

Oct. 1, 1940.

T. T. HAMPEL

2,216,388

WASHING AND STERILIZING MACHINE

Filed Oct. 5, 1938

4 Sheets-Sheet 1

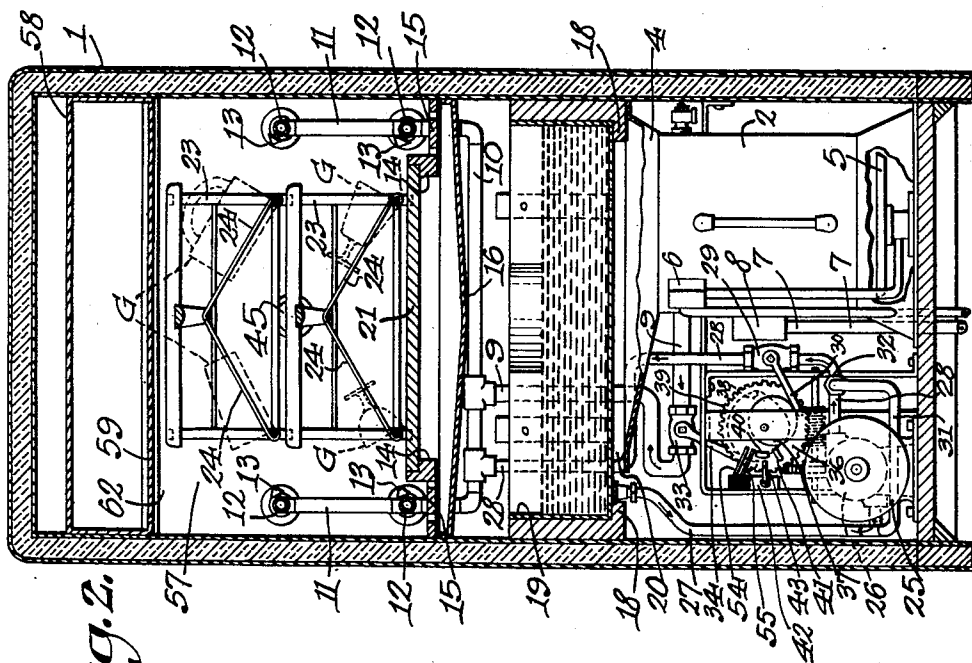


Fig. 2.

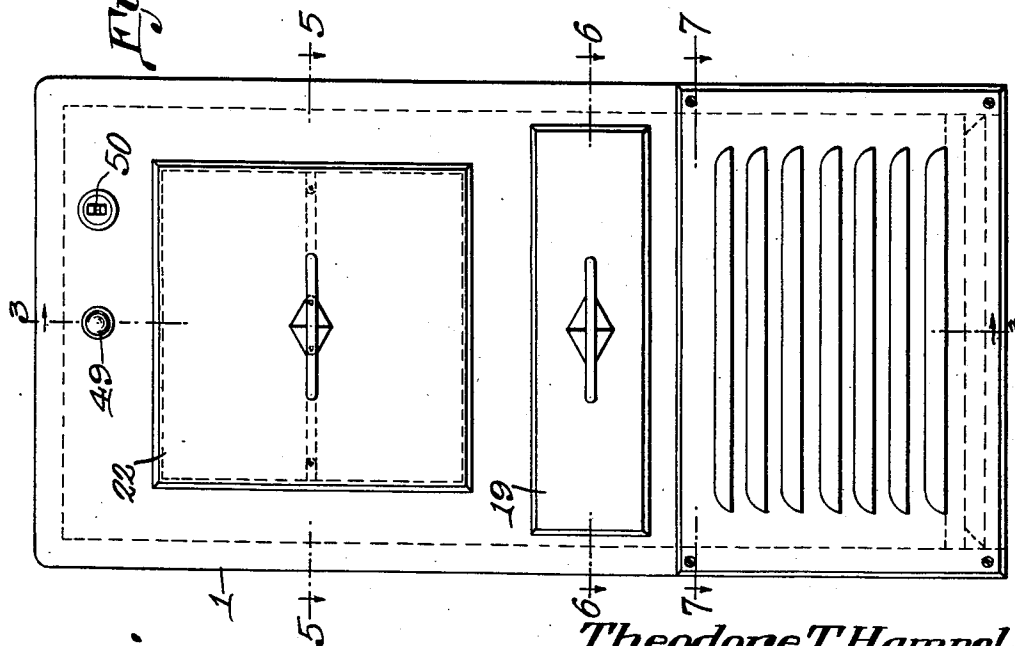


Fig. 1.

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Fig. 5.

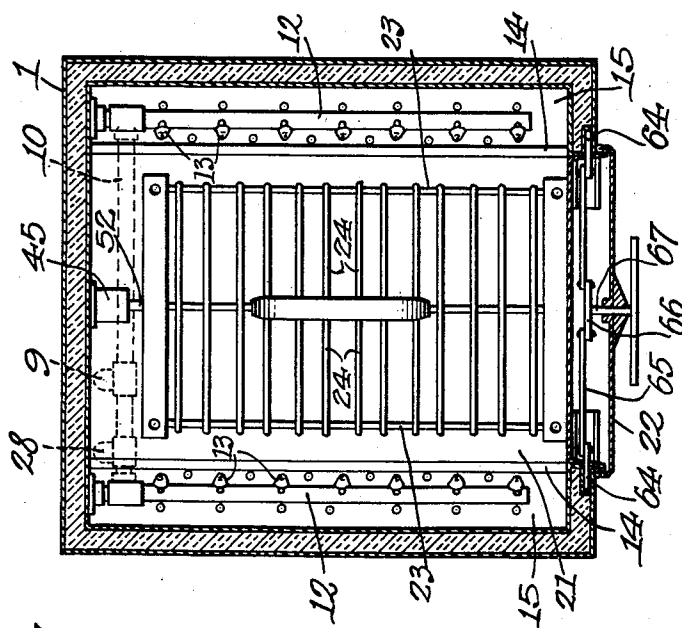
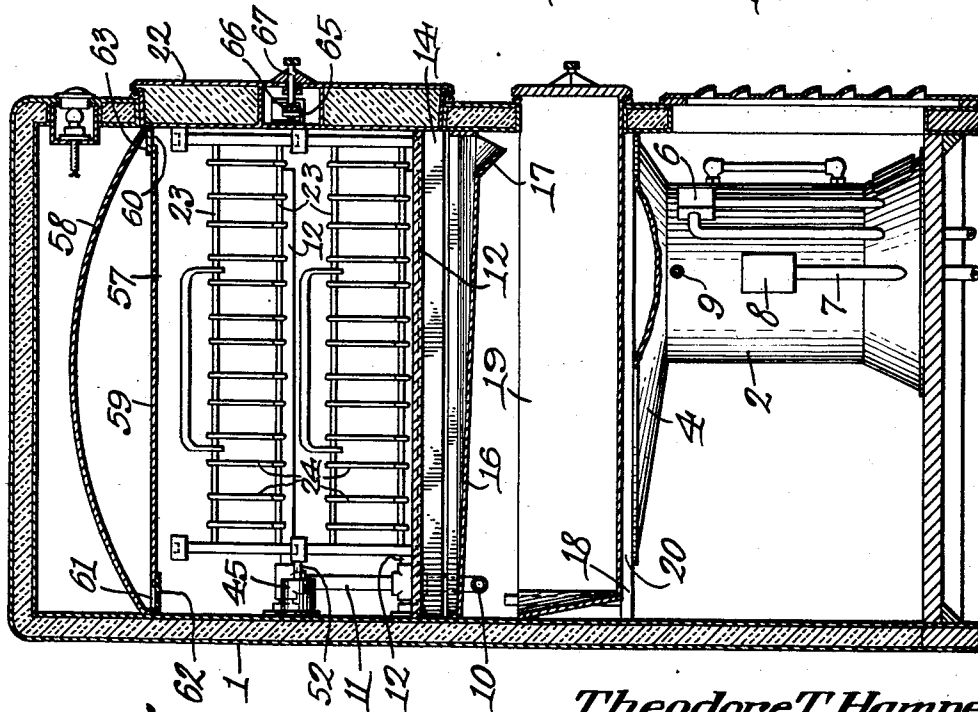


Fig. 3.



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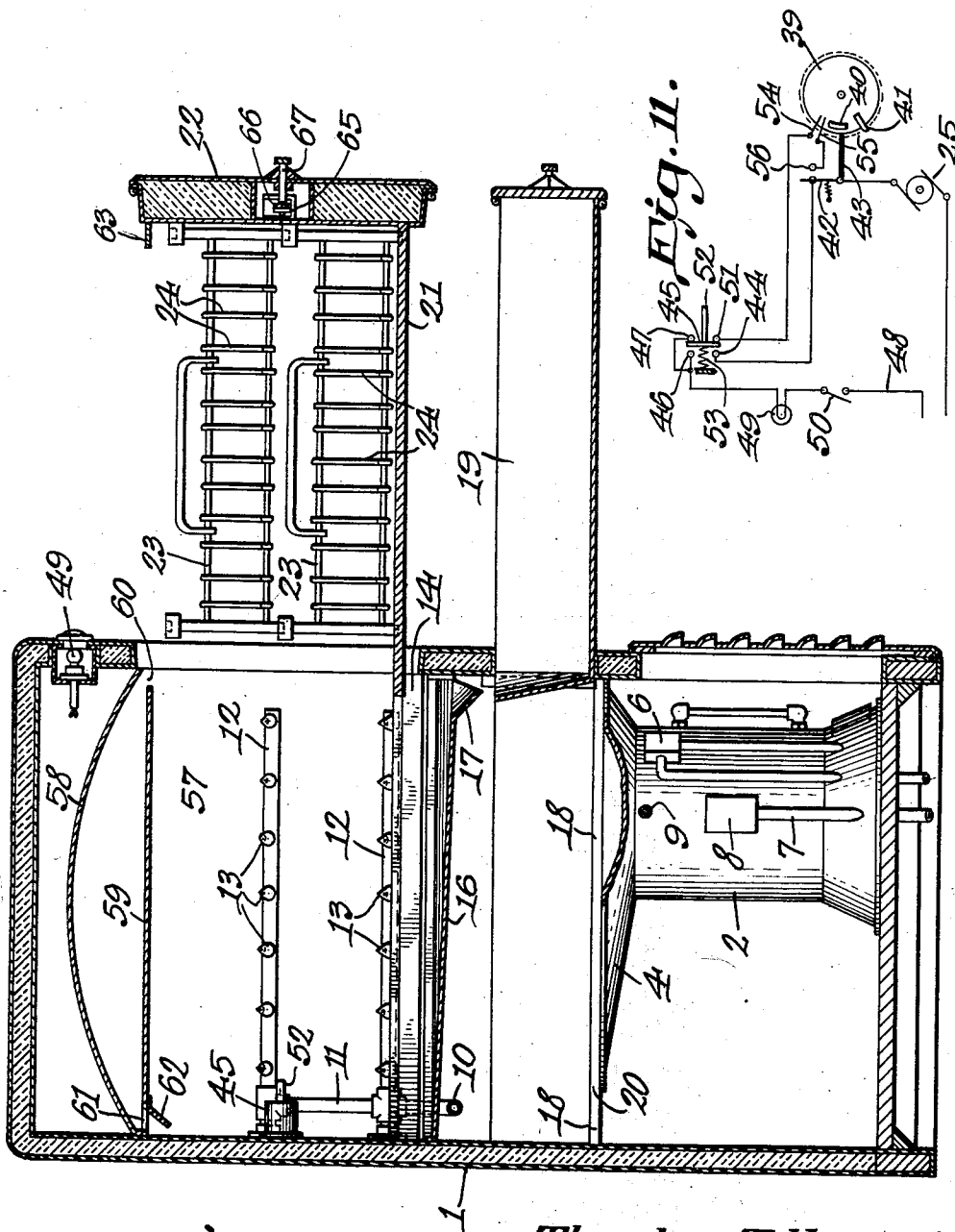
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Fig. 7.

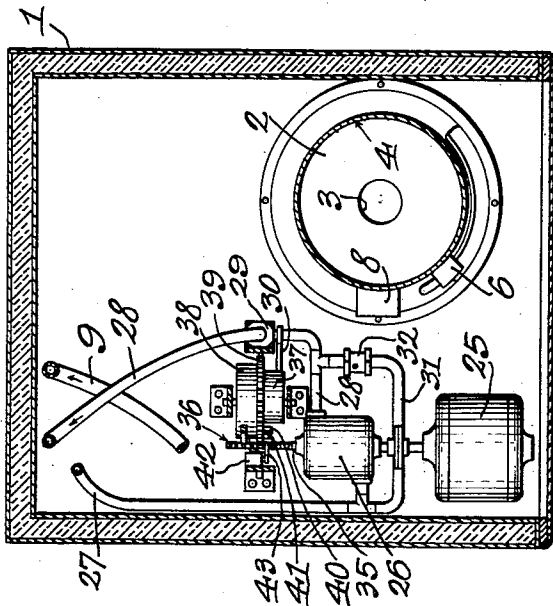


Fig. 6.

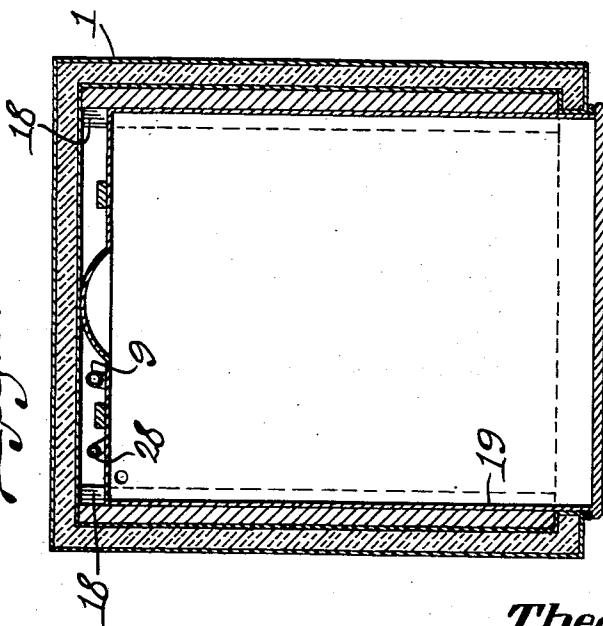


Fig. 10.

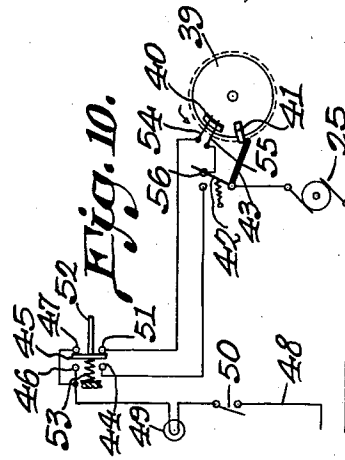


Fig. 9.

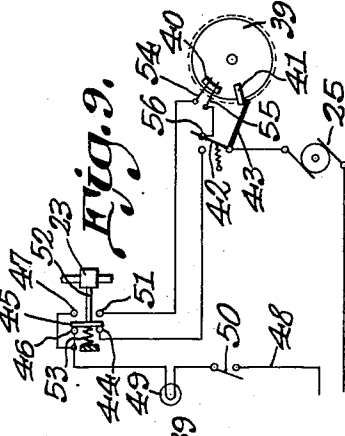
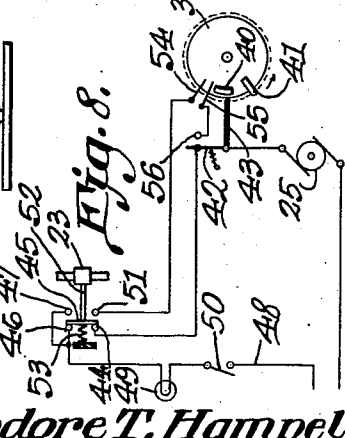


Fig. 8.



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UNITED STATES PATENT OFFICE

2,216,388

WASHING AND STERILIZING MACHINE

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Application October 5, 1938, Serial No. 233,486

9 Claims. (Cl. 141—9)

This invention relates to a machine for washing and sterilizing dishes, beverage glasses, and the like.

Under the sanitary codes of some States and cities it is required that dishes, beverage glasses and the like used by the public shall be washed with soap and water at not less than a stated temperature and subsequently subjected for a stated time to the action of live steam in a closed compartment.

An object of the present invention is to provide a cabinet for receiving the articles to be cleaned and sterilized, there being mechanism within the cabinet which will operate automatically when the cabinet is closed, to direct the cleansing fluid on the contained articles, subsequently shut off the fluid, thereafter direct live steam onto the contained articles and continuing the application of the steam for a required time, and subsequently shutting off the steam.

A further object is to provide apparatus of this character which is simple and compact and requires no manipulation by the user other than the insertion and withdrawal of the trays or other containers holding the articles to be or which have been treated.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings

Figure 1 is a front elevation of the cabinet containing the mechanism constituting the subject matter of the present invention.

Figure 2 is a vertical transverse section there-through.

Figure 3 is a section on line 3—3, Figure 1.

Figure 4 is a similar view showing the cabinet opened.

Figure 5 is a section on line 5—5, Figure 1.

Figure 6 is a section on line 6—6, Figure 1.

Figure 7 is a section on line 7—7, Figure 1.

Figure 8 is a view showing in diagram the positions of the circuit controlling mechanism when in starting position at the beginning of the cycle of operation.

Figure 9 is a view similar to Figure 8 showing the relative positions of the parts when the opera-

tion of the parts is completed following the cleansing and sterilizing of the contained articles.

Figure 10 is a view similar to Figure 9 showing the positions of the parts of the circuit controlling apparatus immediately following the opening of the drawer carrying the articles which have been sterilized.

Figure 11 is a similar view showing the positions of the parts following the completion of the cycle of operation and after the parts have been reset.

Referring to the figures by characters of reference, 1 designates a cabinet of any preferred construction preferably insulated. In the lower portion of this cabinet is provided a steam generator 2 formed with one or more flues 3 extending therethrough and open at its ends, the upper end of the flue being adapted to deliver hot products of combustion or heated air into a heat distributing pan 4 which is supported by the steam generator and is so shaped as to extend substantially throughout the width and depth of the interior of the cabinet.

The heating element 5 located in the lower portion of the steam generator can be controlled by a thermostat indicated generally at 6 so that the generation of steam can be controlled. A water supply pipe 7 opens into the steam generator and can also have any suitable controlling means indicated generally at 8 for maintaining the water at the desired level.

A steam pipe 9 is extended from the generator 2 and upwardly past pan 4 to a header 10 and standpipes 11 are extended upwardly from the ends of the header 10 and are provided with superposed delivery pipes 12 located close to the side walls of the cabinet and each provided with a longitudinal series of spraying devices 13 adapted to direct sprays upwardly and inwardly away from the side walls.

Guide cleats 14 are supported inwardly from and parallel with the side walls of the cabinet 1 by apertured partitions 15 carried by the side walls, it being understood that the delivery pipes 12 are located above the partitions. A drip pan 16 is supported under the partitions 15 and extends throughout the width and depth of the interior of the cabinet, the bottom of this drip pan being inclined downwardly to an outlet 17.

Secured to the sides of the cabinet 1 and adjacent to the sides of the heat distributing pan 4 are guide cleats 18 on which a drawer 19 is slidably mounted, this drawer constituting a tank for holding soapy water or other suitable cleansing fluid and being so located and proportioned

that, when either in open or closed position, it will receive liquid delivered through the outlet 17. This will be apparent by referring to Figures 3 and 4 wherein the drawer or liquid tank is shown in the two positions mentioned.

Normally this liquid tank or drawer is closed so as to overlie the heat distributing pan 4 although said pan is slightly spaced from the drawer as shown to permit the escape of heated air from the pan after it has travelled along the bottom of the tank 19. The outlet for the heated air has been indicated at 20 in Figures 2 and 3.

The cleats 14 support a slide 21 constituting the bottom of a drawer the front 22 of which is normally closed against the front of the cabinet 1. This slide 21 is adapted to support superposed skeleton trays indicated generally at 23 each of which is formed preferably with downwardly diverging racks 24 for supporting beverage glasses, dishes, etc., in inclined positions so that they will open downwardly as indicated at G in Figure 2. The trays are preferably supported one on top of the other and are adapted to move with the drawer 21 when opened or closed so as to permit the trays to be readily filled or emptied. When the door is closed the trays are located between the superposed series of spraying devices 13 as shown in Figure 2.

An electric motor 25 is located within the cabinet, preferably at the bottom thereof and operates a pump 26 to the inlet of which is extended a flexible tube 27 connected to the bottom of the tank 19. An outlet pipe 28 extends from this pump to the manifold 10 and contains a valve 29 adapted to be opened and closed by a valve arm 30 mounted for swinging movement. A by-pass 31 connects the inlet pipe 27 to the outlet pipe 28, this by-pass containing a check valve 32 which is normally closed but which will open when subjected to excessive back pressure from the outlet pipe 28.

The steam pipe 9 is provided with a valve 33 adapted to be opened and closed by a valve arm 34 mounted for swinging movement.

A worm shaft 35 rotates with the pump and constitutes a part of a speed reduction gear indicated generally at 36 whereby motion is transmitted to cams 37 and 38 rotatable together about a common axis. Cam 37 is positioned where it will engage and actuate the valve arm 30 while cam 38 is positioned where it will engage and actuate the valve arm 34. In addition to these cams, there is provided a disk 39 which rotates with them and can be one of the gears of the speed reduction gearing. This disk forms a part of the circuit controlling mechanism of the apparatus and, in the structure illustrated, carries a short segmental contact strip 40 and a tripping finger 41.

A spring-restrained pivoted switch 42 is electrically connected to the motor 25 and has an arm 43 normally projecting into the path of the tripping finger 41. This switch 42, when in its normal position, as in Figure 8, establishes an electrical connection between motor 25 and one contact 44 of a switch 45 which is adapted to engage either of two contacts 46 and 47 connected to one of the leads 48 of the circuit. This lead can include a signal lamp 49 located at the front of the cabinet 1 and it can also include a switch 50 located on the cabinet at any suitable point for the purpose of controlling the flow of current to the apparatus.

Another contact 51 is located opposite to the contact 44 and the switch 45, which carries a

plunger 52, is normally pressed against the contacts 47 and 51 by a spring 53. Plunger 52 is located in the path of the top portion of the lower tray 23 so that when the drawer 21 with a tray thereon is in closed position, said tray thrusts against plunger 52 and holds the switch 45 against the contacts 44 and 46, thereby completing the circuit to the motor when the parts are positioned as in Figure 8.

Contact 51 is electrically connected to a contact finger 54 which is located close to but spaced from another contact finger 55 electrically connected to a contact 56 adjacent to but normally spaced from the switch 42. These contact fingers 54 and 55 lap the disk 39 and extend across the path of the segment 40.

The cams 37 and 38 are so proportioned and so located relative to each other that, during one complete rotation of these cams and the disk 39, cam 37 will first engage and shift valve arm 30 to open valve 29 and maintain it open during a predetermined time interval after which the valve arm will be released and the valve closed. Immediately thereafter the other cam 38 will engage and actuate valve arm 34, thereby opening the valve 33 and maintaining it open for a predetermined time interval after which the valve will be closed.

In practice steam is generated and the heat flowing upwardly through the generator 2 will be spread over the bottom of the closed tank 19 which is filled with a suitable cleansing fluid, such as soapy water. Thus this fluid is heated to proper temperature and is maintained ready for use.

The drawer 21 is moved to open position as shown in Figure 4 and as the switch 45 is thereby released, its spring 53 will move it to the position shown in Figure 11. The circuit controlling apparatus will be located as shown in said figure. The apparatus is thus set for use after switch 50 has been closed, it being understood that no further attention need be given to this switch 50 until it is desired to completely cut off the current to the apparatus.

While the drawer 21 is open the racks are filled with the beverage glasses or other articles to be cleaned and sterilized, these being supported in an inclined position as indicated at G in Figure 2. The drawer 21 is then pushed to closed position and this will cause the back end of one of the trays 23 to move against and actuate plunger 52 which causes switch 45 to move against the contacts 46 and 44 and to place spring 53 under compression. This actuation of the switch promptly closes the circuit to the motor 25 through switch 42 as will be apparent by referring to Figure 8 and, when the motor is energized, the pump 26 will be actuated thereby and motion will be transmitted through the reduction gearing to the cams 37 and 38. The operation of the pump sets up a circulation of cleansing fluid which is withdrawn from the tank 19 through pipe 27 to the pump and expelled through pipe 28 and the valve 29 to the header 10, standpipes 11, and spraying devices 13. Thus sprays of cleansing fluid will be directed forcibly against the supported articles on the trays and this action will continue for a predetermined period of time determined by the speed of rotation of cam 37 and the shape of the cam. It is to be understood that at the start of the foregoing operation the valve 29 is open, its arm 30 being held in open position by the cam 37. However as soon as the predetermined washing period has passed, the cam 37

which has completed a partial rotation, will release arm 30 and permit valve 29 to close, thereby shutting off the flow of cleansing fluid. Immediately thereafter the cam 38 comes into action and presses the arm 34 so as to open valve 33. This will release the confined live steam so that it will flow upwardly to the header 10 and be distributed by way of the standpipes 11 and outlet pipes 12 to the spraying devices 13. This live steam will thus envelop the track and the articles carried thereby and they will be subjected to the sterilizing action of the steam throughout a predetermined time, depending upon the shape of the cam and its speed of rotation. Upon the completion of the steaming period, the arm 34 will be released by the cam and valve 33 closed. It will be noted that when the drawer 21 is in closed position it closes off the upper portion of the interior of the cabinet from the lower portion, thereby providing a steaming chamber 57 which is substantially sealed. This chamber can be provided with a dome 58 closed at the bottom by a partition 59 having an inlet 60 across the front end thereof and an outlet 61 across the back end thereof. A normally closed flap 62 forming a valve is preferably located at the outlet 61 and another valve, which can be a plate 63 carried by the front of drawer 21, serves to close inlet 60 when the drawer is closed.

As soon as the steam is shut off the disk 39, which has been rotating with the cam, arrives at the position shown in Figure 9, bringing the segment 40 into engagement with contacts 54 and 55 and bringing the tripping finger 41 into engagement with the switch arm 43 so that switch 42 is thus swung against the action of its restraining spring and into engagement with contact 56. Consequently the circuit through contacts 44 and 46 is broken and the motor is stopped. At the same time the lamp 49 will be cut out so that by looking at the cabinet it will be noted that the cleaning and steaming operations have been completed. The operator then pulls the drawer 21 to open position and this immediately releases plunger 52 so that switch 45 can be shifted against the contacts 47 and 51. Consequently a circuit will be momentarily established through the contacts 54 and 55 and switch 45 to the motor, as will be seen by referring to Figure 10 but this circuit will be maintained only for a very short period because as soon as the motor starts the disk 29 will be rotated a sufficient distance to cause tripping finger 41 to snap out of engagement with arm 43. Consequently switch 42 will be returned to its initial position and the parts will thus be reset as shown in Figure 11. The sterilized articles can be removed from the trays and said trays refilled, drawer 21 closed, and the operation thus far described will be repeated.

When the drawer is opened a suction is created and the remaining steam, which naturally hugs the top of chamber 57, will be pulled upwardly through the opened inlet 60 to the empty chamber under the dome 58 and toward the outlet 61 where valve 62 will be opened by the suction. Thus steam will not envelop the vicinity of the cabinet every time the drawer 21 is opened.

Obviously the steam generator can be provided with all desired safety devices. However it is not designed to use steam under pressure because all that is ordinarily required is live steam.

With apparatus such as herein described the

glasses, dishes or the like can be thoroughly washed and cleansed automatically, the operation being controlled solely by the opening and closing of the drawer containing the trays.

Inasmuch as the cleansing fluid, as fast as used, is returned to the tank 19, it can be used repeatedly and will be kept heated as long as steam is being generated. By pulling the drawer or tank to open position, it becomes possible to readily empty or fill it as found necessary.

The front 22 of the drawer or slide 21 can be secured tightly in closed position by any suitable means. For example oppositely extending bolts 64 can be mounted in the front 22 for engagement with the cabinet, these bolts being shiftable toward or from each other by bars 65 operated by arms 66 on a rotatable stem 67.

It is to be understood that a drain can be suitably located at any desired point in the bottom of the drawer or tank 19 so that the same can be emptied readily whenever desired.

What is claimed is:

1. Cleaning and sterilizing apparatus including a cabinet, a structure for supporting articles to be cleaned and sterilized, said structure being movable into and out of the cabinet, a motor, means controlled by said structure when moved into the cabinet, for starting the motor, spraying devices in the cabinet for directing fluid onto the contents of the holding structure when in the cabinet, a fluid container in the cabinet connected to the spraying devices, a steam generator in the cabinet and connected to the spraying devices, and means controlled by the motor for directing cleansing fluid to the spraying devices and steam to the spraying devices successively, and means under the control of the motor for stopping the motor after a predetermined period of operation and while the article holding structure is within the cabinet.

2. Cleaning and sterilizing apparatus including a cabinet, a structure for supporting articles to be cleaned and sterilized, said structure being movable into and out of the cabinet, a motor, means controlled by said structure when moved into the cabinet, for starting the motor, spraying devices in the cabinet for directing fluid onto the contents of the holding structure when in the cabinet, a fluid container in the cabinet connected to the spraying devices, a steam generator in the cabinet and connected to the spraying devices, means controlled by the motor for directing cleansing fluid to the spraying devices and steam to the spraying devices successively, means under the control of the motor for stopping the motor after a predetermined period of operation and while the article holding structure is within the cabinet, and means controlled by the movement of said structure positioned outside of the cabinet for resetting the first mentioned structure controlled means for actuating the motor when said structure is returned to position in the cabinet.

3. Cleaning and sterilizing apparatus including a cabinet, a structure for holding articles to be cleaned and sterilized, said structure being movable to open and closed position within the cabinet, a holder for cleansing fluid, a steam generator, spraying means within the cabinet adjacent to said structure, a motor, separate means actuated by the motor for successively directing cleansing fluid from the container to the spraying means and steam from the generator to the spraying means, means operated by the holding structure when moved to closed po-

sition, for starting the motor, means for automatically stopping the motor after it has operated during a predetermined time interval, and means operated by said structure when moved to open position, for resetting the motor-starting means.

4. Cleaning and sterilizing apparatus including a cabinet, a steam generator therein, a liquid container in the cabinet for holding cleansing fluid, a drawer slidable to open and closed position within the cabinet, said drawer constituting means for holding articles to be sterilized, a motor, separate means actuated by the motor and in communication with the container and generator for successively releasing cleansing fluid and steam into contact with the contents of the drawer when closed, means controlled by the drawer when moved to closed position, for starting the motor, means controlled by the motor for automatically stopping said motor after a predetermined time interval of operation, and means controlled by the opening of the drawer for supplying fresh air to the interior of the cabinet and displacing steam adjacent to the drawer.

5. Cleaning and sterilizing apparatus including a cabinet, a drawer movable to open and closed position, said drawer constituting means for holding articles to be sterilized, a cleansing fluid container in the cabinet, a steam generator in the cabinet, means opening into the drawer, when closed, for conducting cleansing fluid and steam from the container and generator respectively, a motor, means actuated by the motor for directing cleansing fluid and releasing steam successively into said conducting means and onto the contents of the drawer when closed and for shutting off the escape of steam after a predetermined time interval, means actuated by the drawer when closed for starting the motor, means controlled by the motor for stopping its actuation after a predetermined time interval.

6. In cleaning and sterilizing apparatus a cabinet, a drawer movable to open and closed position in the cabinet, said drawer constituting means for holding articles to be sterilized, means within the cabinet and above the drawer cooperating to form a steam chamber having an inlet and an outlet at the front and back of said chamber respectively, a steam generator, means under the control of the drawer when moved to closed position, for directing generated steam onto the contents of the drawer and for shutting off the escape of steam at a predetermined time interval, said drawer, when moved to open position, constituting means for setting up a suction of steam from the cabinet and of fresh air through said steam chamber into the back portion of the cabinet to displace the withdrawn steam.

7. In cleansing and sterilizing apparatus a cabinet, a cleansing fluid container, a drawer slidable to open and closed position, said drawer constituting means for holding articles to be sterilized, spraying means within the cabinet and adjacent to the drawer when closed, a steam

generator in the cabinet, a connection between said generator and the spraying means, a pump for withdrawing fluid from the container and directing it to the spraying means, a motor for actuating the pump, means actuated by the motor for successively opening and closing the connection between the pump and the spraying means and opening and closing the connection between the generator and the spraying means and subsequently closing the last named connection, means controlled by the drawer when moved to closed position for operating the motor, means under the control of the motor for automatically stopping its operation following a predetermined time interval.

8. In cleansing and sterilizing apparatus a cabinet, a cleansing fluid container, a drawer slidable to open and closed position, said drawer constituting means for holding articles to be sterilized, spraying means within the cabinet and adjacent to the drawer when closed, a steam generator in the cabinet, a connection between said generator and the spraying means, a pump for withdrawing fluid from the container and directing it to the spraying means, a motor for actuating the pump, means actuated by the motor for successively opening and closing the connection between the pump and the spraying means and opening and closing the connection between the generator and the spraying means and subsequently closing the last named connection, means controlled by the drawer when moved to closed position for operating the motor, means under the control of the motor for automatically stopping its operation following a predetermined time interval, said fluid container comprising a drawer slidable to position into or out of the cabinet, and means for returning cleansing fluid to the container when in either of said positions.

9. In cleaning and sterilizing apparatus a cabinet, a cleansing fluid container slidable into and out of the cabinet, a steam generator positioned to heat said container, a drawer movable to open or closed position within the container, said drawer constituting means for holding articles to be sterilized, means adjacent to the drawer and within the cabinet for spraying fluid onto the contents of the drawer, a pump for withdrawing cleansing fluid from the container and directing it to the spraying means, a motor for actuating the pump, means operated by the motor for successively opening and closing communication between the pump and the spraying means and opening and closing communication between the steam generator and the spraying means, thereby to successively wash and steam the articles carried by the drawer, means for returning cleansing fluid to the container following discharge thereof from the spraying means, means under the control of the article-holding drawer, when moved to closed position, for operating the motor, and means under the control of the motor for stopping its operation after a predetermined time interval.

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