May 6, 1952 B. O. GOODIN 2,595,242

DRIER AND STERILIZER

Filed Dec. 2, 1947 3 Sheets-Sheet 1

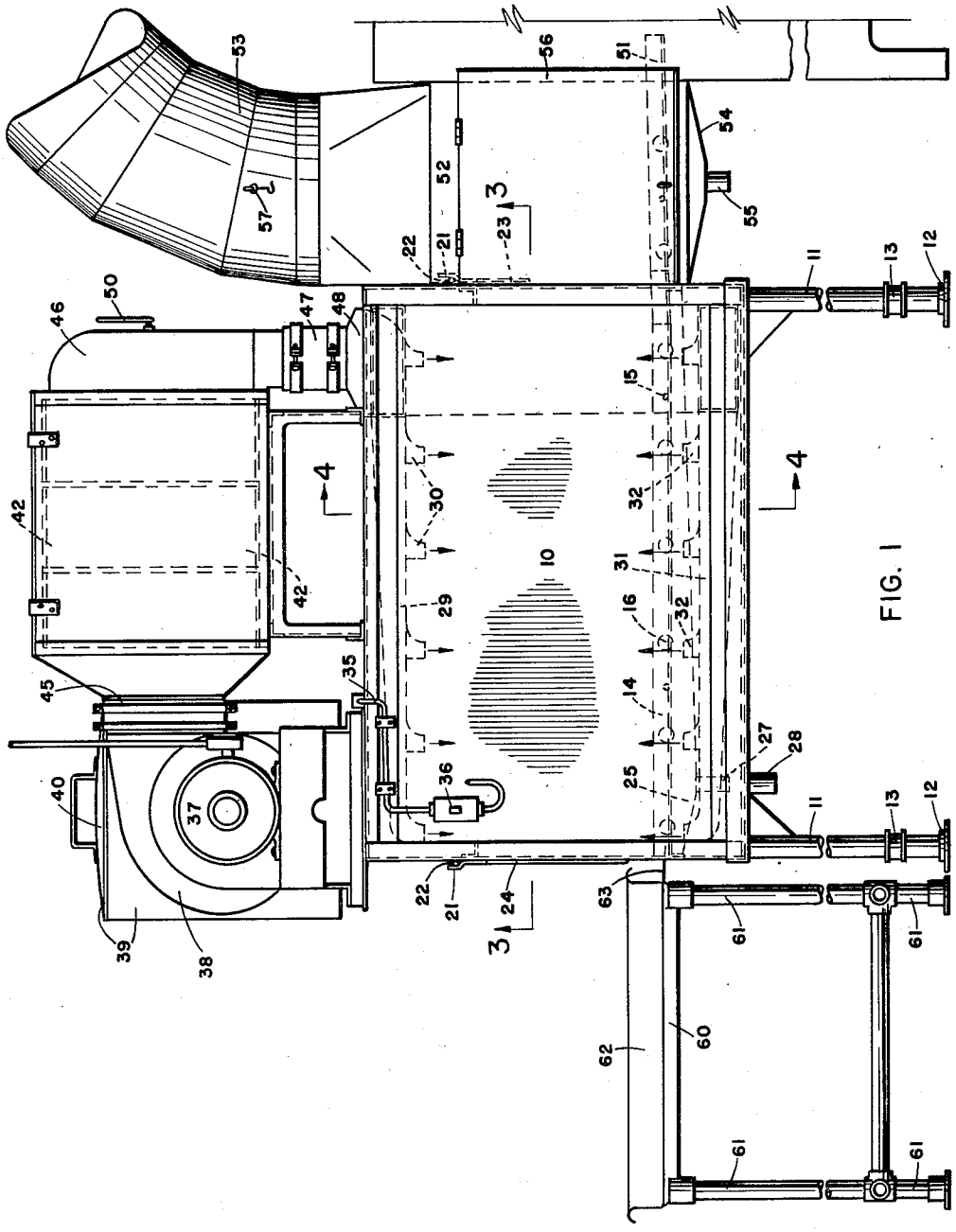


FIG. 1

INVENTOR.
BENJAMIN O. GOODIN
BY
ATT'Y.

May 6, 1952 B. O. GOODIN 2,595,242

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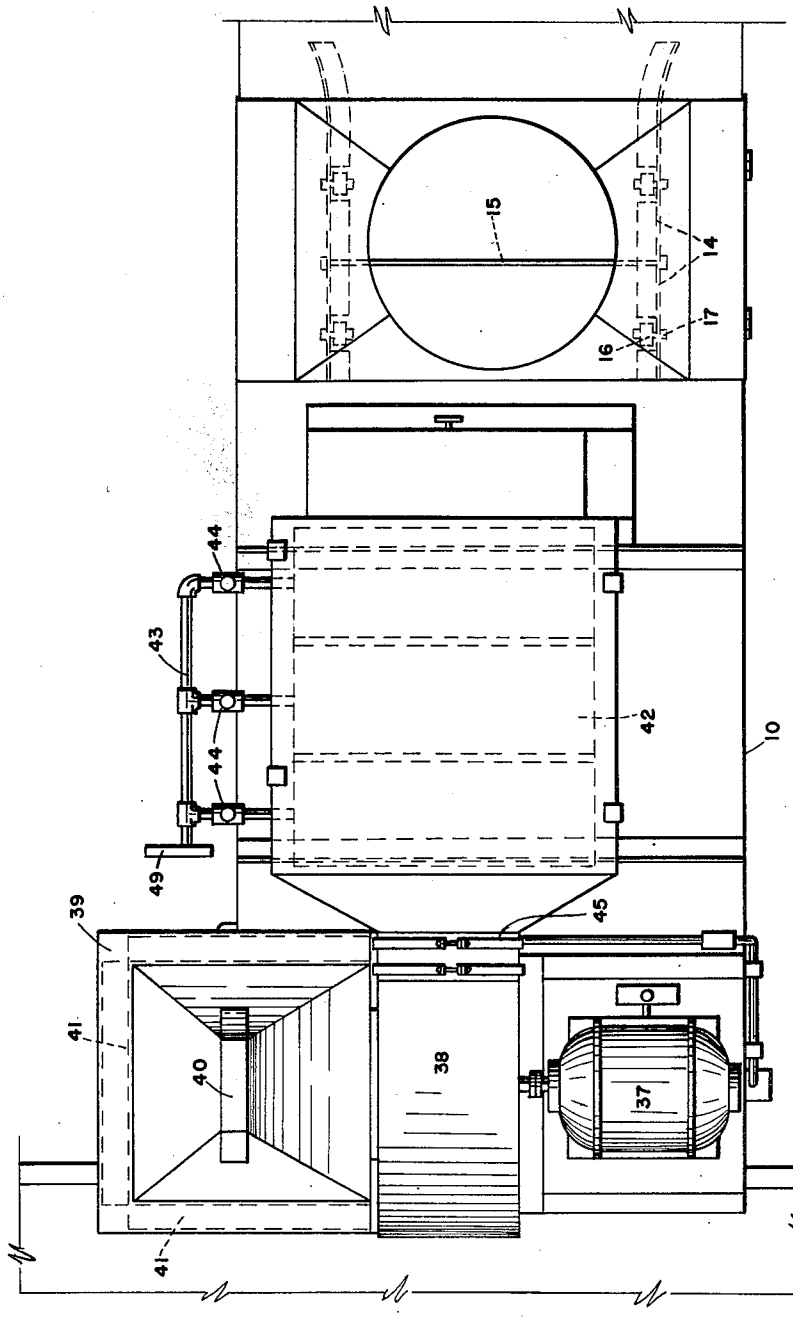


FIG. 2

INVENTOR.
BENJAMIN O. GOODIN
BY
M. O. Hayes
ATT'Y.

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DRIER AND STERILIZER

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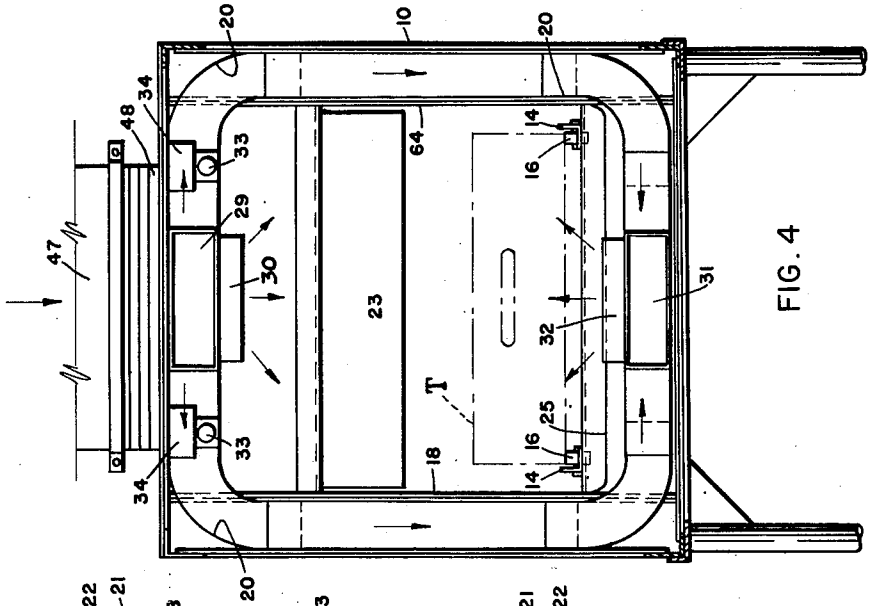


FIG. 4

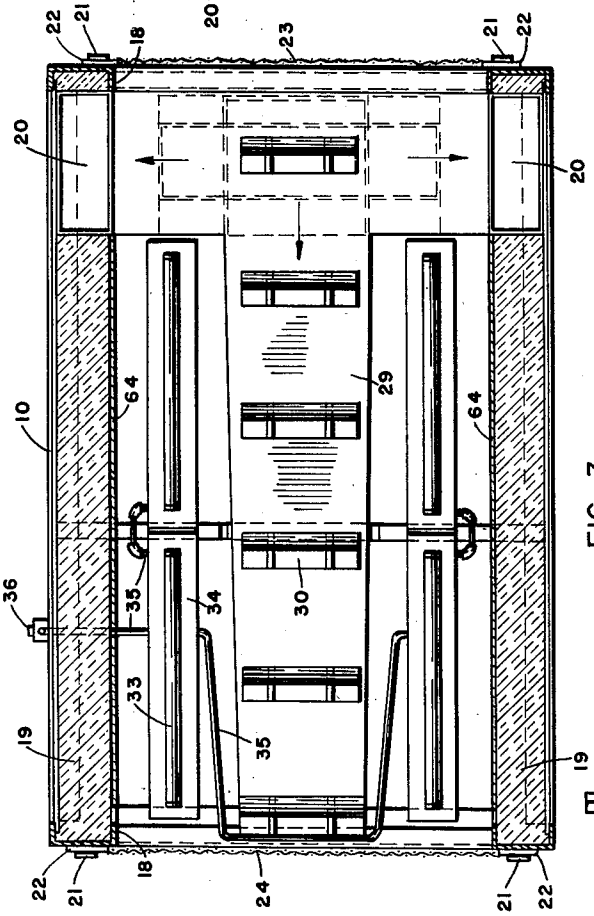


FIG. 3

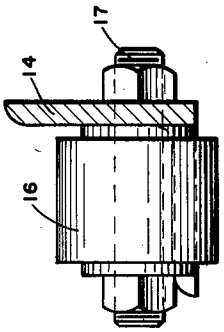


FIG. 5

INVENTOR.
BENJAMIN O. GOODIN
BY M. D. Hayes
ATT'Y.

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UNITED STATES PATENT OFFICE

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DRIER AND STERILIZER

Benjamin O. Goodin, Jefferson City, Mo.

Application December 2, 1947, Serial No. 789,258

7 Claims. (Cl. 34—69)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates in general to a drier for continuously drying and sterilizing articles which pass therethrough, but is more particularly described as a dish drier and sterilizer.

An important object of the invention is to provide a machine of this class which may be attached to existing installations of washing and cleansing machinery, such as dish washers, and also originally installed therewith.

A further object of the invention is to provide a drying container with a roller track for conveying articles therethrough and with flexible curtains in container openings at the ends of the track for partially closing and retaining heat therein.

Another object of the invention is to provide hot air and electrical means for drying and sterilizing articles as they are moved in the container.

Still a further object of the invention is to provide a drier in which a drip receiver is located at the bottom and below a conveyor with air ducts at the top and bottom, the latter extending through the drip receiver.

Other objects of the invention are: to provide a dish drier and sterilizer which is simple in construction for operation by a relatively small force of inexperienced help, without slowing down during the course of a meal, and not requiring a large amount of maintenance to keep it in working order; to obviate excess handling of dishes which causes the spread of bacteria; to prevent loss of time in towel drying of dishes and air drying of conveying trays; to dry the dishes free of water marks and bacteria; and in general, to effectively and efficiently prepare the dishes for reuse.

Other objects of the invention will appear in the specification and will be apparent from the accompanying drawings, in which:

Fig. 1 is a side elevation of a drier and sterilizer in accordance with this invention;

Fig. 2 is a top plan view of the drier and sterilizer shown in Fig. 1;

Fig. 3 is a plan view of the container as taken on the line 3—3 of Fig. 1;

Fig. 4 is a transverse sectional view as taken on the line 4—4 of Fig. 1; and

Fig. 5 is a detail view of one of the conveyor rollers and its mounting.

In feeding a large number of people the dishes must be re-used during the course of a meal, and unless they are cleaned, dried and sterilizer, the subsequent diners must use wet dishes which are objectionable and spoil the appearance of a meal and also tend to spread bacteria. To cleanse and

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towel wipe and dry the dishes not only requires a larger working force, but also the supply of dishes is materially slowed down. The present invention overcomes these objections by mechanically drying and sterilizing the dishes as rapidly as they are cleaned, without requiring the laborious hand wiping, and by subjecting them to ultra violet electric lamp rays which sterilizing, tending to kill bacteria.

Referring now more particularly to the drawings, a drier casing and receptacle is preferably fabricated of angle bars and sheet metal to form a hollow container 10 supported on tubular legs 11 each having a floor flange 12 for securing it to a supporting base and a coupling 13 for separately adjusting the length of the leg.

Extending through the container near the bottom is a track for trays of dishes, comprising angle bars 14 held in spaced apart relation by cross bars 15. The horizontal web of each bar 14 is recessed at intervals to seat a roller 16 therein supported by a stud 17 secured to the adjacent vertical web. At each end of the container and extending above the track is an opening 18. The bottom of each opening is spaced above the bottom of the container, and the sides of the openings are spaced within the sides of the container to provide room for insulation 19 and hot air ducts 20 at the outer sides of the track.

At the outside of each end of the container, above and at the sides of the opening 18, are curtain hooks 21 adapted to receive the ends of a curtain rod 22. At the admission end a curtain 23 of canvas, plastic or any suitable material is mounted on the rod and is slightly narrower than the opening 18 so that it will swing inwardly when a tray T containing dishes is pushed in on the track. This curtain 23 also depends only about one-third of the height of the opening so it will not catch on the tray. At the exit end a curtain 24 is mounted on the rod 22 and depends to a length to freely clear the track, and is slightly wider than the opening 18 so it will not swing within the opening but will swing outwardly therefrom when a tray of dishes is moved outwardly on the track. These two curtains do not close the openings 18 but they do serve to keep the heat therein and offer no bar to the movement of the dishes or the trays thereof on the track through the container. By thus mounting the curtains on the rods and seating the rods 22 at the ends in the hooks 21, the curtains are easily and quickly removable from the openings by lifting the rods from the hooks for access to

the interior of the container, for cleaning, repair, and removal of trays or dishes they may be lodged therein.

Below the track in the container is a shallow removable drip tray 25 which is inclined toward the exit end and a discharge tube 27 extends downwardly therefrom to register with a discharge tube 28 in the bottom of the container. Any drippings from the dish trays will be caught in the drip tray and discharged from the container.

Air ducts 20 extend from the top closely within and at the sides of the container at its inlet end, and join at the bottom below the track. Extending centrally from the ducts lengthwise of the container is a distributor duct 29 having outlets 30 at intervals projecting downwardly. Extending centrally from the ducts 20 below the track and longitudinally of the container is a distributor duct 31 having outlets 32 at intervals projecting upwardly through openings provided therefor in the drip tray 25.

By raising or removing the conveyor track, the tray 25 may be raised disengaging it from the air outlets 30, and moved endwise through one of the end openings 18 for cleaning or replacement. The tray preferably fits these outlets closely and the edges of the tray openings may be inclined upwardly to reduce leakage around the outlets.

In the top of the container, at the sides of the distributor duct 29, are straight electric tubular lamps 33 of the ultra-violet ray type, suitably mounted in adjustable reflectors 34 and controlled by circuit connections in conduits 35 leading to a switch 36 at the outside of the container.

Mounted on top of the container 10 is an electric motor 37 driving a blower fan (not shown) in a casing 38. Connected to the casing at the side opposite the motor is a filter housing 39 with a removable cover 40. In the housing are fibre glass filters 41 or other suitable air filters.

Between the fan casing and the hot air ducts 20 is a coil housing 42 mounted on an angle iron support at the top of container 10. In the housing are hot steam coils (not shown) separately connected to a steam supply pipe 43 by valves 44. At one end the housing 42 is connected to the blower fan casing 38 by a flexible coupling 45 and at the other end is a hot air supply manifold 46 connected at its bottom by a flexible joint 47 to a top fitting 48 for that portion of the ducts 20 which open through the top of the container 10.

At the end of the steam supply pipe 43 is a gauge 49 to indicate steam pressure, and connected in the outer end of the manifold 46 is a thermometer 50 to indicate the temperature of the hot air or other drying medium within the manifold.

The unit as thus described is complete for use as a drier, but it is adapted to be connected to a dish washing machine, or to receive dishes upon a track extension 51 from and similar to the container track and located in an adjoining exhaust hood 52 at the inlet end of the container 10. Leading upward from the hood is an exhaust duct 53 for vapors, and the bottom forms a centering drain tray 54 with a pipe 55 extending therefrom for a liquid dripping discharge. At one side is an inspection door 56 hinged at the top, adapted to be supported in a raised position by a hook 57 on the exhaust duct.

At the opposite or discharge end of the drier is a receiving table 60 supported by legs 61 substantially at the level of the conveyor track. An upwardly extending retaining rim 62 has one side 63 cut and bent outwardly to extend inside the drier just above the track side rail angle bars 14.

With this construction, dishes, trays of dishes, and other objects or materials to be dried, are deposited upon the track extension 51. Being supported upon rollers 16, they are pushed along the drive track by successively deposited trays or articles, until the preceding ones emerge from the discharge end of the drier. The trays, dishes, and the like are removed, placed on the table 60 and distributed as desired.

During passage of the articles through the drier, the coils in the housing 42 are heated so that air drawn through the filter housing and forced through the heater housing, will be directed through the hot air manifold ducts 20, 29 and 31, and outlets 30 and 32, from the top and bottom, respectively, of the container, above and below the conveyor track. At the same time, heating and sterilizing rays from the lamps 33 will be directed downwardly by the reflectors 34 upon all articles passing through the drier.

Within the container is an inner wall 64 outside of the conveyor track, at the sides, and about the same distance from the outer wall as the inner side of the side ducts 20. This provides a hollow side wall space into which the insulations 19 are inserted. The insulation is protected on the inside by the wall 64 and the outside wall is cooler, not transmitting so much heat to the room in which the drier is located.

Thus the movement of articles through the drier is progressive or continuous, heated vapors and drippings are automatically removed, and drying and sterilizing are continued as long as the articles are in the container. The drier and exhaust hood may be added to any washing or cleansing machine already installed, they may be installed separately as a complete operative unit, or they may be part of a complete installation of a washer, exhaust, and drier. The exhaust hood may also be omitted, if desired, from any such combination, as the drier will perform its functions alone, but perhaps not so satisfactorily nor efficiently as when the exhaust hood is connected thereto, thereby disposing of vapors, surplus drippings, and conserving heat from the drier at the inlet end. The hood also reduces the escape of ultra-violet rays from the lamps 33, which may be detrimental if a person is too much exposed to them.

While a preferred construction has been thus described in detail, it should be regarded as an example and not as a limitation of the invention, as various constructions, combinations, and arrangements of the parts may be made without departing from the spirit and scope of the invention.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. In a drier, a hollow container with a removable track extending through it, material inlet and exit openings at the ends of the conveyor above the track, a hot air duct in the bottom of the container, upwardly extending outlet nozzles in the top wall of the duct below the track, and a removable tray between the duct and the track, openings in the bottom wall of the tray through which the outlet nozzles project, said nozzles substantially closing the tray openings.

2. In a drier for wet articles, a hollow container, a conveyor track extending through the container, a hot air duct extending around the inside of the container at one end outside of and below the track, hot air distributor ducts extending horizontally from the hot air duct at the top of the container and below the track, outlet nozzles in the distributor ducts extending inwardly, centrally and upwardly of the container to direct hot air at the top and bottom of anything supported by the conveyor track, a drip tray between the bottom duct and the track, openings in the bottom wall of the tray through which the nozzles project upwardly from the duct below the track, a fluid discharge tube projecting downwardly from the tray, and a discharge tube in the bottom wall of the container which registers with the tray discharge tube.

3. In a drier, a hollow container with inside walls spaced at the sides from outside walls, a conveyor track extending through the container within the inside walls, end material openings in the container above the track in the inside and outside walls, hot air ducts at one end of the container occupying the space between the inside and outside walls, insulation between the inside and outside walls for the remainder of the sides, and extensions from the hot air ducts above and below the track having nozzles directed toward the track to dry articles as they are moved along the track.

4. In a drier, a hollow container with a removable track extending through it, material inlet and exit openings at the ends of the container above the track, a hot air duct in the bottom of the container having upwardly extending outlet nozzles in the top wall of the duct below the track, a removable tray below the duct and the track, the tray having openings in the bottom wall through which the outlet nozzles project, said nozzles substantially closing the tray openings, and curtains removably supported at the outside of the container and at the top of each opening and opened by contact of a tray movable through the container upon the track, the curtains tending to remain closed to retain heat in the container.

5. In a drier, a hollow elongated means for forcibly circulating warm air through said container, material inlet and outlet openings in the end walls of the container, a conveyor track extending through the inlet opening and through the container to adjacent the outlet opening, means forming an exhaust hood connected to the inlet end walls and surrounding the inlet opening and that section of the track extending through said inlet opening, a vapor discharge duct extending upwardly from the hood, a curtain removably secured to the outside of the inlet end wall and covering the inlet opening, an opening in a wall of the hood and a removable door closing said opening to provide access to the curtain and conveyor track.

6. The combination of claim 5 characterized further by a drip tray under the hood beneath the track to carry off condensed water.

7. In a drier, a hollow container, material inlet and outlet openings in the opposite end walls of the container, a conveyor track extending through the container from the inlet and outlet opening, hot air ducts within the container extending horizontally above and below the conveyor track, openings provided with nozzles in opposed walls of said ducts for directing hot air towards the track, means connected to one of the ducts supplying hot air, conduit means within the container and extending about the walls of the container and around the tracks to conduct the air to the other duct.

BENJAMIN O. GOODIN.

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