

March 9, 1937.

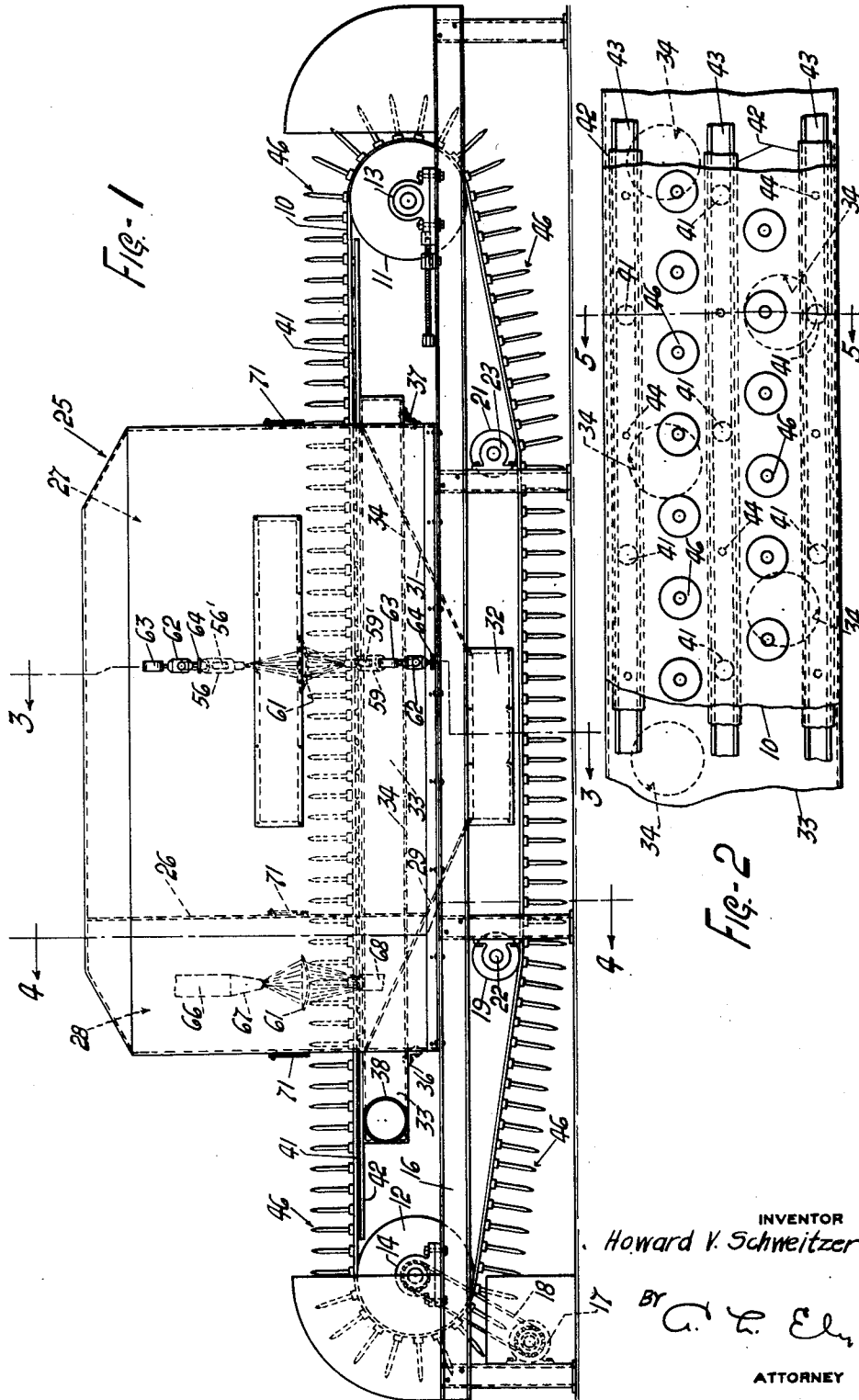
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2,073,184

APPARATUS FOR CLEANING ARTICLES OF CERAMIC MATERIALS

Filed Nov. 11, 1935

2 Sheets-Sheet 1



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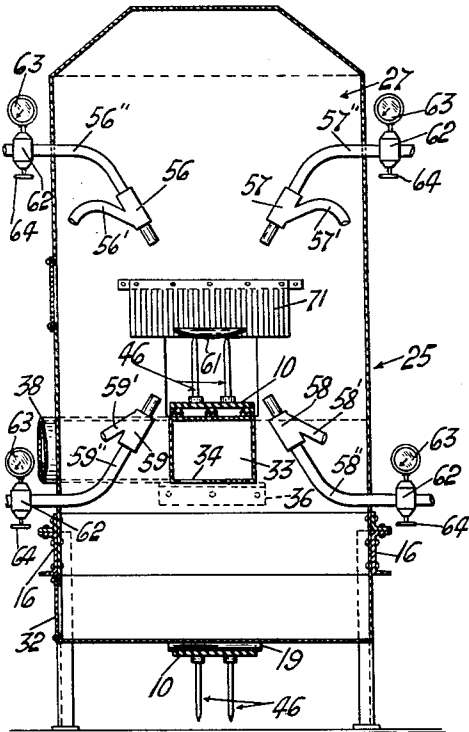


Fig. 3

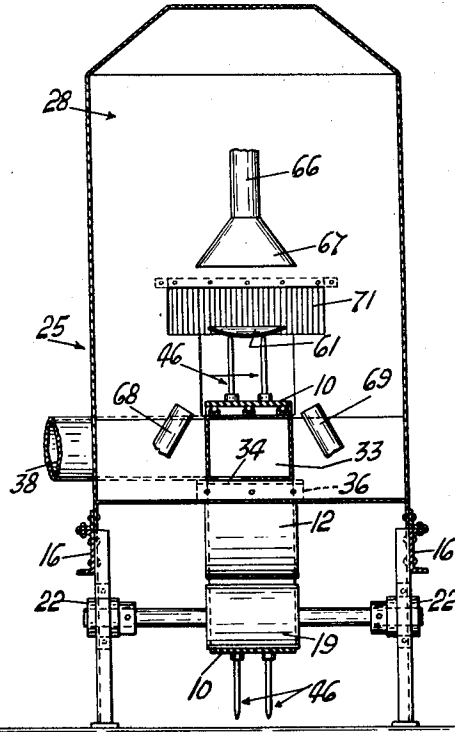


Fig. 4

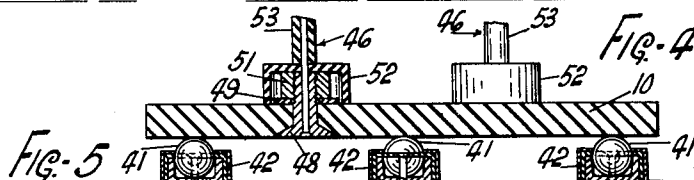
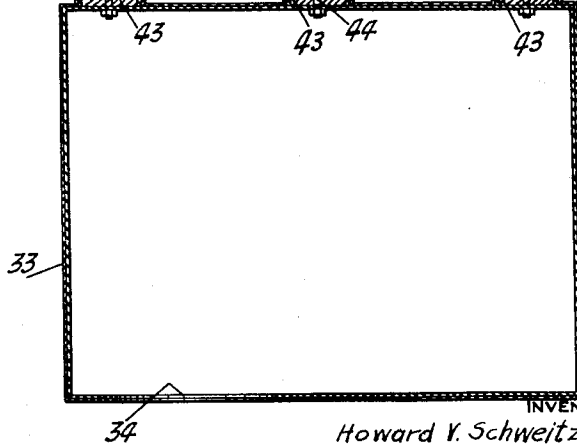
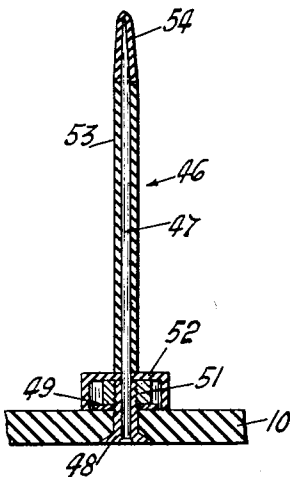


Fig. 5

Fig. 6



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APPARATUS FOR CLEANING ARTICLES OF
CERAMIC MATERIALS

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17 Claims. (Cl. 51-14)

This invention relates to the art of cleaning frangible articles, such as vitreous and semi-vitreous ware and other articles of ceramic materials. In the manufacture of vitreous and semi-vitreous ware it is necessary to clean or brush each piece before the glaze is applied. The purposes of this invention are to provide apparatus embodying impacting means, such as sand blast guns, for thoroughly and effectively performing this cleaning operation in minimum time.

Other important objects of the invention are to provide for simultaneously cleaning opposite surfaces of the pieces as a continuous process; to provide for smooth running and elimination of shocks so as to avoid breakage and shifting of the ware out of its proper position during treatment, and also to provide apparatus of this class having an improved construction and relative arrangement of parts.

Apparatus embodying the features of the invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a front elevation of a machine for cleaning vitreous and semi-vitreous ware, parts of the machine being omitted and broken away for purposes of illustration;

Fig. 2 is an enlarged plan view of a portion of the conveyor, illustrating the arrangement of the exhaust conduit and the supporting means for the upper run of the conveyor;

Fig. 3 is an enlarged section on the line 3-3 of Fig. 1, illustrating the arrangement of the impacting devices and the conveyor and also the pressure control means.

Fig. 4 is an enlarged section on the line 4-4 of Fig. 1, illustrating the arrangement of the blowing apparatus;

Fig. 5 is an enlarged section on the line 5-5 of Fig. 2, showing the conveyor, the supporting means therefor and the exhaust conduit; and

Fig. 6 is an enlarged section through one of the pins carried by the conveyor.

The preferred embodiment of the invention selected for illustration comprises a travelling conveyor 10 in the form of an endless belt of flexible, yieldable material, preferably rubber belting such as elastic rubber reinforced with fabric. This conveyor operates over an idler pulley 11 and over a driven pulley 12. These pulleys are rotatably mounted in bearings 13 and 14 and similar bearings (not shown) carried by the main frame 16. Power for operating the conveyor is transmitted from a suitable source, such as a combined motor and reduction unit 17, through

a chain drive 18 to the driven pulley 12. The unit 17 may conveniently be mounted on the main frame. The lower run of the conveyor passes over idler pulleys 19 and 21 mounted in bearings 22 and 23 and similar bearings (not shown) carried by the main frame.

The upper run of the conveyor passes horizontally through a cabinet 25 which is divided by a vertical transverse partition 26 into a sand blasting chamber 27 and a blower chamber 28. The inner bottom walls 29 and 31 of the cabinet slope downwardly from the ends toward the center to provide a bin or hopper for sand or other material supplied to the impacting devices. A door 32 affords access to the lower portion of this hopper.

An exhaust conduit 33 extends through the cabinet beneath the conveyor. This conduit has longitudinally spaced openings 34, preferably in its lower side for removing dust from the cabinet. Preferably this conduit is covered with rubber. The conduit 33 may be supported in any convenient manner as by means of angle bars 36, 37 secured to the cabinet. This conduit has a lateral connection 38 (Figs. 3 and 4) which may be connected to suction apparatus (not shown).

Means are provided for supporting the upper run of the conveyor to maintain this run substantially level and to assure smooth and easy operation free from shocks or other disturbances. As shown in Figs. 1 and 5, this run may be supported on rows of smooth, highly finished convex surfaces provided by balls 41 preferably of glass, although good results may be obtained with similar surfaces formed of highly finished steel or with some of the harder alloys or steels for special purposes. Preferably these balls do not rotate but are held stationary in longitudinal rows. The means for holding the balls in position comprise upper and lower strips 42 and 43 of channel section with their flanges overlapping. The upper strips 42 have holes slightly smaller in diameter than the balls which project through these holes and are held fixed in position when the strips 42 and 43 are drawn together by attaching elements, such as the bolts 44, which also secure these strips to the exhaust conduit 33. Preferably as shown in Fig. 1, these strips extend beyond the exhaust conduit substantially to the pulleys 11 and 12 so that practically the entire upper run of the conveyor is adequately supported and assured of smooth and easy operation and of being maintained substantially level. It will be evident that the upper run of the conveyor rides only on the spherical or convex sur-

faces of these balls. Preferably the upper ball retaining strips 42 are covered with rubber.

The conveyor is provided with two rows of pins 46, the pins of one row being staggered with respect to those in the other row. As shown in Fig. 6 each pin comprises a shank portion 47 which is affixed to a threaded head 48, as by means of solder. The threaded portion of the head extends through the conveyor and receives a washer 49 and a nut 51 by means of which the pin is clamped securely in an upright position. A rubber cap 52 fits over the nut and washer and has an aperture through which the shank 47 extends. A rubber tube 53 fits over the shank. The upper end of the pin tapers to a point and this tapering portion is covered by a conical rubber tip or cap 54. It will be seen that each pin and all metal parts or attachments thereof are fully covered with elastic rubber. As these pins pass through the zone where the action of the sand blasting devices is most intense, it will be evident that the rubber covering makes it practical to use pins of comparatively soft and inexpensive metal which otherwise would be rapidly worn away.

Upper and lower impacting means in the form of sand blast guns 56, 57, 58 and 59 (Fig. 3) are arranged in opposed relation in the chamber 27. It will be noted that the lower guns are disposed at the sides of the conveyor which is thus out of their range so as not in any way to interfere with their action. The upper and lower guns have a common zone of action into which the upper ends of the pins 46 project so that an object, such as a dish 61, supported on these pins will have its upper and lower surfaces subjected to the blast. These guns are supplied with sand through the connections 56', 57', 58' and 59' and with air through the connections 56'', 57'', 58'', and 59''. In order to prevent shifting and possible breakage of the ware passing through the machine it is advisable to maintain such a pressure on the guns that the pressure on the opposite surfaces of the ware being cleaned is substantially balanced, or the pressure on the upper side of the ware may be maintained slightly greater than that on the lower side. It will be evident that if excessive pressure is applied to the under side of the ware, the latter will shift and may fall off or be blown off the pins. Therefore the term "balanced pressure" as used herein and in the claims is intended to mean a pressure which is substantially balanced on opposite surfaces of the article being treated or a pressure which is only slightly greater on the upper than on the lower surface of the article. It will also be evident that excessive downward pressure is likewise undesirable. In order to provide for maintaining the desired pressure each of the air lines to the impacting devices or guns may be equipped with a regulating device 62 having a gage 63 and adjusting means 64.

In the chamber 28, a blast of air issues downwardly from a connection 66 which may have a flattened, fan-shaped end 67. Air blasts are also directed upwardly from the connections 68 and 69 at the sides of the conveyor. These air blasts are supplied from a common source, as a blower and therefore produce a substantially balanced pressure on opposite surfaces of an article such as a dish resting on the pins 46 and travelling through their common zone of action. At the ends of the cabinet and on the partition 26 the upper portions of the openings through which the conveyor passes are covered by a flap or flex-

ible door 71, preferably of shredded rubber which hangs to the tops of the pins and permits dishes of various heights to pass.

In using this apparatus the conveyor is set in motion so that its upper run travels from right to left as viewed in Fig. 1. Articles to be treated, such as pieces of unglazed vitreous, or semi-vitreous ware may be delivered to the pins mechanically or manually. Each article resting on the pointed ends of the pins passes through the flexible door into the chamber 27 and into the zone of action of the sand blast devices. Both surfaces of each piece may be cleaned by one set of any suitable number of opposed sand blasting devices or additional sets of any number of opposed impacting devices may be arranged to act on each piece successively as it passes through the chamber. As the conveyor advances each piece into the chamber 28 the piece passes between the issuing blasts of air which remove particles of sand, dust and the like and leave the surface smooth and clean as the articles pass from this chamber. These opposed blasts of air may be supplied from any suitable number of connections forming one set adapted to act simultaneously on one piece or the blasts may be delivered from a plurality of such sets arranged to act on each article successively. It will be evident that the cleaned articles may be removed from the pins manually or mechanically.

The travelling conveyor 10 with the supporting pins 46 have not been claimed herein as they form the subject matter of my copending application Serial No. 88,795, filed July 3, 1936, for improvements in Conveyor.

While the preferred form of the invention and the best mode of applying the principles thereof have been disclosed herein, it will be understood that various modifications will occur to those skilled in the art when informed by this specification and that the invention is not limited except as indicated by the appended claims.

What is claimed is:

1. Apparatus of the class described, comprising the combination of a travelling conveyor, lower impacting means disposed at the sides of the conveyor and directed above and across the same to a zone of action sufficiently above the conveyor so that said impacting means may effectively cover the lower surface of an object disposed in said zone, upper impacting means directed downwardly toward said zone for covering the upper surface of an object disposed therein, and means carried by the conveyor for supporting an object in said zone.

2. The combination of substantially opposed upper and lower impacting means having a common zone of action and means for transporting articles of ceramic material through said zone, said means comprising slender pins in fixed spaced relation extending from below the range of said lower impacting means into said zone for supporting said articles.

3. The combination of substantially opposed upper and lower impacting means having a common zone of action, flow control means for obtaining a substantially balanced pressure in said zone, and means for transporting articles of ceramic material through said zone, said means comprising slender pins in fixed spaced relation extending from below the range of said lower impacting means into said zone for supporting said articles.

4. Apparatus of the class described comprising substantially opposed impacting means having a

common zone of action, and means for conveying articles of frangible material through said zone, the latter means comprising pins in fixed spaced relation and having pointed ends projecting into said zone, and rubber disposed about said pins for protecting the latter.

5 5. Apparatus of the class described comprising substantially opposed upper and lower impacting means having a common zone of action, a conveyor having a substantially horizontal run be-
10 neath said zone and out of range of said lower impacting means, and pins carried by the conveyor and having pointed ends projecting into said zone for supporting frangible articles therein.

15 6. Apparatus of the class described comprising substantially opposed upper and lower impacting means having a common zone of action, an endless conveyor of elastic material, said conveyor having a substantially horizontal run adjacent
20 said zone and out of range of one of said impacting means, and elements carried by said conveyor and having pointed ends projecting into said zone for supporting frangible articles therein.

7. Apparatus of the class described comprising
25 substantially opposed upper and lower impacting means having a common zone of action, adjustable flow control means for obtaining a substantially balanced pressure in said zone, a travelling conveyor of elastic material, said conveyor hav-
30 ing a substantially horizontal run adjacent said zone and out of range of one of said compacting means, and elements carried by said conveyor and having pointed ends projecting into said zone for supporting frangible articles therein.

35 8. Apparatus of the class described comprising an endless conveyor having a substantially horizontal run, chambers disposed along and about said horizontal run of the conveyor, substantially opposed impacting means in one of said chambers,
40 said impacting means having a common zone of action above the conveyor, substantially opposed blowing means in the other of said chambers, said blowing means having a common zone of action above the conveyor, and means carried by
45 the conveyor for supporting articles of frangible material in said zones.

9. Apparatus of the class described comprising an endless conveyor having a substantially horizontal run, chambers disposed along and about
50 said horizontal run of the conveyor, substantially opposed impacting means in one of said chambers, said impacting means having a common zone of action above the conveyor, substantially opposed blowing means in the other of said chambers, said
55 blowing means having a common zone of action above the conveyor, pins mounted on the conveyor and having pointed ends projecting into said zones for supporting articles of frangible material.

60 10. Apparatus of the class described comprising an endless conveyor having a substantially horizontal run, chambers disposed along and about said horizontal run of the conveyor, substantially
65 opposed impacting means in one of said chambers, said impacting means having a common zone of action above the conveyor, substantially opposed blowing means in the other of said chambers, said blowing means having a common zone of action
70 above the conveyor, metallic pins mounted on the conveyor and having pointed ends projecting into said zones for supporting articles, and means

for protecting at least the shanks of said pins from the action of said impacting means.

11. Apparatus of the class described comprising the combination of a travelling conveyor of yield-
5 able, flexible material, substantially opposed impacting means unobstructed by the conveyor and having a common zone of action above the conveyor, and means carried by the conveyor for supporting an article of frangible material in said zone.

12. Apparatus of the class described comprising the combination of upper and lower impacting
10 means having a common zone of action, and means for transporting articles of frangible material through said zone, said means comprising
15 a conveyor of elastic material operable adjacent said zone, and pins in fixed, spaced relation on said conveyor for supporting articles of frangible material in said zone.

13. Apparatus of the class described comprising
20 ing the combination of a travelling conveyor of elastic material, substantially opposed impacting means having a common zone of action above the conveyor, means carried by the conveyor for supporting articles of frangible material in said zone,
25 and spherical elements for supporting the conveyor.

14. Apparatus of the class described comprising the combination of a travelling conveyor of elastic
30 material, substantially opposed impacting means having a common zone of action above the conveyor, means carried by the conveyor for supporting articles of frangible materials in said zone, an exhaust conduit extending longitudinally be-
35 neath said conveyor, and spherical elements for supporting the conveyor, said spherical elements being supported by said exhaust conduit.

15. Apparatus of the class described comprising a travelling conveyor of elastic material, substan-
40 tially opposed impacting means having a common zone of action above the conveyor, means carried by the conveyor for supporting articles of frangible material in said zone, and supporting means for the conveyor comprising smooth, highly finished
45 convex surfaces engaging the under side of the conveyor.

16. Apparatus of the class described comprising a travelling conveyor of elastic material, substan-
50 tially opposed impacting means having a common zone of action above the conveyor, means carried by the conveyor for supporting articles of frangible material in said zone, and supporting means for the conveyor comprising glass balls spaced
55 longitudinally and transversely of the conveyor and engaging the under side thereof, and means for retaining said balls in their spaced relationship.

17. Apparatus of the class described comprising a travelling conveyor of elastic material, substan-
60 tially opposed impacting means having a common zone of action above the conveyor, means carried by the conveyor for supporting articles of frangible material in said zone, an exhaust conduit disposed beneath the conveyor and having open-
65 ings spaced longitudinally thereof, glass balls spaced longitudinally and transversely of the conveyor and engaging the under side thereof, and means carried by the exhaust conduit for retaining and supporting said balls in their spaced relationship.

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