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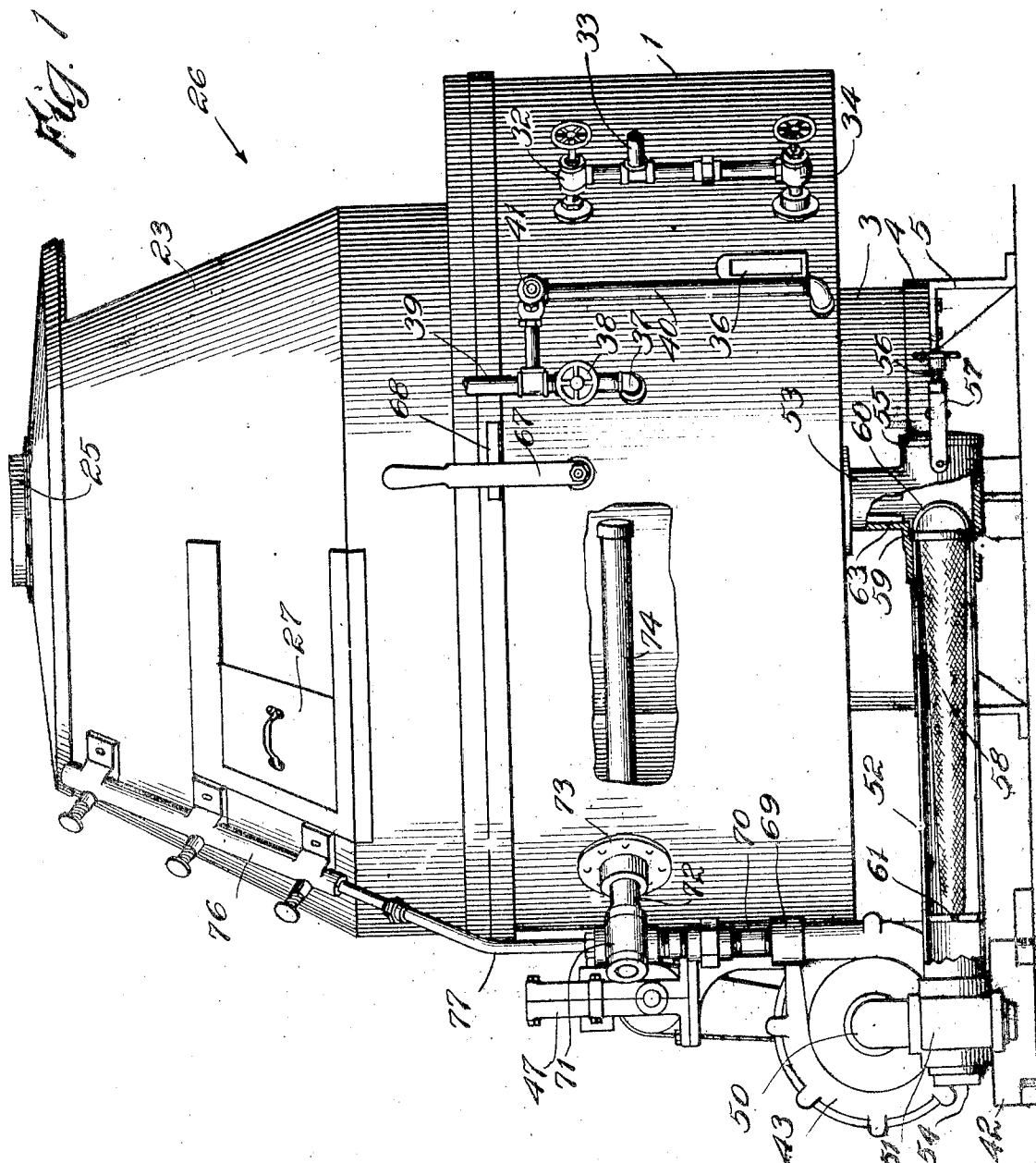
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O. LARSEN

CAN WASHING, STERILIZING, AND DRYING APPARATUS

Filed Dec. 22, 1921

5 Sheets-Sheet 1



Witness:
John E. Titus

Inventor
Olaf Larsen
by Hewitt S. Dixon Atty.

Oct. 26, 1926.

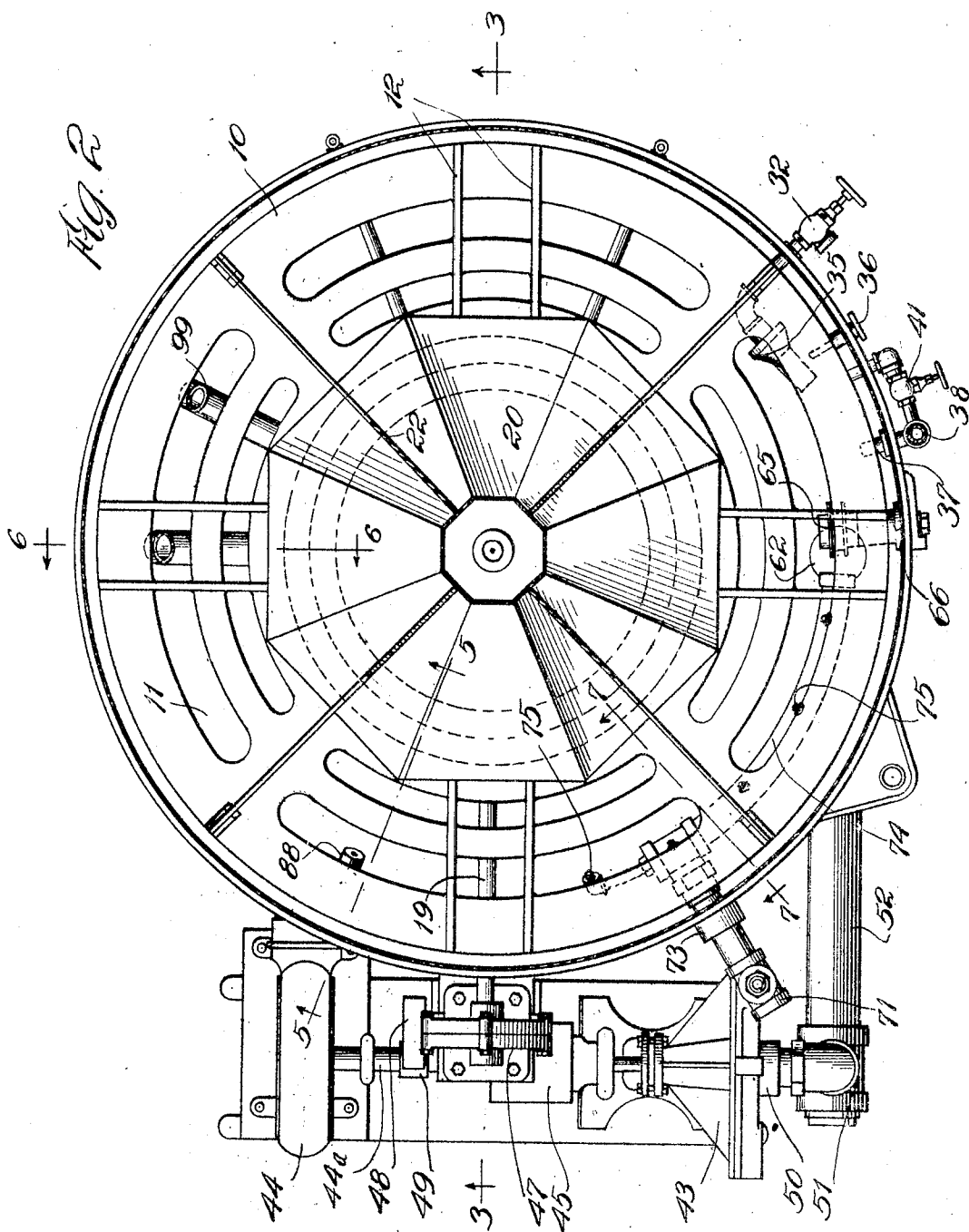
O. LARSEN

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5 Sheets-Sheet 2



Witness
John E. Titus

Inventor
Olaf Larsen
by Hewitt S. Dixon
Atty.

Oct. 26, 1926.

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O. LARSEN

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Filed Dec. 22, 1921

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Fig. 3

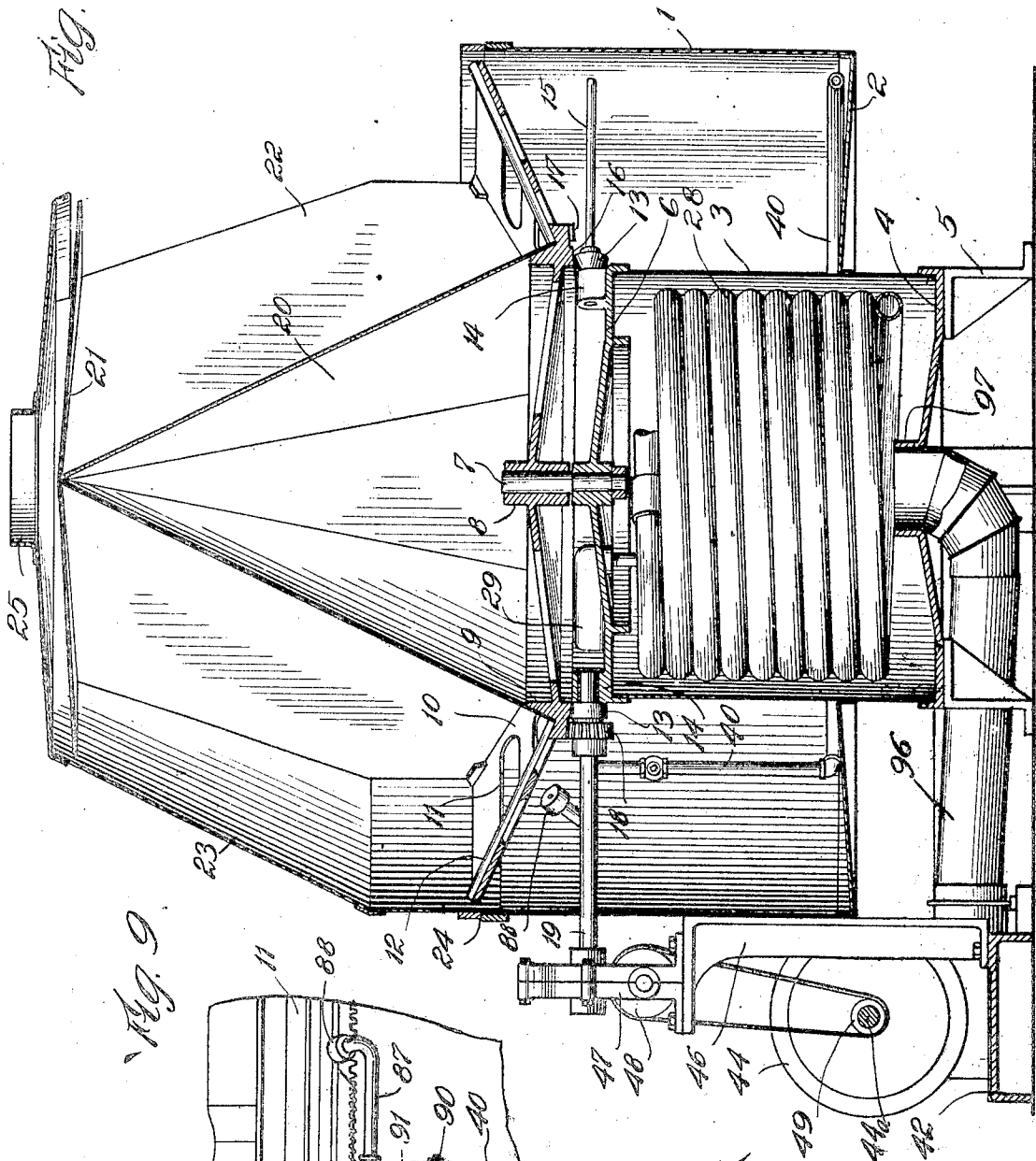
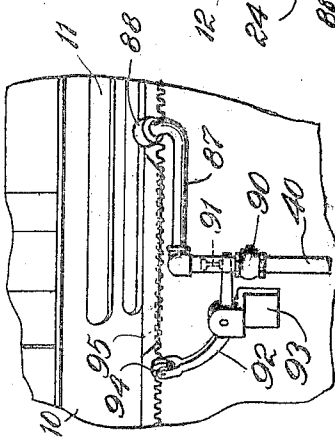


Fig. 9



Witness
John C. Titus

Inventor
Olaf Larsen
by Hewitt S. Dixon
Atty

Oct. 26, 1926.

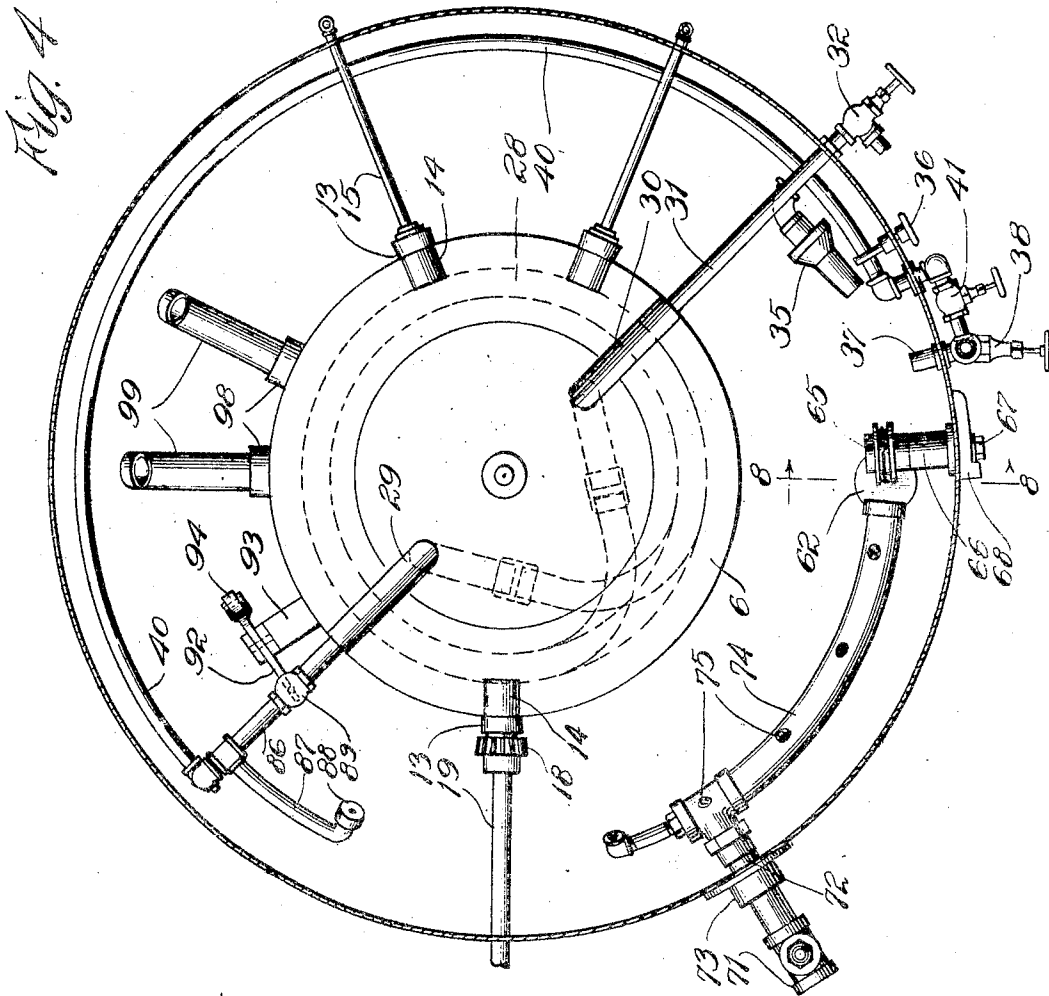
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O. LARSEN

CAN WASHING, STERILIZING, AND DRYING APPARATUS

Filed Dec. 22, 1921

5 Sheets-Sheet 4



Witness
John E. Titus

Inventor
Olaf Larsen
by H. Smith & Dixon
Atty.

Oct. 26, 1926.

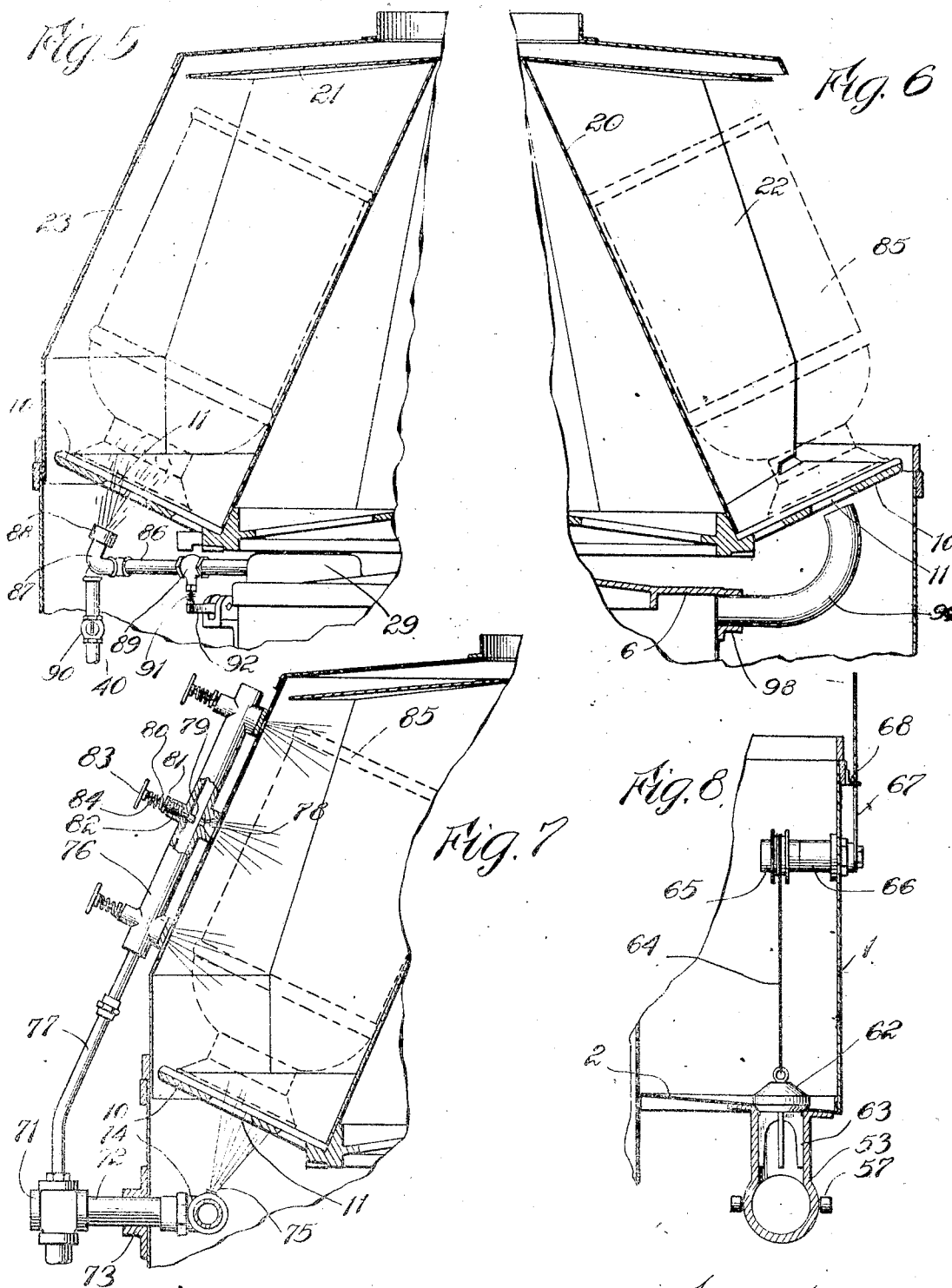
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O. LARSEN

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Filed Dec. 22, 1921

5 Sheets-Sheet 5



Witness:
John E. Titus

Inventor
Olaf Larsen
by Hewitt S. Ripon
Atty.

UNITED STATES PATENT OFFICE.

OLAF LARSEN, OF FORT ATKINSON, WISCONSIN, ASSIGNOR TO THE CREAMERY PACKAGE MFG. COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CAN WASHING, STERILIZING, AND DRYING APPARATUS.

Application filed December 22, 1921. Serial No. 524,138.

The invention relates to apparatus for cleaning milk cans and like containers, and more particularly to a self contained machine for washing, sterilizing and drying the cans.

The general object of the invention is to provide a compact machine occupying a minimum of space and capable of thoroughly cleansing the containers at a rapid rate.

Another object is to provide a machine in which a series of cans may be successively washed, rinsed, sterilized and dried during a revolution of a rotary carrier.

Other and more specific objects include: to provide an improved screening device which may be readily dismantled for cleaning; to provide an improved washing jet head construction in which the jet openings may be readily cleared of accumulations which tend to obstruct them; to provide automatic means for successively injecting rinsing water and a sterilizing steam jet into the cans; and to provide an efficient compact arrangement of concentric chambers for the cleansing operations, the air heating means, and the carrier for the cans.

Further objects and advantages will be apparent in the following description of a preferred embodiment of the invention, which I have illustrated in the accompanying drawings. It will be understood, however, that in the interpretation of the appended claims, they are not to be limited to the precise construction and arrangement set forth, except as may be necessitated by the state of the prior art.

In the accompanying drawings, Fig. 1 represents a side elevation of the machine selected for illustration herein.

Fig. 2 represents a plan view with the outer cover removed from the upper part of the machine.

Fig. 3 is a sectional elevation taken on the plane of the line 3—3 in Fig. 2.

Fig. 4 is a plan view of the body portion of the machine with the turn table and upper parts removed.

Fig. 5 represents a partial vertical section taken on the plane of the line 5—5 in Fig. 2.

Fig. 6 represents a partial vertical section taken on the line 6—6 in Fig. 2.

Fig. 7 is a similar section taken on the line 7—7 in Fig. 2.

Fig. 8 is a similar section taken on the line 8—8 in Fig. 4.

Fig. 9 is a detailed side view of the mechanism operating the sterilizing jet.

The general organization of the machine as herein illustrated, comprises a tank to contain washing solution and enclosing an air heating chamber, above which is supported a horizontally revolving skeleton table arranged to carry a number of inverted cans, placed on and removed from the table at one side of the machine. Associated with the tank are means adapted to accomplish a series of operations upon the cans as they are revolved with the table, comprising force spraying the cans inside and out with a hot washing solution, injecting a spray of hot rinsing water, sterilizing by a jet of steam, and further sterilizing and drying the cans by a hot air blast. The operations are completed with one revolution of the table.

While the invention is herein shown as embodied in a machine for treating containers of the well known type used in the handling of milk, it will be understood that the invention may be applicable to the handling of other containers of various shapes and sizes.

In the accompanying drawings, a tank preferably annular in shape, is constructed with an outer wall 1, a bottom wall 2, and an inner wall 3. The inner wall 3 extends below the bottom of the tank and rests within a peripheral flange formed on a base plate 4, the latter forming a bottom closure for the chamber enclosed by the inner wall 3. Appropriate legs 5, attached to the base plate support the structure.

A flanged cover plate 6, removably resting on the upper end of the inner wall 3, carries at its center a pivot stud 7 upon which revolves the hub 8 of the turn table. The latter comprises a center portion defined by an upstanding flange 9, for convenience in the present arrangement being octagonal in shape, and an upwardly inclined outer carrier portion 10. The portion 10 overlies the tank and is provided with a plurality of concentric slots or openings 11 permitting the passage of solution sprayed from within the tank, and also allowing the liquid to drain back into the tank. Radial ribs may be provided upon which to rest the in-

verted cans, the space at either side of the ribs being available for the can cover. The inclined portion of the carrier table also serves to inwardly tip the cans supported thereon, so that practically no water remains in the cup shaped bottoms of the cans after the spraying operations.

A plurality of radially pivoted rollers 13 may be spaced about the periphery of the cover plate 6, journaled in upraised bearing lugs 14. The bearings of the latter may be lubricated through oil pipes 15 passing outwardly of the outer tank wall. A suitable bearing ring 16 formed on the underside of the turn table operatively bears upon the rollers and supports the table in revolution.

Outwardly of the bearing ring, a toothed rack ring 17 may be formed for driven engagement by a gear 18 fixed on a radially positioned shaft 19 extending outwardly of the tank. The shaft 19 is preferably journaled in one of the bearing lugs 14, forming also a pivotal support for one of the rollers 13, and is the means by which power is transmitted for the rotation of the turn table.

Over the center portion of the turn table preferably is mounted a pyramidal cover 20, secured at its base about the flange 9, and carrying at its apex a top plate 21. The annular chamber thus defined preferably is divided by upright radial partitions 22 secured at their edges to the carrier portion 10 of the table, the cover 20, and to the top 21, there being four partitions in the present illustration, forming as many can receiving compartments. The compartment walls, serve to collect the sprayed liquid and drain it back into the tank, and also to prevent the water from splashing from those cans being sprayed upon the cans which have reached the drying hot air blast.

As a further protection against splashing and loss of the solution a covering canopy 23 is mounted over the whole and suitably supported upon the outer tank wall as at 24. Preferably the canopy is provided with an open flue 25 at its top to permit the escape of vapors. The canopy is laterally open for a sufficient section, as at 26, to give access to the table for an operator to place and withdraw the cans. Slide doors 27 also may be provided for access to other portions of the enclosed structure.

Positioned within the enclosed chamber formed by the inner wall 3 and its closures is a steam coil 28, having its two ends suitably connected respectively with each of a pair of passages preferably formed in the structure of the cover plate 6, as at 29 and 30. By this construction the steam coil is entirely supported from the cover plate and may be assembled therewith as a unit. The passage 30 is connected by a pipe 31 passing through the outer wall 1 of the tank to a valve

32 controlling the inlet of steam through a pipe 33 leading to a suitable steam supply. The passage 29 is connected to the sterilizing means as hereinafter described.

Steam may also be taken from the supply pipe 33 through the valve 34 to a water heating device 35 located within the tank adjacent its bottom and illustrated herein as of the ejector type adapted for the noiseless discharge of steam into the water. A thermometer 36, having its bulb extending within the tank, may be employed to indicate the temperature of the solution.

Water for the washing solution in the tank may be admitted through the discharge pipe 37 entering the tank wall and controlled by a valve 38 connected with a water supply line 39. A branch water connection 40 controlled by the valve 41, the latter preferably being of the needle type for accurate control, passes into the bottom portion of the tank and around one side of the latter for connection with the rinsing means as hereinafter described.

Located laterally of the tank, and mounted on a suitable base 42, are a solution pump 43 and an air blower 44. As illustrated herein, both are of the rotary type and operate upon a common shaft 44^a. The latter may be driven by any suitable power means, in the present instance I employ a pulley 45 mounted on the shaft between the blower and the pump and adapted to be belt connected with power shafting.

A standard 46, mounted on the base 42 and preferably secured to the tank wall 1, carries a suitably housed worm and worm gear of conventional type represented at 47. The worm shaft carries a pulley 48 shown herein as belt connected to a pulley 49 carried by the drive shaft 44^a. The shaft 19 is journaled at its outer end in the worm gear housing 47 and carries the worm gear, the shaft being driven thereby to rotate the turn table as previously described.

The pump 43 is arranged with its intake 50 connected, preferably through a fitting 51, with a pipe 52 leading to another fitting 53 secured to the bottom of the tank and opening thereinto. The fitting 51 may be provided with removable plugs 54 to facilitate cleaning the connecting pipes. The fitting 53 is also provided with a lateral opening opposite the connection for the pipe 52, the opening normally being closed by a readily removable cap 55 secured in place by a screw threaded hand stem 56 operatively mounted in a yoke 57 pivoted on the opposite sides of the fitting 53. The yoke and stem may be dropped down to clear the opening upon removal of the cap.

Positioned within the pipe 52, there may be employed a tubular screen 58, supported at its outer end by an attached collar 59 removably seated in the fitting 53 and carrying

a handle 60 by which the screen may be withdrawn through the lateral opening in the fitting for cleaning. The screen preferably tapers toward its inner end which is supported by a spacing spider 61.

The opening from the fitting 53 into the bottom of the solution tank preferably is controlled by a valve 62 (see Fig. 8) seated in the upper end of the fitting and having guide wings 63 extending within the fitting. As shown herein, the valve 62 is operated by a cable 64 wound over a drum 65 mounted on a stub shaft journaled in a bearing support 66 secured to the outer wall of the tank, the outer end of the stub shaft extending outwardly of the tank and having secured thereto an operating handle 67. A stop 68 may be secured on the tank wall to indicate the closed position of the valve 62. By swinging the handle 67 downward from the position illustrated, the valve 62 is raised and communication established from the tank to the pump 43. The advantage of the valve is in permitting the closing of the tank outlet for the removal and cleaning of the screen 58 without drawing off the contents of the tank. When it is desired to empty the tank, the cap 55 may be removed and the valve 62 then opened.

The outlet 69 of the pump 43, is connected through a pipe 70, fitting 71, and a pipe 72 entering the tank wall through a flanged collar 73, to a curved jet head 74. The fitting 71 preferably is provided also with removable plugs to facilitate cleaning the connection. The jet head 74 is provided along its upper surface with a series of nipples 75 positioned beneath the course of the slots 11, in the turn table, and designed to spray the cans being carried over the nipples by the revolving table.

Coincident with the spraying from beneath, the cans are laterally sprayed by means of jets discharged from another jet head 76 mounted on the canopy 23 and receiving washing fluid from the pump through the pipe 77 connected to the fixture 71. The jet head 76 is provided with a series of jet openings 78 positioned over registering openings in the canopy wall. Means are also provided for clearing the jet openings when clogged, as with grease accumulated in the solution, comprising in each case a plunger 79, of dimensions to closely pass through the jet opening but normally withdrawn therefrom. The plunger may be manually operated by means of a stem 80 of reduced diameter extending outwardly and slidable through a bushing 81 threaded into a collar 82 projecting from the jet head 76 and arranged to form with the bushing a suitable packing gland to prevent escape of the washing solution. The outer end of the stem carries a hand knob 83 between which and the bushing is positioned a coiled spring 84 ten-

sioned to hold the plunger 79 normally out of engagement with the jet opening. Should the jet openings 78 become clogged with such sediment as may pass the screen, the simple manual operation of the plungers 79 serves to clear them.

With the tank charged with a supply of washing solution heated to the desired temperature, the operation of the pump accomplishes the circulating discharge of the hot solution through the jet heads 74 and 76 with considerable force upon the inner and outer surfaces of the passing cans, one of the latter being represented at 85 in Fig. 7. The sprayed solution drains from the cans and from the walls of the canopy and turn table cover back into the tank and is there available for further use. The soil washed from the cans is carried into the tank from whence it may be flushed out after completion of the can washing operations. The circulating solutions is delivered to the jet heads in sufficiently clear condition for effectively washing the cans by reason of its having been strained through the strainer 58 in the pump inlet connection.

Having passed through the washing solution sprays, the cans are next rinsed and sterilized. The water pipe 40, arranged within the tank as previously described, rises adjacent to the steam coil terminal connection 29 in the cover plate 6, and is connected thereto through the pipe 86 (Figs. 4 and 5). A lateral branch 87, connected into the pipe 86, terminates in a cap 88 having a jet orifice positioned beneath the course of the slots 11 in the turn table, and is designed to discharge both water and steam at 88.

A blow-off valve 89, positioned in the pipe 86, controls the flow of steam to the branch 87, and a check valve 90 positioned in the riser section of the pipe 40, prevents the back flow of water therein when the steam valves is opened. The latter is preferably of the plunger type, the spring closed sliding stem 91 of which is positioned to be operatively engaged by a lever 92, centrally pivoted on a bracket 93 secured to the inner wall of the tank. The outer end of the lever 92 preferably carries a pivoted roller 94 which is arranged for engagement by a series of cams 95 (Fig. 9) mounted on the underside of the turn table and rotating therewith. The cams 95 are arranged to cause the opening of the steam valve when the cans are successively positioned over the jet cap 88.

In the operation of the rinsing and sterilizing jet, the valve 41, controlling the water supply to the pipe 40, is so adjusted that between the intervals during which the steam valve 89 is open, there is just sufficient flow of water to fill the branch 87. Then upon engagement of the next cam with the valve operating lever, steam is permitted to pass the valve 89. The back pressure in the pipe

40 closes the check valve 90, and the full steam pressure is applied to the water in the branch pipe which is discharged from the terminal jet orifice with considerable force into the interior of the can then positioned thereover. The jet of water is followed by the live steam, thereby subjecting the can to the immediate successive rinsing water bath and sterilizing steam jet, the latter being continued while the mouth of the moving can is in register with the jet orifice.

By reason of the position of the pipe 40 at the bottom of the tank immersed in the hot washing solution, the limited intermittent flow of the water therethrough consumes sufficient time for it to be heated to practically the same temperature as the solution before it reaches the branch pipe 87. The latter may be increased in holding capacity by curving its mid portion down into the tank to increase its length and permit a greater quantity of hot water to be used for the rinsing bath. The steam jet further results in clearing the steam coils 28 of condensation water and keeping them charged with live steam for efficient heating.

Succeeding the sterilizing operation, the moving cans are next subjected to a hot air blast for drying them. The mechanism for accomplishing this purpose comprises the blower 44 from which a discharge conduit 96 (Fig. 3) leads beneath the tank and terminates in a central aperture 97 in the base plate 4 opening into the chamber enclosed by the inner tank walls 3 and containing the steam heating coils 28. At the upper end of the chamber and preferably supported in a pair of laterally extending collars 98 formed on the chamber cover plate 6, are a pair of radially disposed discharge spouts 99. The latter open into the enclosed heating chamber and have their open outer ends upwardly directed beneath the course of the slots 11 in the turn table.

With the operation of the blower 44, air is driven through the conduit 96 and compressed to some degree while being heated to a high temperature by the steam coil within the heating chamber, and is thereafter discharged under pressure through the spouts 99, the hot air blasts therefrom being directed against the inner and outer surfaces of the passing cans and effectively accomplishing their drying.

As each can carried by the turn table makes a complete revolution of the machine and has been subjected to the successive cleansing and drying operations, it reappears before the lateral opening 26 in the canopy, and is there removed by an attendant who places an unwashed can in the compartment during the continued revolution of the table.

It will now be apparent that I have provided a very compactly arranged and rapid-

ly operable machine for the effective and thorough cleansing of milk cans and similar containers.

I claim as my invention:

1. An apparatus of the class described comprising an annular tank adapted to contain washing fluid and having a central enclosed air chamber, steam means for heating air in said chamber, a rotary table adapted to support containers for movement over said tank, a series of spraying devices positioned in said tank adjacent the path of said containers and adapted to spray fluids thereupon, means for discharging washing fluid from certain of said devices, means for discharging fresh water together with the condensation and steam from said steam means for rinsing and sterilizing said containers from another of said devices, and means for discharging the heated air in said chamber from other of said devices.

2. In an apparatus of the class described, a rotary table adapted to support cans to be cleansed, a pipe terminating adjacent the path of said cans and having a jet orifice to spray rinsing and sterilizing fluids upon said cans, said pipe being connected to a regulated source of water supply and having a check valve positioned therein substantially removed from said jet orifice, a connection positioned intermediately of said jet orifice and said check valve for admitting steam to said pipe, a valve controlling the passage of steam through said latter connection, and means operable by said table for intermittently opening said steam valve coincidently with the passage of said cans over said jet orifice whereby the water in said pipe is forced by steam pressure from said orifice and followed by a jet of steam therefrom.

3. In an apparatus of the class described, a rotary table adapted to support cans to be cleansed, a water supply pipe terminating in a jet orifice positioned to discharge a spray upon said cans, a check valve in said pipe, a steam connection between said check valve and said orifice, a quick operating valve controlling said steam connection, a pivoted lever operatively connected to said latter valve, and a series of cams on said table adapted to operatively engage said lever and intermittently open said latter valve.

4. An apparatus of the class described, comprising a tank having an annular portion adapted to contain washing fluid and having an enclosed central air chamber, a rotatably mounted table adapted to support containers for movement over the annular portion of said tank, means for spraying the washing fluid upon said containers, means employing steam for heating the air in said chamber, means for spraying rinsing fluid upon said containers, a connection from said steam heating means to said rinse spray-

ing means for the discharge of steam with said rinsing fluid, and means for discharging air from said air chamber upon said containers.

5 5. An apparatus of the class described, comprising an annular tank, the inner wall of said tank enclosing a central air chamber, heating means in said chamber, a base supporting said tank and forming a bottom closure for said chamber, said base having
10 an air inlet, a cover plate removably positioned on said inner wall forming a top closure for said chamber, a turn table pivotally supported on said cover plate, said table
15 being adapted to receive cans to be washed, washing devices in said tank operable upon said cans, and means for discharging heated air from said chamber upon said cans.

20 6. An apparatus of the class described, comprising a tank adapted to contain hot washing liquid, a rotary table for support-

ing containers in said tank to be cleaned, an air chamber, means for heating the air therein for drying the containers, said heating means employing a hot fluid under pressure, 25 a pipe in said tank partially immersed in said hot liquid having connection with a water supply, said pipe terminating in a jet adapted to spray the containers positioned thereover, a check valve in said pipe, a connection from said heating means to said pipe 30 adapted to deliver the hot pressure fluid to said pipe between said check valve and said jet, a valve controlling said latter connection, and means operable by said table for 35 intermittently opening said valve to effect the spraying of said water and said hot fluid upon said containers.

In witness whereof I have hereunto set my hand.

OLAF LARSEN.