Feb. 25, 1947. I. FRIEDMAN 2,416,475

APPARATUS FOR CLEANING WATCH-WORKS AND THE LIKE MECHANISMS

Filed March 14, 1945 2 Sheets-Sheet 1

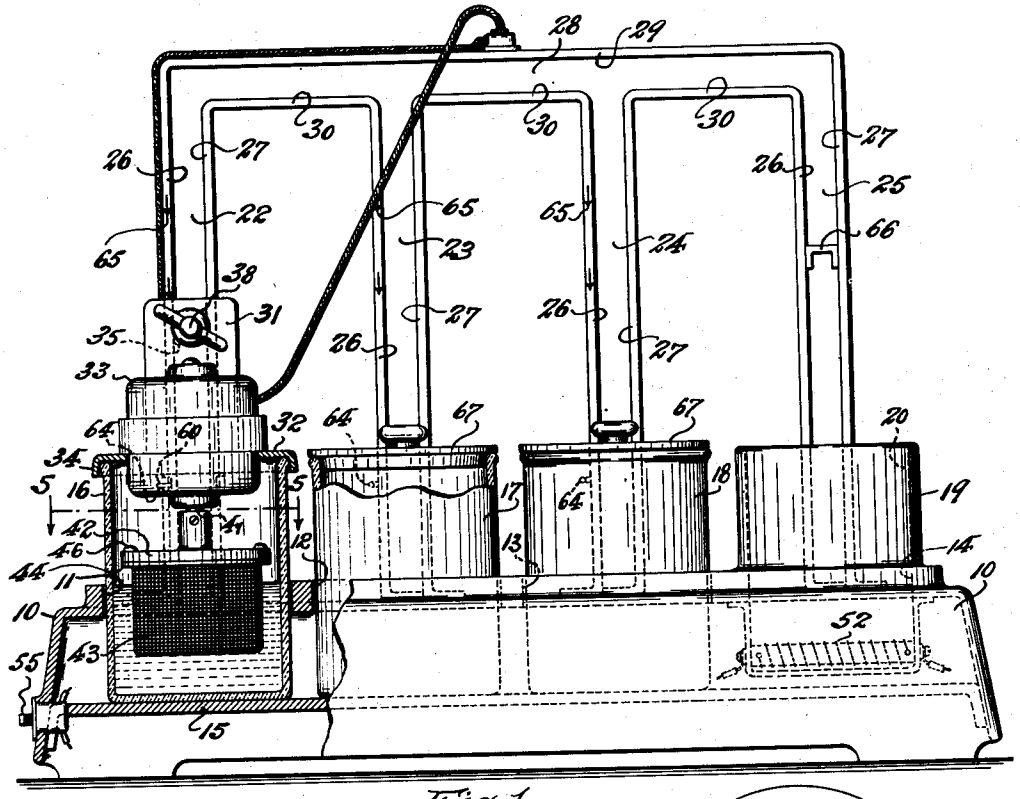


Fig. 1

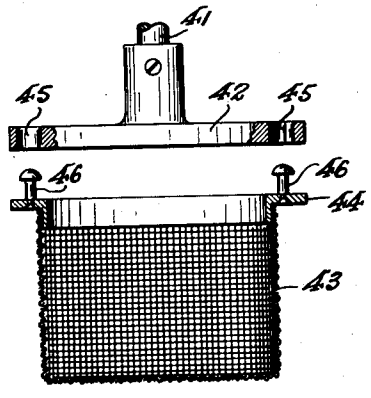


Fig. 4

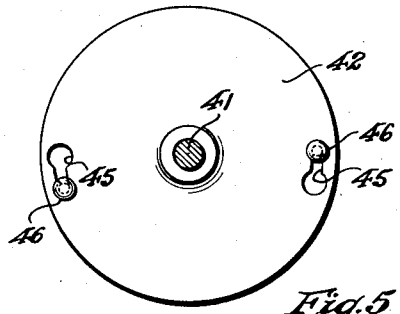


Fig. 5

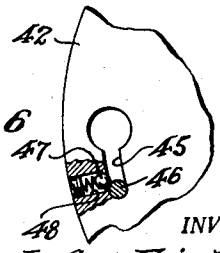


Fig. 6

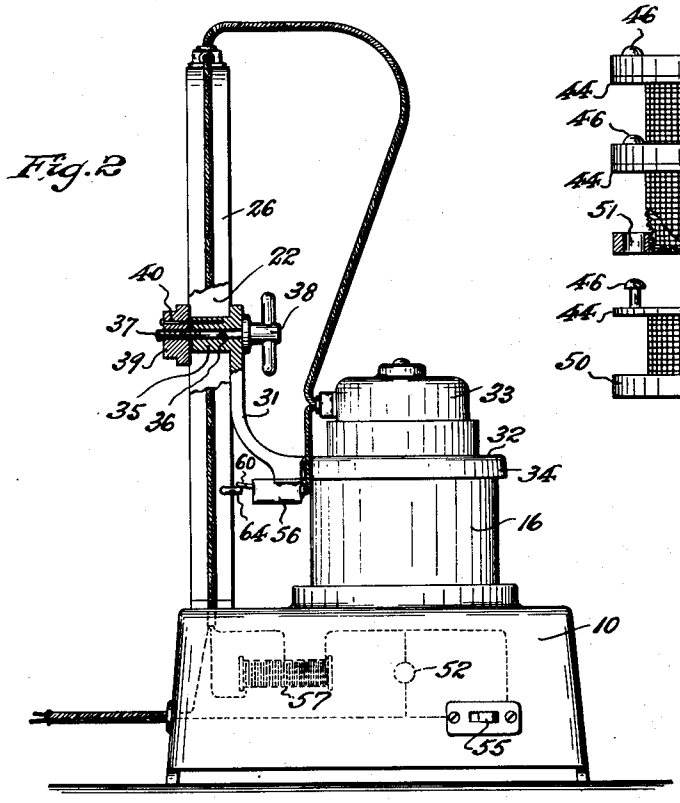
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Fig. 2



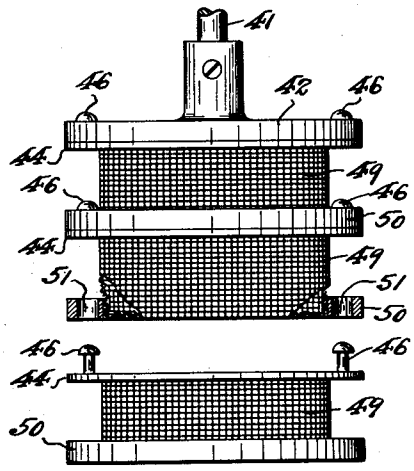


Fig. 7

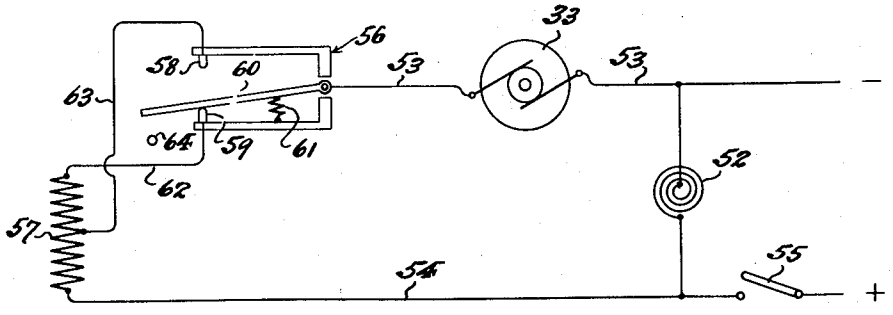


Fig. 3

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APPARATUS FOR CLEANING WATCHWORKS AND THE LIKE MECHANISMS

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Application March 14, 1945, Serial No. 582,726

8 Claims. (Cl. 134—58)

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This invention relates to improvements in apparatus for cleaning watch-works and similar mechanisms; and the invention has reference, more particularly, to novel apparatus for conveniently and expeditiously carrying out the several successive steps of the cleaning process, which comprise immersing the mechanism to be cleaned, with accompanying agitation, in a cleaning solution, thereafter in rinsing solution or solutions, and finally subjecting the mechanism to a drying operation.

This invention has for an object to provide a novel construction of apparatus whereby the several steps of a watchwork or the like cleaning process may be successively carried out in proper sequence and in an efficient manner; the apparatus being constructed to provide, in combination with a motor driven work holding means, novel means for supporting the latter and guiding the same from station to station at which the respective steps of the cleaning operation are to be performed.

The invention has for another object to provide a novel apparatus wherein the several stations at which the respective steps of the cleaning operation are to be performed are arranged in sequence in a straight line in connection with a common base; the apparatus including a carriage bracket for a movable motor driven work holding means, and a novel track or guideway means along which said carriage bracket may be manually moved, quickly and easily, from station to station.

Another object of the invention is to provide a novel electrical circuit control means whereby the motor driven work holding means may be operated at a desired speed and by adequate power when immersed in a liquid, and at a desired speed and properly reduced power when withdrawn from a liquid and spun to centrifugally discharge excess liquid from the work.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:

Fig. 1 is a front elevation, in part section, of the apparatus according to the invention; Fig. 2 is an end elevational view, in part section, of the same; and Fig. 3 is a wiring diagram showing the electrical circuit control means by which the motor driven work holding means is operated.

Fig. 4 is a sectional view of a work holding basket and the means for coupling the same with a driving motor, said basket and couping means being shown in separated or uncoupled relation; Fig. 5 is a detail horizontal section, taken on line 5—5 in Fig. 1, but drawn on an enlarged scale; and Fig. 6 is a fragmentary plan view, in part section, showing further details of the coupling means for connecting a work holding basket with the driving motor.

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Fig. 7 is a side elevation of a modified form of work holding means comprising a plurality of work holding basket members adapted to be interconnected together, end to end, and with the driving motor, one of said basket members being shown in detached or uncoupled relation to the others.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

Referring to the drawings, the reference character 10 indicates the hollow elongated base of the apparatus. The top wall of said base is provided with a plurality of openings 11, 12, 13 and 14, which are spaced in a longitudinally extending row between the ends thereof. Fixed within the interior of said base is a longitudinal supporting platform 15 which is suitably spaced below and in opposition to said row of openings with which the top of the base is provided. Upwardly open containers 16, 17 and 18 are supported by the platform 15 to respectively extend upwardly and outwardly through said openings 11, 12 and 13. Said containers are adapted to hold various fluids for application to the watchworks or similar mechanisms to be treated. Preferably the container 16 is supplied with a cleaning fluid, while the containers 17 and 18 are supplied with suitable rinsing fluids. Connected with the base top wall, to project upwardly therefrom in axially aligned relation to the opening 14, is an upwardly open annular wall 19 which defines a drying chamber 20.

Suitably affixed to the base 10, to upstand therefrom behind the said fluid containers and drying chamber, is a track or guideway means. Said track or guideway means is formed to provide perpendicular ways 22, 23, 24 and 25 respectively disposed parallel to the axes of the containers 16, 17 and 18 and the drying chamber 20; each said way being bounded by laterally spaced vertical track walls 26 and 27, and said ways being open from front to back. Said perpendicular ways are interconnected at their upper ends by a communicating horizontal way 28, which is bounded by vertically spaced horizontal track walls 29 and

30, said horizontal way being likewise open from front to back.

Mounted upon the track or guideway means, for movement relative thereto, is a carriage bracket 31; the same being adapted to bear against the front face of said track or guideway means in straddling relation to the edges of the track walls of the ways thereof. This carriage bracket terminates at its lower end in a forwardly projecting horizontal carriage plate 32 by which is supported an electric motor 33 adapted to operate a work holding means. Said carriage plate and motor are so disposed as to be axially alignable with a container or with the drying chamber, when moved into operative relation thereto. Preferably, said carriage plate 32 is provided with a dependent peripheral flange 34 to embrace the open end of a container when lowered into abutting relation thereto. Said carriage bracket 31 is provided at the back thereof with a rearwardly projecting rider block 35, preferably of rectangular cross-section, which is adapted to engage the ways of the track or guideway means for sliding movement therethrough. Extending through said carriage bracket 31 and its rider block 35 is an axial bore 36, through which extends the shank 37 of a manipulatable clamp screw 38. Bearing against the rear face of said track or guideway means in straddling relation to the edges of the track walls of the ways thereof is an internally screw-threaded clamp nut 39 adapted to be operatively engaged by the threaded portion of the clamp screw shank 37. Means is provided for retaining said clamp nut against rotation when the clamp screw is turned; an illustrative form of such means (as shown) comprising a key pin 40 which projects from said clamp nut to telescope slidably into the rider block 35 of the carriage bracket.

The shaft 41 of the motor 33 is perpendicularly disposed to extend downwardly therefrom, and fixed on said shaft is a coupler plate 42 with which a work holding means may be detachably coupled so as to be rotated by said motor. The work holding means comprises a perforate basket 43, preferably made of wire mesh material, but which may be made of any other suitable perforate material. Connected with the upwardly open end of said basket 43 is a lateral annular flange 44, adapted to be connected in detachably coupled relation to the motor driven coupler plate 42. A preferred form of coupling means for such purpose (as shown) comprises bayonet slots 45 with which marginal portions of the coupler plate 42 are provided, and headed coupling pins 46 upstanding from the basket flange 44, adapted to be engaged in and with said bayonet slots 45. Yieldable detent means are provided in association with at least one bayonet slot 45 to engage the shank of a coupling pin 46, when the latter is moved into interlocking relation to said bayonet slot, whereby to yieldably hold the pin 46 against accidental release from said slot. A preferred form of said detent means comprises a spring pressed check ball 47 which is confined in a housing chamber 48 provided in the wall of said coupler plate 42, and which is spring moved to project into the locking portion of the bayonet slot, whereby to lie in the path of outward movement of the coupling pin operatively occupying the same (see Fig. 6).

While in Figs. 1 and 4 the work holding means is shown as comprising a single basket suitable to accommodate a single watch-work or like mechanism to be treated, said work holding means

may be provided in a multiple basket or compartment form, to accommodate a plurality of watch-works or like mechanisms to be simultaneously treated. A work holding means of multiple basket form is shown in Fig. 7, the same comprising a plurality of baskets 49, each provided at its upper end with a lateral annular flange 44 provided with upstanding coupling pins 46, and at its lower end with a lateral annular coupler flange 50 provided with coupling pin receiving bayonet slots 51. In this form of work holding basket, one basket member may be coupled to the motor driven coupler plate 42, and the others then coupled successively end to end to said first basket and one to another; each such basket being adapted to hold an individual watch-work or like mechanism.

Suitably supported beneath the drying chamber 20 is an electrical heater element 52, the heat from which radiates upwardly through the interior of said drying chamber.

Operating current is served to the motor 33 from a suitable source and by a suitable circuit comprising ingoing and outgoing conductors 53 and 54 controlled by a manual switch 55 which is mounted on the base 10 in a conveniently accessible location; said heater element 52 also being connected in said circuit so as to be controlled by said switch 55.

Within the broader aspects of my invention, the current supply circuit to the motor may be of the simple character thus far described. Within more specific aspects of my invention, it is an object of the same to provide means for suitably modifying the current delivered to the motor to better accommodate the operation of the motor for actuating the work holding means accordingly as the latter is immersed in liquid or withdrawn from the liquid. To this end I provide in the motor circuit a two-way switch means 56 in series with a resistance coil 57, see more particularly the circuit diagram shown in Fig. 3. Said two-way switch means 56 includes a pair of vertically spaced contacts 58 and 59 between which is arranged a pivoted contact arm 60 urged by spring means 61 toward the lower contact 59 for engagement therewith. Said contact arm 60 is connected in series with the motor preferably in the ingoing circuit line 53. Leading from said lower contact 59 is a conductor 62 which is connected to one terminal pole of the resistance coil 57, the opposite terminal pole of which is connected to the outgoing circuit line 54. Leading from the upper contact 58 is a conductor 63 which is in tapped connection with said resistance coil 57 intermediate its ends.

The resistance coil 57 is suitably supported within the interior of the base 10, while the two-way switch means 56 is mounted on the carriage bracket 31 of the motor driven work holding means, so as to be carried thereby and to move therewith, the interconnecting circuit wires being suitably carried in cable means, parts of which loop to the motor and two-way switch so as to permit the required traveling movements of these parts along the track or guideway means. Said two-way switch means 56, as mounted on the carriage bracket 31, is so positioned that its pivoted contact arm 60 may at proper times, when the motor carriage bracket is moved downward to engage a given container in position to immerse the work holding basket in the liquid content thereof, be brought into engagement with a stop projection 64 with which the perpendicular way of the track or guideway means corresponding

to the container is provided. When said contact arm abuts a stop projection 64, it is unswung to break contact with the contact 59 and to make contact with the contact 58. Under such conditions, the current flow is through but part of the resistance coil 57, and consequently current at maximum strength is delivered to the motor, so that the power of the latter is sufficiently increased to assure spinning of the immersed work holding basket at a desired speed against the impedance of the liquid. When the carriage bracket 31 is raised to withdraw the work holding basket from the liquid content of a container but positioned to nevertheless retain the basket within the upper part of said container above the liquid content thereof, so that the basket and contained work may be spun to centrifugally discharge therefrom any liquid clinging thereto, the contact arm 61 will be disengaged from the adjacent stop projection 64, and will be swung down by the spring means 61 into engagement with the contact 59, thus cutting into the circuit the full resistance of the coil 57, whereby to deliver to the motor current of modified strength, so that spinning of the unimpeded work holding basket at excessive speed is prevented, while nevertheless permitting a speed adequate to assure the centrifugal liquid discharge effect desired.

In the operation of the apparatus, the work having been deposited in a holding basket, and the latter coupled to the motor driven coupler plate 42, the carriage bracket is lowered through the first perpendicular way 22 to immerse the basket in the cleaning liquid content of the first container 16, whereupon the switch 55 is closed and the motor 33 operated to spin the basket and contained work in the cleaning liquid. The spinning of the basket agitates the liquid and causes it to penetrate the work. The work is subjected to the cleansing action of the cleaning liquid for a desired time deemed sufficient to effect the cleansing. When the cleansing of the work has thus been effected, the carriage bracket 31 is moved upwardly in the way 22 until the basket clears the level of the liquid in said container 16, while nevertheless being still surrounded by the upper end portions of the container walls. The carriage is releasably secured in such position by tightening the clamp screw and clamp nut in binding relation to the track walls of the way. Such positioning of the carriage bracket and basket, with respect to any of the containers, may be determined by registering the carriage bracket with corresponding position indicating marks 65 with which the track walls of the container serving perpendicular ways of the track or guide way means are provided. When the basket is thus disposed, spinning thereof is continued, to effect centrifugal discharge of cleaning liquid therefrom and from the contained work, such liquid draining back into the container 16.

The initial cleansing operation having been completed, the carriage bracket 31 is released, by relaxing the clamp screw and nut, and thereupon moved upwardly through the way 22, and thence into and through the horizontal way 28 to and downwardly through the perpendicular way 23 to immerse the basket and contained work in the container 17 and its content of liquid, which may be a second cleaning liquid or a rinsing liquid as desired. Here the operations of spinning the immersed basket and then raising it to spin clear of the liquid is repeated, and a second cleaning or first rinsing operation, as the case may be, thereby accomplished. If another liquid treatment is desired, such e. g. as a final rinsing operation, the carriage bracket 31 is again released, and thereupon moved upwardly through the way 23, and thence into and through the horizontal way 28 to and downwardly through the perpendicular way 24 to immerse the basket and contained work in the container 18 and its content of liquid; again repeating the above described operations. Finally, the carriage bracket 31 is released and moved upwardly through the way 24, and thence into and through the horizontal way 28 to and downwardly through the perpendicular way 25, to enter the basket and contained work in the drying chamber 20. A stop 66 is provided in the way 25 to arrest downward movement of the carriage bracket 31 so that the two-way switch 56 remains set to cut the resistance coil 57 into the motor circuit, so that the basket and work will be spun within the drying chamber at non-excessive speed. When the basket and work is entered in the drying chamber, said work will be submitted to the drying effect of the heat radiated from the heating element 52. After the work is dried, the motor is stopped by opening switch 55, the carriage bracket is raised to give access to the basket, whereupon the latter is detached from the coupler plate 42, and the clean work may be removed. Upon return of the carriage bracket to the first way 22, the basket may be reloaded and replaced, and the above described work cleansing operations may be repeated.

Removable covers 67 may be provided for containers not at any given time in use.

The straight line arrangement of the stations at which the different operations are performed is of real advantage in that the progressive movement of the motor driven work holding means from station to station in proper sequence is facilitated, and likelihood of mistake in following the sequence of operations is avoided.

It will be understood that various changes could be made in the apparatus of this invention, without departing from the scope of said invention as defined by the following claims. It is therefore intended that all matter shown in the accompanying drawings and described in the preceding specification shall be considered as illustrative and not in a limiting sense.

I claim:

1. Apparatus of the kind described comprising a base having rectilinearly spaced receivers, a trackway means upstanding from said base behind said receivers, said trackway means having perpendicular ways respectively corresponding in position to the respective receivers and a horizontal way common to and with which the upper ends of said perpendicular ways communicate, a motor driven rotatable work holding means, and a single carriage means to support the latter, said carriage means being movable through the ways of said trackway means whereby to shift said motor rotated work holding means selectively from one to another of said receivers.

2. Apparatus of the kind described comprising a base having rectilinearly spaced receivers, a trackway means upstanding from said base behind said receivers, said trackway means having perpendicular ways respectively corresponding in position to the respective receivers and a horizontal way common to and with which the upper ends of said perpendicular ways communicate, a motor driven rotatable work holding means, a single carriage means to support the

latter, said carriage means being movable through the ways of said trackway means whereby to shift said motor rotated work holding means from one to another of said receivers, and manipulatable means cooperative with said carriage means and said trackway means for releasably holding the carriage means in a given operative position on the trackway means relative to a selected receiver.

3. Apparatus of the kind described comprising a base, a plurality of liquid containers, said base having means to support said containers spaced in a straight row therealong, said base having an upwardly open drying chamber aligned with said row of containers at an end thereof, a trackway means upstanding from said base behind said row of containers and said drying chamber, said trackway means having perpendicular ways respectively corresponding in position to said containers and drying chamber and a horizontal way with which the upper ends of said perpendicular ways communicate, a motor driven work holding means, a carriage means to support the latter, said carriage means being movable through the ways of said trackway means whereby to shift said motor driven work holding means progressively into and out of operative relation to said containers and drying chamber, an electric circuit serving said motor driven work holding means including a manual control switch and a heater means for said drying chamber.

4. Apparatus of the kind described comprising a base, a plurality of liquid containers, said base having means to support said containers spaced in a straight row therealong, said base having an upwardly open drying chamber aligned with said row of containers at an end thereof, a trackway means upstanding from said base behind said row of containers and said drying chamber, said trackway means having perpendicular ways respectively corresponding in position to said containers and drying chamber and a horizontal way with which the upper ends of said perpendicular ways communicate, a motor driven work holding means, a carriage means to support the latter, said carriage means being movable through the ways of said trackway means whereby to shift said motor driven work holding means progressively into and out of operative relation to said containers and drying chamber, means cooperative with said carriage means and said trackway means for holding the former in selected operative positions on and along the latter.

5. Apparatus of the kind described comprising a base, a plurality of liquid containers, said base having means to support said containers spaced in a straight row therealong, said base having an upwardly open drying chamber aligned with said row of containers at an end thereof, a trackway means upstanding from said base behind said row of containers and said drying chamber, said trackway means having perpendicular ways respectively corresponding in position to said containers and drying chamber and a horizontal way with which the upper ends of said perpendicular ways communicate, a motor driven work holding means, a carriage means to support the latter, said carriage means being movable through the ways of said trackway means whereby to shift said motor driven work holding means progressively into and out of operative relation to said containers and drying chamber, an electric circuit serving said motor driven work holding means including a manual control switch and a heater means for said drying chamber, a two-way switch and a resistance coil connected in said circuit in series with the motor of said work holding means, said two-way switch being mounted on said carriage means, means to normally condition said two-way switch to connect the full capacity of said resistance coil in said circuit, and stop means engageable by said two-way switch to condition the same to connect but part of the capacity of said resistance coil in said circuit when the work holding means is submerged in the liquid content of a container.

6. Apparatus of the kind described as defined in claim 5, including means cooperative with said carriage means and said trackway for holding the former in selected operative positions on and along the latter.

7. Apparatus of the kind described comprising a base, a plurality of liquid containers, said base having means to support said containers spaced in a straight row therealong, said base having an upwardly open drying chamber aligned with said row of containers at an end thereof, a trackway means upstanding from said base behind said row of containers and said drying chamber, said trackway means having perpendicular ways respectively corresponding in position to said containers and drying chamber and a horizontal way with which the upper ends of said perpendicular ways communicate, a carriage means movable through the ways of said trackway means, an electric motor mounted on said carriage means, a perforate work holding means, means to detachably couple the said work holding means in dependent and driven relation to said motor, means cooperative with said carriage means and said trackway means for holding the former in selected positions on and along the latter to operatively enter said work holding means in a given container or the drying chamber, and an electric circuit serving said motor including a manual control switch and a heater means for said drying chamber.

8. Apparatus of the kind described comprising a base, a plurality of liquid containers, said base having means to support said containers spaced in a straight row therealong, said base having an upwardly open drying chamber aligned with said row of containers at an end thereof, a trackway means upstanding from said base behind said row of containers and said drying chamber, said trackway means having perpendicular ways respectively corresponding in position to said containers and drying chamber and a horizontal way with which the upper ends of said perpendicular ways communicate, a carriage means movable through the ways of said trackway means, an electric motor mounted on said carriage means, a perforate work holding means, means to detachably couple the said work holding means in dependent and driven relation to said motor, means cooperative with said carriage means and said trackway means for holding the former in selected positions on and along the latter to operatively enter said work holding means in a given container or the drying chamber, an electric circuit serving said motor including a manual control switch and a heater means for said drying chamber, a two-way switch and a resistance coil connected in said circuit in series with the motor of said work holding means, said two-way switch being mounted on said carriage means, means to normally condition said two-way switch to connect the full capacity of said resist-

ance coil in said circuit, and stop means engageable by said two-way switch to condition the same to connect but part of the capacity of said resistance coil in said circuit when the work holding means is submerged in the liquid content of a container.

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