion of a frame side member showing the mounting of a platform suspension spring.

Referring more in detail to the drawings:

As required, detailed embodiments of the present invention are disclosed herein. However, it is to be understood that the disclosed embodiments are merely

exemplary of the invention which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriate detailed structure.

In the disclosed embodiment of the present invention, the reference numeral **1** generally designates a polishing apparatus which polishes particulate items or material including rocks, stones, gems, and the like by effecting an oscillating and vibrating movement of at least one container **2** having the material to be polished therein and mounted on a suitable holder **3** extending upwardly from a platform **4** which is resiliently suspended and supported within a support frame **5**.

The polishing apparatus **1** may have any suitable support frame having the platform **4** resiliently suspended and supported thereon as later described. In the illustrated structure, a base **6** includes a plurality of legs **7** each adapted to be supported on a floor surface or the like. For leveling purposes, it may be desirable to mount suitable adjustable glides **8** on the lower ends of the legs **7**. The base **6** preferably includes suitable bracing members **9**, extending between and connected to the legs **7** thereby providing a substantially rigid structure.

The support frame **5** is secured to the upper ends of the legs **7** and may be any suitable shape, however, the support frame **5** is illustrated as being generally rectangular in shape and having a pair of generally parallel side members **10** and **11** which are laterally spaced apart and a pair of end members **12** and **13** are substantially parallel and extend between respective opposite ends of the side members **10** and **11** and connected thereto to form a rigid member framing an opening **14** within the support frame **5**.

The platform **4** preferably has a shape corresponding to the support frame **5** and is illustrated as a generally rectangular member having a planar top surface **15** and a pair of substantially parallel side edges **16** and **17** and a pair of generally parallel end edges **18** and **19**. The side edges **16** and **17** are positioned to be substantially parallel with the side members **10** and **11** respectively and the end edges **18** and **19** are positioned to be substantially parallel with the end members **12** and **13** respectively.

The platform **4** is positioned in the opening **14** within the support frame **5** and is resiliently suspended therein for vibratory movement with oscillations in a generally horizontal plane the oscillations having an amplitude in one direction being greater than the amplitude thereof in a direction normal to said one direction. The mounting also provides a rocking vibration. The mounting may be any suitable arrangement of springs to provide such motion and in the illustrated structure, the means for resiliently suspending and supporting the platform **4** within the opening **14** in the support frame **5** is a plurality of pairs of opposed springs **21** and **22** each extending between a respective one of the side edges of the platform **4** and the side members of the support frame **5**. The springs are preferably suitably mounted to adjust the tension thereof and thereby the resistance to movement of the platform in the direction of the springs. This also adjusts the depression of the platform below the level of the spring ends connected to the frame **5**. In the illustrated structure, the springs **21** and

22 are elongated coil springs and each have one end thereof suitably connected relative to respective side edges of the platform 4. Said springs on each side of the platform being spaced apart along the length of the side edges. The other ends of the springs on one side of the platform 4, for example springs 21, are suitably connected relative to the side member 10 of the support frame 5. The other ends of the springs on the other side of the platform 4, for example, springs 22, are suitably movably supported relative to the side member 11 of the support frame 5. In the illustrated structure, a plurality of internally threaded sleeves 23 are positioned in and extend through the side member 11 of the support frame 5 and each of the sleeves 23 receive therein a respective one of a plurality of threaded shafts 24 each being connected to the other end of a respective one of the springs 22 whereby movement of the threaded shafts 24 within the sleeves 23 is operative to adjust the tension in the springs 21 and 22. The connection between the threaded shafts 24 and the respective springs 22 may be any suitable connection permitting rotation of the shafts, as by suitable handles 25 each extending from and connected to a respective shaft 24 without effecting rotation of the respective springs 22. The connections between the threaded shafts 24 and the respective springs 22 are each illustrated as a suitable swivel.

While the polishing apparatus 1 may have a single holder 3 and container 2, it is preferable to have a plurality of containers 2 each supported in a position above the platform 4, therefore, a plurality of holders 3 are mounted on the upper surface 15 of the platform 4 and are arranged in any desired pattern preferably any uniform pattern having the center of the pattern coinciding with the center of the platform 4. The holders have base portions 26 illustrated as a flange rigidly secured to the platform 4 by suitable fastening devices such as screws and the like 27.

The holders 3 may be any desired shape, however, in the illustrated structure, the holders 3 are generally tubular members having an open upper end 28 adapted to removably receive a respective container 2 therein. The holder side walls 29 define a shape at said upper end 28 substantially conforming to an extension shape of a respective container 2.

The containers 2 each have a shape preferably having interferring engagement to removably and frictionally retain the container 2 in the respective holder 3. The containers 2 may be any suitable material which will resist impact of particulate items to be polished and suitable materials to effect polishing, such as carborundum grit and polishing powder mixed with water. In the illustrated structure, the containers 2 are cups or bowls with walls defining a receptacle of a capacity to hold a desired quantity of material and of a depth whereby the material will remain therein during all vibratory operation. The depth of the containers is less than the height of the holders so that the bottom 2' of the containers and the material therein is spaced above the platform. The containers 2 preferably have an edge or flange engaging the upper edge of the holder wall to limit movement of the container into the holder.

Polishing of the items within the containers 2 is effected by an oscillating and vibrating action transmitted to the containers 2, the vibratory force being imparted in a plane substantially parallel to the surface 15 of the platform. The illustrated means for effecting the oscillating and vibrating movement includes a drive motor 30 suitably secured to a lower surface of the platform 4 and positioned at the center thereof and at the center of the arrangement of holders 3 thereon. The drive motor 30 may be any suitable motor adapted to rotate a shaft 31.

A suitable rotatable member 32 is fixed on the shaft 31 and has a mass or weight 33 thereon in spaced relation to the shaft 31 providing an eccentric load. The member 32 is preferably near the platform and in the illustrated structure, the shaft 31 extends through an aperture 34 in the platform and the member 32 is positioned above the platform 4 whereby rotation of the shaft 31 applies a force to the platform 4 which is resisted by the springs 21 and 22 thereby oscillating same and with the movement of the platform 4 being transferred to the containers 2 and thereby the material therein. The illustrated member 32 and weight 33 are a disc mounted on the upper end of the shaft 31 and having a way or groove 35 therein and extending substantially radially from the shaft 31. A suitable weight 33 is movable along the way or groove 35 and is suitably secured in an adjusted position by a fastening device 36 to thereby vary the force applied to the platform 4.

The rotatable member 32 and weight 33 are enclosed by a guard or shield 37 preferably having a cylindrical wall 38 with a base member or flange 39 secured by suitable fastening devices such as screws 40.

In using a polishing apparatus constructed as illustrated and described, the particulate items to be polished are positioned in the respective containers 2 and a minimum amount of water is placed in said containers. A selected grit having a desired size, such as carborundum grit, and a suitable polishing powder is also placed in the containers 2. The tension applied to the springs 21 and 22 is adjusted by means of the handles 25 and preferably positioning the springs 21 and 22 with a desired depression of the platform 4 below the connection of the springs to the frame 5. The drive motor 30 is then activated or energized to rotate the disc 32 with the weight 33 positioned in and secured in a selected position spaced from the shaft 31 thereby effecting an oscillating and vibrating action to the platform and the containers 2 and the items therein. When a desired vibratory operation is completed the motor 30 is stopped and the containers 2 may be lifted from the respective holder, the items cleaned and examined with a minimum of time and work. If further polishing is desired, the items are replaced in the containers with desired grit, powder and water, the containers replaced in the holders and the motor energized to impart further vibratory action. The vibratory motion includes a rocking due to the depression of the platform and the spacing of the items in the container above the platform. Also the amplitude of oscillation of the platform in the direction of the spring axes is less than that in a direction normal to axis of the springs.

It is to be understood that while I have illustrated and described one form of my invention, it is not to be limited to the specific form or arrangement of parts herein described and shown.

What I claim and desire to secure by Letters Patent is:

1. A polishing apparatus for polishing non-flat items comprising:

a. a support frame having opposed spaced apart side members and opposed spaced apart end members, said side and end members defining a space therebetween;

b. a substantially horizontal platform positioned within said space in said support frame and having side and end edges spaced from said side and end members respectively of the support frame;

c. a plurality of spaced elongate resilient means extending in opposed relation between said side members of said support frame and said platform and connected thereto for movably and resiliently suspending said platform within said support frame space whereby said platform is movable up and down and horizontally;

d. at least one holder mounted on said platform and upstanding therefrom;

e. a container mounted on said holder, said container having a bottom and upstanding side walls defining a receptacle adapted to receive and retain therein polish material and a plurality of items to be polished; and

f. means mounted on said platform and having an eccentric member rotatable on an axis normal to the plane of said platform and operable to impart oscillatory motion to said platform for oscillating and vibrating said container and items and polish material therein thereby effecting polishing of the items.

2. A polishing apparatus as set forth in claim **1** wherein:

a. said platform is generally rectangular;

b. said resilient means comprises a plurality of pairs of elongated opposed springs each extending between a respective one of said side edges of said platform and an adjacent side member of said support frame to suspend the platform therebetween;

c. said springs on at least one side of the platform being adjustable for varying the resilient force applied to the platform to resist motion and to adjust platform depression in the suspended position by the springs; and

d. said container is positioned with the bottom thereof spaced above said platform.

3. A polishing apparatus as set forth in claim **2** wherein:

a. said platform is planar and has a plurality of said holders upstanding from the upper surface thereof, said holders being hollow shells terminating in open upper ends;

b. said containers being positioned in respective holders and having a depth less than the height of the respective holder and having flanges removably engaging upper portions of the holders for support of items to be polished spaced above the platform; and

c. said means for oscillating and vibrating said platform is substantially centered on said platform.

4. A polishing apparatus as set forth in claim **2** wherein:

a. said holders are each an upstanding tubular member having an upper portion with a peripheral wall defining an open top;

b. said containers are cup-shaped members with a depth less than the height of the respective holder, said containers having a peripheral surface frictionally engaging the holder wall portion to retain the container in the holder; and

c. said containers having stop portions engaging the holders to limit movement of the container into the holder and position the container and items therein spaced above the platform.

5. A polishing apparatus as set forth in claim **4** wherein:

a. said springs are elongate coil springs with the opposed springs aligned and the springs on a side being substantially parallel with each other, said springs each having one end connected to a respective adjacent side of the platform;

b. spring connectors movably mounted on at least one side frame member for each spring at the respective side and having connection with the respective spring, said spring connectors being selectively movable substantially in the line of the respective spring to adjust the tension thereof;

c. said elongate springs being the sole support of said platform and providing a suspension thereof with limited movement in all directions and the resistance to movement in the direction of the springs being greater than in a direction transverse thereto.

6. A polishing apparatus as set forth in claim **5** wherein:

a. said oscillating means includes a motor mounted on said platform in depending relation thereto and having a driven shaft on an axis substantially centered between side and end edges thereof and perpendicular to the platform; and

b. said eccentric member being a rotatable member connected to said motor shaft and having a weight eccentric to the axis of rotation thereof, said eccentric member being adjacent to and above said platform.

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