Jan. 29, 1946. W. H. EMERSON 2,393,762

CHINAWARE SAND BLASTING MACHINE

Filed Sept. 8, 1943 2 Sheets-Sheet 1

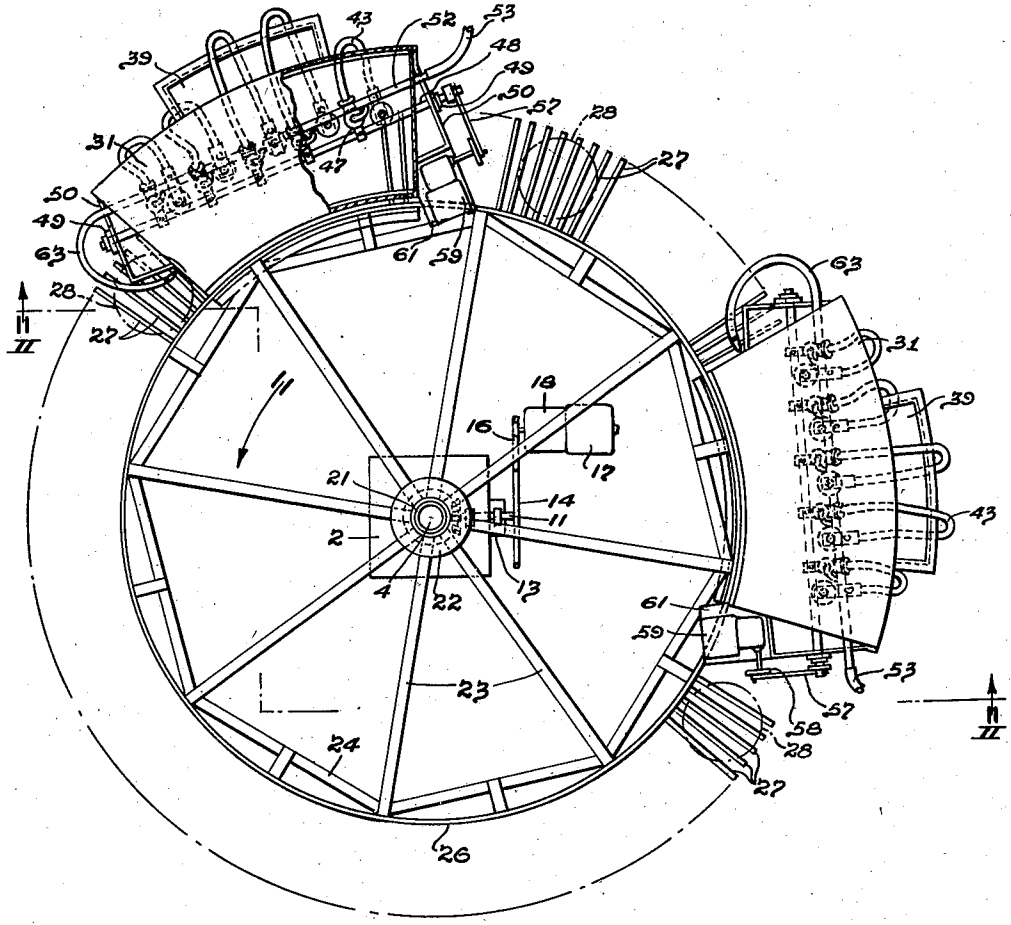

FIG. 1.

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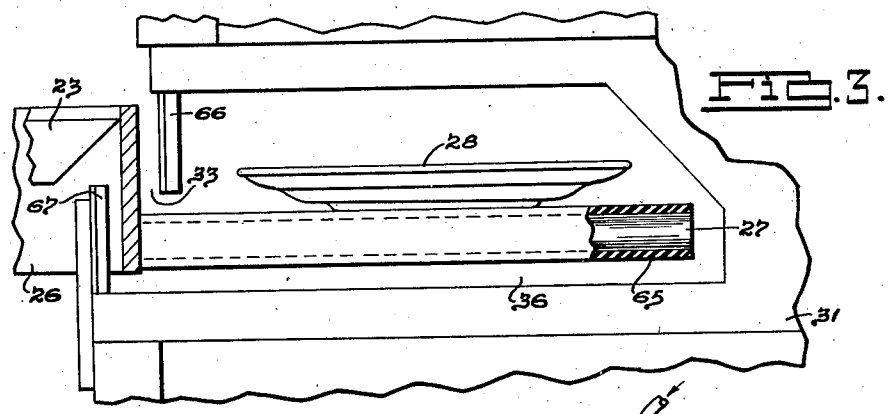

FIG. 3.

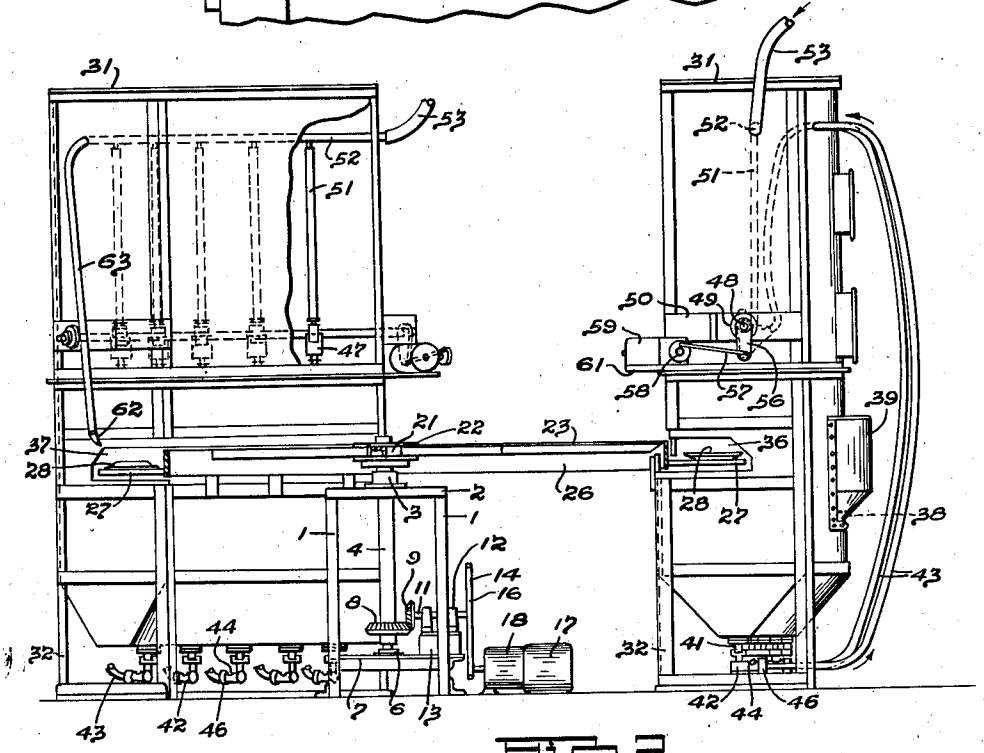

FIG. 2.

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UNITED STATES PATENT OFFICE

2,393,762

CHINAWARE SANDBLASTING MACHINE

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Application September 8, 1943, Serial No. 501,527

5 Claims. (Cl. 51—15)

This invention relates to apparatus for sand blasting chinaware after the first firing in order to polish its surfaces before the glaze is applied.

In the manufacture of chinaware the air-dried or green ware is stacked in bungs, and sand is packed between the pieces in order to support them while they are being fired in a kiln to a temperature at which the clay softens. The impression of the sand on the ware leaves it with a slightly rough surface which must be made smooth before the glaze is applied to it. In the past this has generally been done by racking the fired ware in revolving boxes or drums containing loose abrasive material. During several hours' rotation of the drums the rough surfaces of the ware are polished by the abrasive. Some attempts also have been made to polish the ware by sand blasting, but the suggested apparatus has not been entirely satisfactory, mainly because the ware has been sand blasted from below as well as from above, and the supports for the ware have interfered with the upwardly directed sand blasting nozzles.

It is among the objects of this invention to provide chinaware sand blasting apparatus which satisfactorily polishes both the top and bottom of the ware, which is not injured by the abrasive sand, which effectively cleans the ware after it has been sand blasted, and which is rapid and dependable in operation.

In accordance with this invention the ware is carried through a pair of laterally spaced sand blasting stations separated by a ware turnover station. At each of the sand blasting stations there is one or more downwardly directed sand blasting nozzles aimed at the ware. Consequently, the upper surface of the ware is sand blasted at the first station and then the ware is turned over and its upper surface sand blasted at the last station. As all of the sand blasting occurs from above, there is no interference with it by the means by which the ware is supported. The ware support is protected from abrasion by the sand, preferably by a covering of rubber or similar yielding material. The sand blasting nozzles may be oscillated transversely of the path of travel of the ware to insure proper polishing of the entire upper area of the ware, after which the ware is cleaned by jets of air directed against it.

The invention is illustrated in the accompanying drawings in which Fig. 1 is a plan view of a rotary machine, partly broken away; Fig. 2 is a vertical section taken substantially on the line II—II of Fig. 1; and Fig. 3 is an enlarged fragmentary view of a detail.

Referring to Figs. 1 and 2 of the drawings, a central framework is formed from four legs 1 that support a horizontal plate 2 at their upper ends. Mounted on the center of the plate is a bearing 3 beneath which the plate has an opening for receiving a vertical shaft 4 that also extends through the bearing. The lower end of the shaft is journaled in a bearing 6 mounted on a plate 7 extending across the lower portion of the framework. Rigidly mounted on the lower end of the shaft is a bevel gear 8 that is driven by a bevel pinion 9 on the inner end of a horizontal shaft 11 journaled in bearings 12 mounted on a block 13 supported by the framework. The outer end of this shaft carries a pulley 14 that is driven by a belt 16 from an electric motor 17 and speed reducing unit 18 mounted beside the framework.

Rigidly mounted on the upper end of the vertical shaft is a hub 21 that carries an encircling ring formed from a pair of vertically spaced circular plates 22 between which the inner ends of a plurality of radial spokes 23 are secured. The outer ends of these spokes are connected by bracing members 24. Attached to the outer ends of all of the spokes is a circular metal band or rim 26 which, with the spokes, forms a table or wheel. A plurality of circumferentially spaced metal rods 27 project radially from the outer surface of the rim near its bottom for supporting fired chinaware, such as dinner plates 28.

Located beside the wheel at two circumferentially spaced points is a pair of sand blasting housings 31 mounted on legs 32. The wheel side of each of these housings is curved horizontally to conform to the curvature of the wheel rim. Also, this inner wall is divided into laterally offset upper and lower portions to provide a downwardly extending slot 33 (Fig. 3) into which the lower portion of the rim projects as shown in Figs. 2 and 3. The end walls of each housing have an inlet opening 36 and an outlet 37 so that rods 27 can pass through it as the wheel rotates. The outer wall of the housing is provided with a horizontal slot 38 from which a sand hopper 39 extends upwardly and outwardly so that sand in the hopper will maintain a uniform level of sand in the housing.

The bottom of the housing is tapered transversely and is provided with a plurality of longitudinally spaced outlets 41 each of which is connected to the closed inner end of a tubular coupling 42. The outer end of each coupling is

connected to a hose 43 that extends up the outside of the housing and in through an opening near the top of its outer wall. The central portion of the coupling has an upper air inlet opening 44 the size of which can be regulated by a sleeve 46 slidably mounted on the coupling. The upper end of each hose in the housing is connected to the sand inlet of a sand blasting gun or nozzle 47 which is rigidly mounted on a horizontal shaft 48 extending through the end walls of the housing where it is rotatably mounted in bearings 49 supported by brackets 50 attached to the ends of the housing. Each nozzle also has an air inlet connected by a flexible hose 51 to a horizontal pipe 52 supported by the end walls of the housing. This pipe is connected by a hose 53 to any suitable source of air pressure (not shown). The air passing through the nozzle draws air through the adjoining hose 43 from the air inlet 44 of the coupling 42. This air carries sand along with it from the bottom of the housing and blows it with considerable force against the ware on the underlying rods 27.

The nozzle-supporting shaft carries at one end an arm 56 that is pivotally connected by a link 57 to a disc 58 mounted on the outer end of the shaft of a combined electric motor and gear reduction unit 59. This unit is mounted on a shelf 61 projecting from the end of the housing. Rotation of the disc operates to oscillate shaft 48 so that the nozzles are swung back and forth across the housing in order that the spray of sand will be more or less uniformly applied to the entire upper surface of the ware.

As the ware leaves each housing, the sand and loosened material that still cling to the ware are blown off by an air jet from a nozzle 62 supported adjacent the housing outlet 37. This nozzle may be connected by a hose 63 to the air pipe 52 at the top of the housing.

In order to prevent the metal parts of the machine, that are exposed to the sand blast, from the abrasive action thereof, rods 27 are each enclosed by a sleeve-like shield 65 (Fig. 3) of rubber or other suitable resilient material that will yield under the impact of the sand instead of rapidly wearing away. Also, the inner walls of the housings 31 are lined in the sand blasting zone with rubber or the like. The rubber walls at the rim-receiving slot in a housing are shown at 66 and 67 in the drawings.

In operation, an operator, stationed beside the wheel where the sand blasting housings are farthest apart, continuously places fired chinaware, either side up, on the radial rods of the continuously revolving wheel. The wheel carries the ware through the first housing where a spray of sand is directed against its upper surface from the oscillating nozzles above it. As the ware leaves this housing it is cleaned by air directed against it from nozzle 62 at the outlet. Before the ware enters the second housing, an operator turns each piece over so that its unpolished surface is uppermost. While the ware is passing through the second housing its upper surface, formerly its lower surface, likewise is made smooth by the sand blasting nozzles in the housing. Any loose material clinging to the ware when it leaves the housing is blown off by the air jet at the exit. The ware can then be removed from the wheel by the same operator who puts it on, or by another operator. It will be seen that both surfaces of the ware receive the same abrasive treatment because they both are sand blasted in identical manner from above. The supporting rods, which are protected by their resilient shields 65, do not interfere with the sand blasting because none of it is done from below. Also, the force of the sand blasting may be as great as desired because it is impossible for the force of the blast to lift the ware from the rods. The wheel can be revolved quite rapidly giving the machine a high capacity.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention, and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A chinaware sand blasting machine comprising a continuously revolving table, a plurality of circumferentially spaced rubber-covered rods projecting radially from the table around its edge for supporting chinaware, a pair of laterally spaced housings provided in their ends and one side with openings into which said rods project, and a plurality of sand blasting nozzles mounted in each housing above said rods and directed toward the ware carried thereby.

2. A chinaware sand blasting machine comprising a pair of laterally spaced sand blasting stations with a ware turnover station between, a downwardly directed sand blasting nozzle at each of said sand blasting stations, a continuously revolving table, a plurality of circumferentially spaced rods projecting radially from the table around its edge for supporting chinaware and for carrying it through all of said stations and beneath said nozzles, whereby the opposite sides of the ware are sand blasted in succession from above, a rocker shaft at each of said sand blasting stations and extending longitudinally of the path of travel of said supporting means, said nozzles being rigidly mounted on said shafts, and means for rocking the shafts to swing said nozzles back and forth across said path.

3. A chinaware sand blasting machine comprising a continuously revolving table having a peripheral rim, a plurality of rubber-covered rods projecting radially from the outer surface of said rim at circumferentially spaced intervals around it for supporting chinaware, a pair of laterally spaced housings beside the table and each having a curved inner side wall divided horizontally to form laterally offset upper and lower wall portions between which there is a downwardly extending slot receiving the lower portion of said rim with the adjoining rods disposed inside the housing, said housings being provided in their end walls with openings through which said rods pass as the table rotates, and a plurality of sand blasting nozzles mounted in each housing above said rods and directed toward the ware carried thereby.

4. A chinaware sand blasting machine comprising a vertical shaft, means for continuously rotating the shaft, a plurality of spokes radiating from the shaft, a rim having its upper portion rigidly secured to the outer ends of the spokes, a plurality of ware-supporting rods projecting radially from the outer surface of said rim at circumferentially spaced intervals around it, a pair of laterally spaced housings beside the table and each having a curved inner side wall divided horizontally to form laterally offset upper and lower wall portions between which there is a

downwardly extending slot receiving the lower portion of said rim with the adjoining rods disposed inside the housing, said housings being provided in their end walls with openings through which said rods pass as the table rotates, and a plurality of sand blasting nozzles mounted in each housing above said rods and directed toward the ware carried thereby.

5. A chinaware sand blasting machine comprising a continuously revolving table, a plurality of circumferentially spaced rods projecting radially from the table around its edge for supporting chinaware, a pair of laterally spaced housings beside the table provided in their ends and inner side walls with openings through which said rods travel, a shaft extending through each housing above said rods and oscillatably mounted adjacent the ends of the housing, a downwardly directed sand blasting nozzle rigidly mounted on each shaft and having an air inlet and a sand inlet, a conduit connecting the bottom of each housing with the sand inlet of the nozzle therein, a conduit for supplying air under pressure to said air inlet, and means for rocking said shafts to swing the nozzles back and forth across the path of movement of said rods through said housings.

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