May 11, 1954 S. T. MORELAND 2,678,052

WATCH AND LIKE PARTS WASHING MACHINE

Filed Oct. 12, 1948 4 Sheets-Sheet 1

FIG. 1

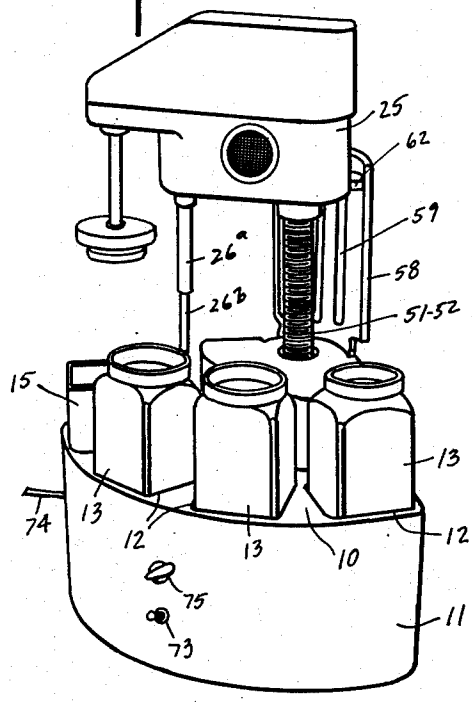

FIG. 2

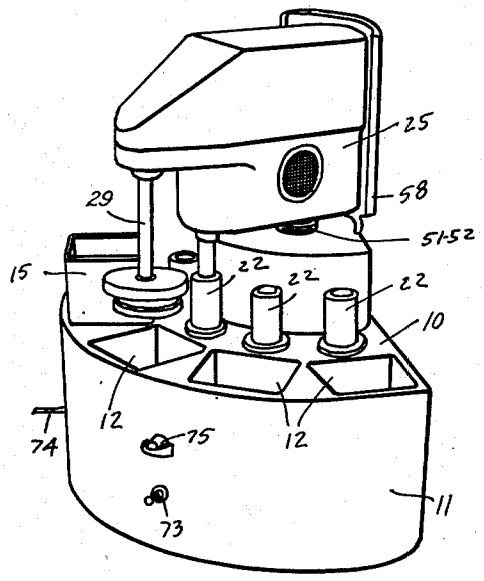

FIG. 3

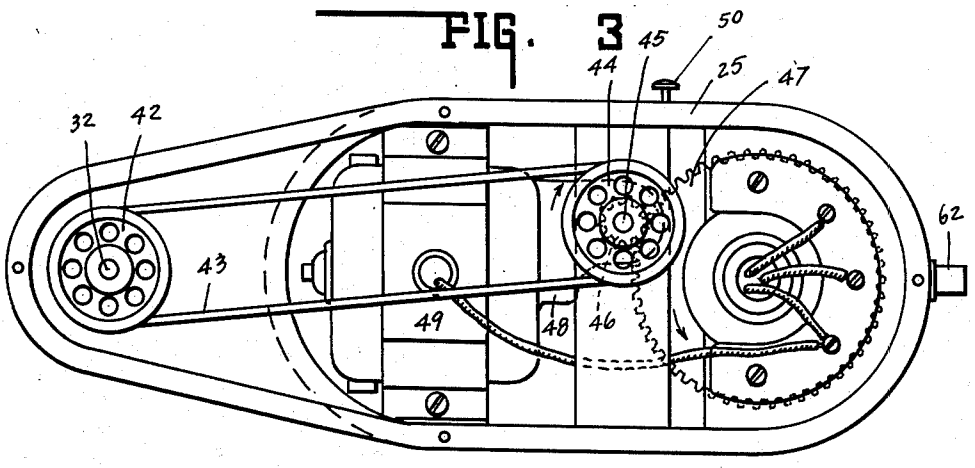

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FIG. 4

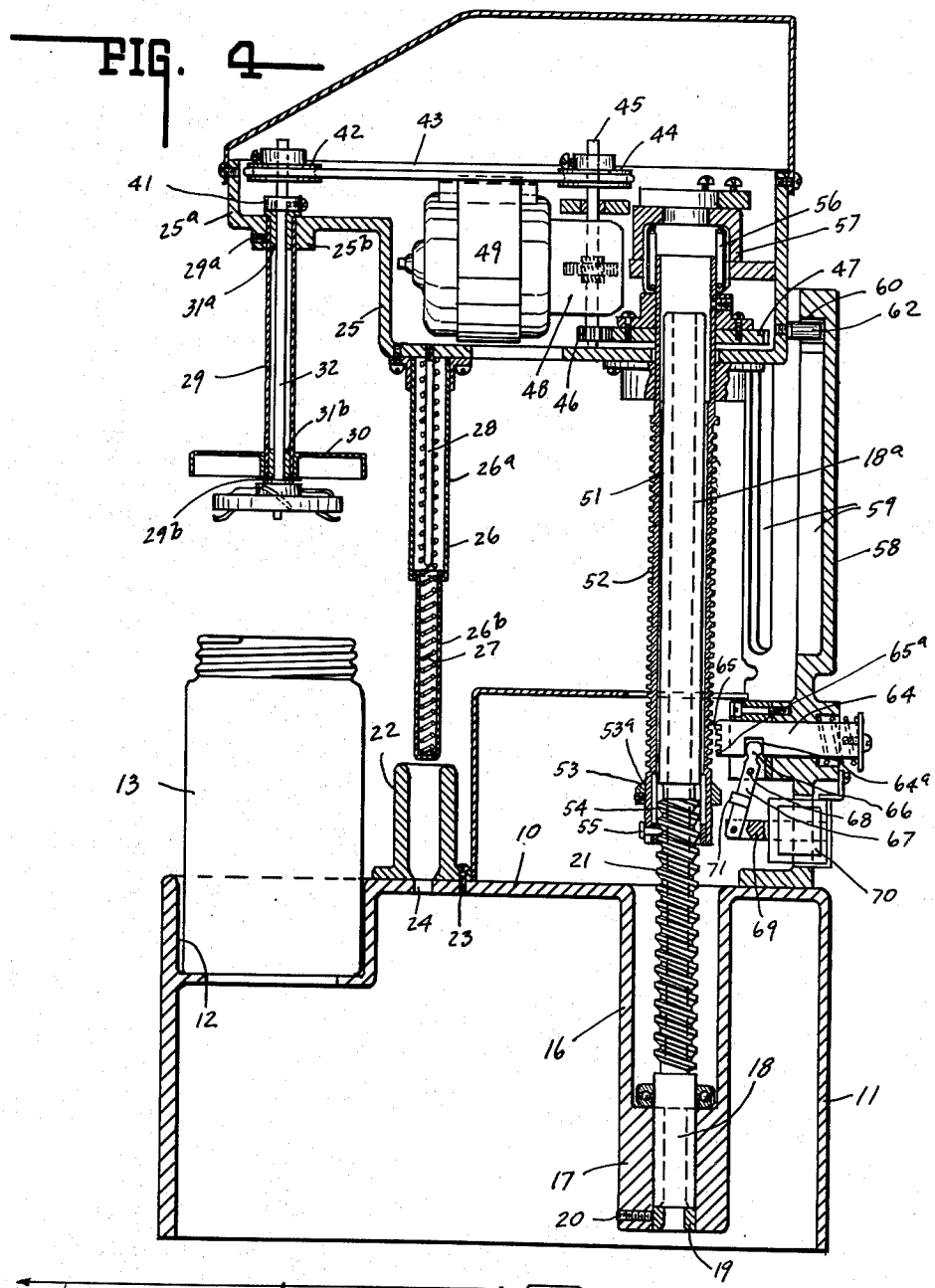

FIG. 9

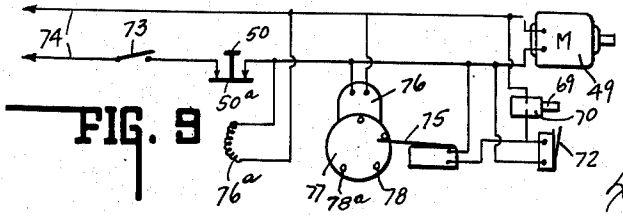

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FIG. 5

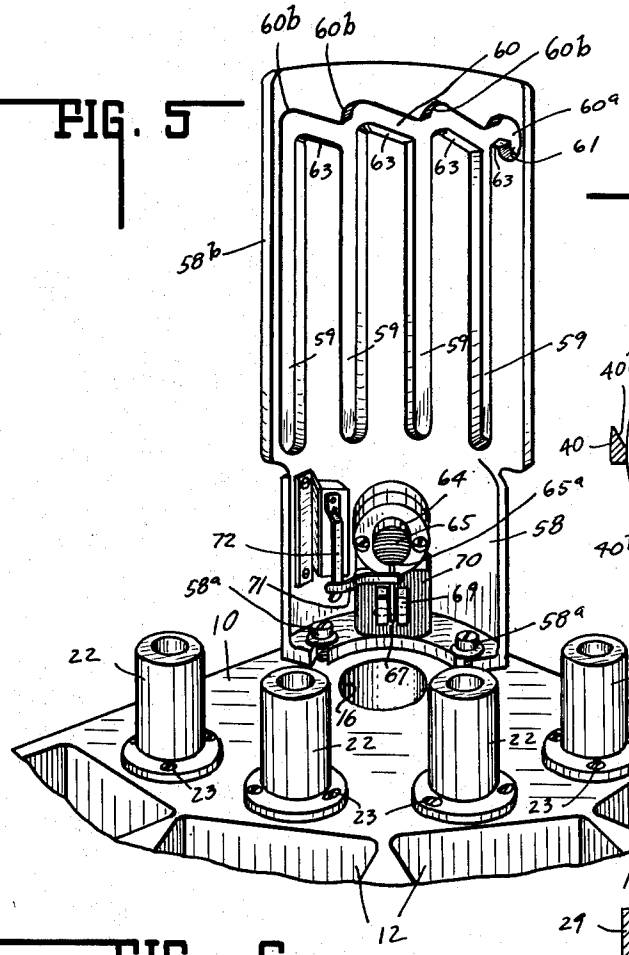

FIG. 8

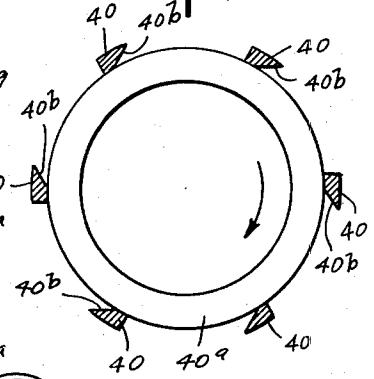

FIG. 6

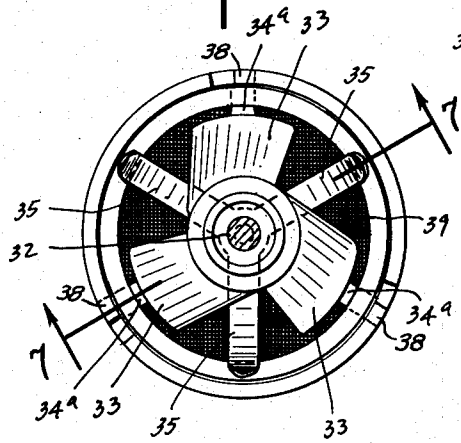

FIG. 7

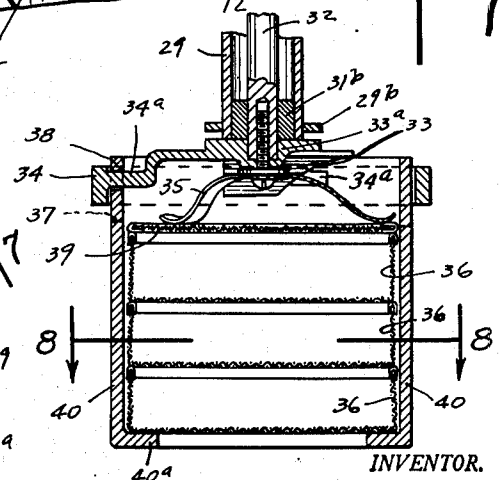

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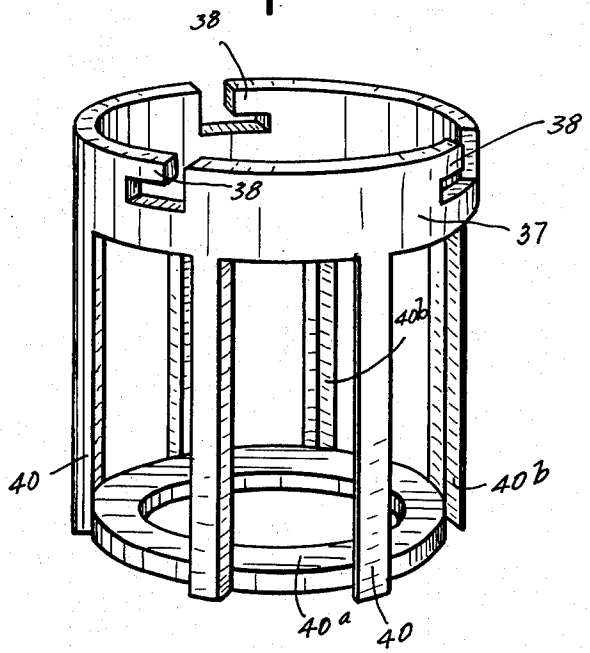
FIG. 10



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2,678,052

UNITED STATES PATENT OFFICE

2,678,052

WATCH AND LIKE PARTS WASHING MACHINE

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Application October 12, 1948, Serial No. 54,134

6 Claims. (Cl. 134—77)

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This invention relates to a machine peculiarly suitable for the cleaning of watch parts.

In the repair and cleaning of watches it is necessary to disassemble same and clean the several parts. These initially were cleaned by hand brushing, washing, rinsing and drying. Then the parts were supplied to a cleaner having a reciprocatory and revolving cage. However, the cleaning solution was of attacking character so that the jeweler frequently, due to attending trade, left the parts exposed to such solution for too long a time resulting in damage thereto.

It is the chief object of this invention to provide a device to which the watch parts may be applied and then the power manually initiated and the rest of the cycle of washing, rinsing, drying, etc., is entirely automatic and when these operations are effected the machine is automatically stopped.

The chief feature of the present invention resides in the construction and operation of the machine whereby cyclic operation is attained to accomplish the foregoing object, such feature being chiefly directed to the full automatic control of the machine.

Another feature of the invention resides in the circulating character of the parts supporting cage.

Other objects and features of the invention will be set forth more fully hereinafter.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings Fig. 1 is a perspective view of an embodiment of the invention in the so-called idle or standby position, the parts receiving cage being omitted.

Fig. 2 is a similar view of the same parts with the head in lowered position and at the third station, the liquid containing vessels being omitted.

Fig. 3 is a top plane view of the head with cover removed.

Fig. 4 is a vertical sectional view of the invention with the head in the elevated position.

Fig. 5 is a perspective view of the back member, table and shock absorbers.

Fig. 6 is a top plan view of one form of cage.

Fig. 7 is a radial sectional view of same taken on line 7—7 of Fig. 6 and in the direction of the arrows.

Fig. 8 is a transverse section of the basket holder with basket removed and is taken on line 8—8 of Fig. 7 and in the direction of the arrows.

Fig. 9 is a wiring diagram.

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Fig. 10 is a perspective view of the cage member illustrated in Figs. 6, 7 and 8.

In the drawings 10 indicates a segmental table having a depending wall 11. Formed therein are three wells 12, see Fig. 2, to detachably receive and partially nest jars or vessels 13 adapted to receive covers. The several liquids are contained in said vessels. Seated in a fourth well is a tubular shield 15.

Extending downwardly from said table 10, see Fig. 4, and adjacent its vertex is a tubular portion 16 terminating in elongated bearing 17 for seating the upright member 18. Collar member 19 and set screw 20 cooperate with bearing 17 to seat the upright 18 which projects upwardly and has a thread 21 thereon above which is a shaft 18a. Upright 18 is free to move upwardly, but collar 19 limits downward movement as shown.

In radial alignment with member 21 and each well is a tubular member 22 detachably secured to table 10 as at 23. Table 10 in alignment with the bore of member 22 includes a reduced aperture at 24 of smaller diameter than the bore of member 22.

A head, indicated generally by numeral 25, see Figs. 1 and 2, is rotatably and cantileverly supported by means associated with upright member 18. Depending from said head is plunger 26. When the head is lowered plunger 26 enters tube 22 and initially insures precise alignment. As the plunger 26 finally seats, it serves as a cushioned pilot. Herein plunger 26 comprises two telescopically associated parts 26a and 26b with oppositely directed stop flanges as shown. Disposed therein and constraining the parts 26a and 26b to extended position is spring 27 guided by stem 28.

The free end of head 25 includes an offset portion 25a provided with boss 25b to accommodate tube 29 secured as at 29a. Slidable upon the tube is skirted cap 30, the downward motion of which is limited by stop 29b, see Fig. 7. Within the tube are upper and lower bearings 31a and 31b which rotatably support shaft 32 that projects beyond said tube at the opposite ends thereof. The lower projecting end, see Figs. 4, 6 and 7, has secured thereto, as at 33a, the hub of a spider, the arms of which are in the form of fan blades 33. The arms are extended at 34a and terminate in ring 34. Also carried by the hub are the spring fingers 35, see Figs. 6 and 7.

A cage 40 includes upper ring 37 from which there projects upwardly the arcuate latches 38 adapted to lock upon extensions 34a. When associated therewith, the spring fingers 35 then op-

eratively bear upon the basket cover 39 of the uppermost basket 36. Successive baskets 36 are stacked and thus close the next lower basket. Herein the cage 40 includes ribs and the internal bottom flange 40*a*, see Fig. 7. Each rib of cage 40 is beveled as at 40*b*, see Fig. 8, to draw liquid into the cage trapped basket during rotation thereof.

A stop collar 41 resting on bearing 31*a* holds shaft 32, as shown in Figs. 3 and 4. Fixed to the upper end of said shaft is pulley 42 driven by endless belt 43 or the like. This in turn is driven by pulley 44 on shaft 45 within said housing. Shaft 45 at its lower end mounts pinion 46 meshing with gear 47 to which reference will be had later.

Shaft 45 is driven at the desired reduced speed by reduction drive unit 48 driven by motor 49 disposed within housing 25. Plunger 50, see Fig. 3, is normally constrained outwardly and controls a switch (not shown) normally constrained to closed position. When plunger 50 is forced inwardly, as hereinafter described the switch controlled thereby is opened, and this opens the circuit to the motor 49.

A tubular shaft 51, see Fig. 4, depends from head 25. It is externally threaded as at 52 and near its lower end mounts a cam collar 53. A conventional roller or needle bearing 54 within shaft 51 rotatably supports the upper end of upright screw member 18—21. Collar 53 includes inwardly directed pin 55 that is engaged with thread 21. As the shaft 51 is rotated the pin 55 serves as a nut to cause the head rapidly to move downwardly.

As shown in Fig. 4 the upper end of tubular externally threaded shaft 51 is rotatably supported by another conventional roller or needle bearing 55 in bracket 57 of the head 25. As indicated at 18*a* the upright member at its upper end nests within tubular screw 51—52.

Disposed near the vertex of the table 10 and suitably secured thereto as at 58*a* is the arcuately sectioned indexing frame member 58. This frame member includes in its inner face as many vertical channels 59 as there are wells in the table 10. The upper ends of the channels are connected by a cross channel 60 which, see Fig. 5, at its right end is extended at 60*a* and terminates in a short channel 61 as shown. Cross channel 60 is of successive biased length type, see 60*b*, which facilitates automatic step by step traversing.

The left hand edge 58*b* of this frame member 58 is adapted to engage plunger 50. When so engaged the head carried follower 62, see Fig. 4, seats in channel 61. Thus the head is held in the elevated position. When the elevated head is raised slightly and rotated so that follower 62 may completely traverse channel 60 to edge 58*b* the head then is in radial alignment with the first well. It then automatically lowers, dwells, and then automatically elevates, as will be described. At the conclusion of this elevation follower 62, incident to angular torque of the head rides the downwardly sloping wall 63 of channel 60 until the follower registers with the second channel 59 and the cycle is repeated until the follower enters seat 61 and edge 58*b* actuates plunger 50 to stop the automatic functioning. Note each of the walls 63 slope downwardly to the right.

As shown most clearly in Figs. 4 and 5, the frame 58 slidably supports a plunger 64. It is radially directed toward shaft 51 and on its free and adjacent end is provided with a partial nut having a suitably threaded face 65 adapted to mesh with threads 52. When said plunger and partial nut are meshed with said threads 52 the head 25 and screw 51 are elevated. When cam face 53*a*, in the rotation of member 51 and collar 53, engages beveled face 65*a*, the plunger 64 is forced rearwardly. This limits upper travel of head 25, etc. At this time follower 62 in engagement with curved cam surface 60*b* is disposed slightly above wall 63 and the inherent reaction of rotating parts 46 and 47 creates clockwise torque on head 25 and turns the head slightly so that follower 62 engages downwardly sloping wall 63 and then follows it to the next channel 59 which it enters.

Plunger 64 is notched at 64*a* and disposed therein is the end 66 of lever 67 pivoted at 68. The other end of the lever is pivotally connected to core 69 of solenoid 70. When energized the solenoid 70 projects the plunger 64 into meshing engagement with threads 52.

Lever 67 mounts arm 71 (see Fig. 5) which is disposed adjacent switch arm 72. Thus only momentary energization of solenoid 70 is required because upon such energization the arm 71 engages arm 72 to close the solenoid maintaining circuit. When cam collar 53 engages plunger 64 and forces it rearwardly the arm 71 disengages from arm 72 and the solenoid maintaining switch is permitted to open.

In Figs. 1, 2 and 9 there is shown a master switch 73, current supply lines 74 and a timer switch control 75. A motor 76 rotates plate 77 carrying cam pins 78 that, in rotation of motor 76, engage switch member 75. Cam pins 78 are spaced from one another and their movement is timed to provide a dwell period of the cage in each vessel 13 for a predetermined time interval calculated to provide adequate cleaning of the watch parts. It will be noted from inspection of Fig. 9 that pins 78 provide three dwell periods of equal time duration and a fourth dwell period of greater time duration. During each of the three equal periods cage 40 rotates within one of the vessels 13, but during the longer dwell period cage 40 rotates within the heated shield 15. Note also button 50 controls switch 50*a*. This is normally closed except when button 50 is forced inwardly by edge 58*b* as described.

Operation is as follows: Main switch 73 can be closed. As long as the head has member 62 disposed in slot seat 61 the switch 50*a* is open. The head drops by gravity being retarded by screw 21 and the cushion device 27 etc. 22. Solenoid 70 is energized at 75 and held energized until cam surface 53*a* moves plunger 64 and therewith arm 71 out of engagement with switch 72. Then the solenoid circuit is deenergized.

Also disclosed in Fig. 9 is a heater 76*a*, which is energized when power is supplied to motors 76 and 49. This heater is disposed in the bottom of the open top well 15. When the basket cage is disposed in well 15 the heat in that confined space drives off the liquid cleaner still adhering by surface tension to the small parts, etc. It, of course, is understood that the basket cage is rotated from the time it is lowered into the first station jar until it is elevated from open top well 15.

From the foregoing the jeweler need only supply the several parts to the several baskets, apply same to the cage and it in turn to the head. Fig. 1 illustrates head 25 in its normal rest po-

sition. Switch 50*a* is normally open due to the fact that the plunger 50 is in engagement with frame member 58 at the edge 58*b* and pushed inwardly. Switches 72, 73 and 75 are normally open. Therefore, to initiate operation the jeweller moves the head 25 in a counterclockwise direction, disengaging follower 62 from slot seat 61 and continuing the rotation of head 25 until follower 62 becomes aligned with the left hand vertical channel 59 (Fig. 5). During this action plunger 50 becomes disengaged from edge 58*b*, closing switch 50*a*. Master switch 73 may then be closed to energize motor 49, motor 76 and heater 76*a*. Motor 49 runs continuously and rotates the cage 40, together with shaft 51. Rotation of shaft 51 has no effect since solenoid 70 is de-energized, and plunger 64 is disengaged from threads 52. When the jeweller releases head 55, gravity causes it to move downwardly with the guide pin 62 in left hand channel 59. Downward movement of head 25 is impeded by pin 55 engaging thread 21 of upright member 18. Member 18 floats freely within shaft 51 and rotates on collar member 19, whereby head 25 has controlled downward movement. Part 26*b* enters tubular member 22 and eventually engages the shoulders of the reduced aperture 24, whereupon spring 27 acts to cushion engagement of plunger 26 with the upper end of tubular member 22. At this time the cage 40 will have entered the right hand container 13 (Fig. 1) and will come to rest in position to wash the parts being cleaned.

Meanwhile, timing motor 76 will have rotated plate 77 to such a position that pin 78*a* will engage switch 75. It will be understood that Fig. 9 illustrates plate 77 in the position where switch 75 is to be operated for the third time. Cage 40 remains in the first container 13 for a calculated, predetermined period after which pin 78*a* closes switch 75. This timed closure of switch 75 energizes solenoid 70 to actuate core 69, lever 67 and plunger 64, moving the plunger to the left into threaded engagement with threads 52. This action of the solenoid moves the arm 71 (Fig. 5) into engagement with switch arm 72, thereby to hold solenoid 70 in energized condition. This allows plate 77 to continue its timing cycle with pin 78*a* slipping by arm 75 and permitting this switch to open. While plunger 64 engages threads 52, the continuous rotation of member 51 causes head 59 to be elevated, thereby lifting cage 40 out of vessel 13. Meanwhile, pin 55 in engagement with threads 21 tends to lift upright member 18. However, since it floats freely in shaft 51, the action of gravity causes member 18 to rotate and either maintain its position shown in Fig. 4 or to move downwardly to that position as head 25 is elevated.

Upward movement of head 25 continues until cam face 53*a* engages the lower edge of plunger 64, moving it out of engagement with threads 52 and stopping the upward movement of head 25. Disengagement of plunger 64 simultaneously moves arm 71 out of engagement with switch arm 72, thereby de-energizing solenoid 70.

As head 25 is elevated, the follower 62 moves upwardly in channel 59 into engagement with curved cam surface 60*b* which produces a slight degree of clockwise rotational movement of head 25. This movement is also enhanced by the reactive torque produced by the rotating motor and shafts driven thereby. Follower 62 engages and rides downwardly along the sloping wall 63 of channel 60 into the second channel 59, whereby the head 25 is permitted to move cage 40 downwardly into the second vessel 13 in the same manner as described in connection with the first vessel 13. Meanwhile, timing motor 76 has been rotating plate 77, and assuming that plate 77 rotates in a clockwise direction, pin 78 will be moved into engagement with switch 75 after the cage has rotated within the second vessel 13 for a predetermined time period. Thereafter head 25 will be elevated as previously described.

The head 25 is cyclically rotated from one vessel 13 to another and into the heated shell 15. When the cage 40 and head 25 are elevated out of shell 15, the follower 62 enters the extension 60*a* of cross channel 60 and at this point the head 25 has rotated in a clockwise direction to such a degree that the plunger 50 engages the edge 58*b* of the frame member 58, thereby opening the contacts of switch 50*a* to de-energize motor 49 and terminate the last cycle of operation, with the head 25 in the position illustrated in Fig. 1. The cleaning fluid used is somewhat corrosive so that this device prevents destruction or excessive action upon the delicate parts being cleaned. The jeweler accordingly can wait upon trade without any worry relative to part wear, etc. Also member 75, Figs. 1 and 2 can regulate the time interval within the range of its capabilities.

While the invention has been illustrated and described in great detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. A cleaning machine comprising a table having arcuately disposed well portions, a screw rotatably mounted on said table centrally of said well portions, a head rotatably mounted on said screw and including a depending basket and continuously operating driving means operatively associated with the basket and the screw, a partial nut movably mounted on said table adjacent said screw for operative engagement therewith, a solenoid operatively associated with said nut, timed switching means for energizing said solenoid to engage said nut with the screw for periodically initiating elevation of the head, cam means on the screw movable into engagement with said nut for disengaging it when the head reaches its uppermost position, guide means on said head, and an indexing means mounted on said table adjacent the path of movement of said head and including a plurality of vertical guide channels for receiving said guide means and aligning said basket with said well portions, said indexing means also including cams extending between said channels for receiving said guide to hold said head in elevated position during rotation of the head and basket from one well portion to another.

2. A cleaning machine comprising a table having arcuately disposed well portions, a screw rotatably mounted on said table centrally of said well portions, a head rotatably mounted on said screw and including a depending basket and continuously operating driving means operatively associated with the basket and the screw, a partial nut movably mounted on said table adjacent said

screw for operative engagement therewith, a solenoid operatively associated with said nut, timed switching means for energizing said solenoid to engage said nut with the screw for periodically initiating elevation of the head, cam means on the screw movable into engagement with said nut for disengaging it when the head reaches its uppermost position, guide means on said head, and an indexing means mounted on said table adjacent the path of movement of said head for receiving said guide means and aligning said basket with said well portions, said indexing means also including structure for receiving said guide to hold said head in elevated position during rotation of the head and basket from one well portion to another.

3. A cleaning machine comprising a table having arcuately disposed well portions, a threaded member rotatably mounted on said table centrally of said well portions, a head rotatably mounted on said member and including a depending basket and continuously operating driving means operatively associated with the basket and the member, a partial nut movably mounted on said table adjacent said member for operative engagement therewith, timed actuating means for engaging said nut with the threaded member for periodically initiating elevation of the head, means on the member movable into engagement with said nut for disengaging it when the head reaches its uppermost position, and an indexing means mounted on said table adjacent the path of movement of said head for aligning said basket with said well portions and for guiding the head and basket from one well portion to another.

4. A cleaning machine comprising a table having arcuately disposed well portions, a threaded member rotatably mounted on said table centrally of said well portions, a head rotatably mounted on said member and including a depending basket and continuously operating driving means operatively associated with the basket and the member, a partial nut movably mounted on said table adjacent said member for operative engagement therewith, actuating means for engaging said nut with the member for periodically initiating elevation of the head, means on the member movable into engagement with said nut for disengaging it when the head reaches its uppermost position, an indexing means mounted on said table adjacent the path of movement of said head for aligning said basket with said well portions and for guiding the head and basket from one well portion to another, and shock-absorbing means extending downwardly from said head comprising spring-biased telescoping tubular members movable into engagement with said table.

5. A cleaning machine comprising a table having arcuately disposed vessels, an elevator mounted on said table centrally of said vessels, a head rotatably mounted on said elevator and including a depending basket and continuously operating driving means operatively associated with the basket and the elevator, electromagnetic actuating means operatively associated with said elevator, timed switching means for energizing said electromagnetic actuating means to periodically initiate elevation of the head, cam means on the elevator in operative relation to said electromagnetic actuating means for resetting it when the head reaches its uppermost position and stopping elevation thereof, and an indexing means mounted on said table adjacent the path of movement of said head for aligning said basket with said well portions, said indexing means including a stop portion for stopping motion of said head after a predetermined number of elevations thereof.

6. A cleaning machine comprising a table having arcuately disposed vessels, an elevator mounted on said table centrally of said vessels, a head rotatably mounted on said elevator and including a depending basket and continuously operating driving means operatively associated with the basket and the elevator, means for periodically initiating elevation of the head, means for automatically stopping elevation of the head when it reaches its uppermost position, guide means on said head, and an indexing means mounted on said table adjacent the path of movement of said head and including a plurality of vertical guide channels for receiving said guide means and aligning said basket with said well portions, said indexing means also including cams extending between said channels for receiving said guide to guide the head and basket from one well portion to another, and a stop for receiving said guide means when the head rotates through a predetermined angle.

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