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J. J. HARRISON
 WASHING UNIT PROVIDING AN UP-AND-DOWN MOVEMENT OF A
 WORKPIECE IN A CLEANING BATH

3,276,459

Original Filed Sept. 11, 1963

2 Sheets-Sheet 1

FIG. 1

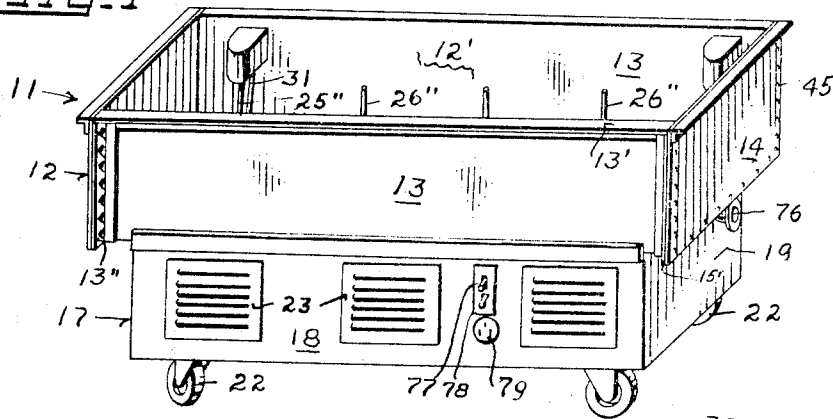


FIG. 2

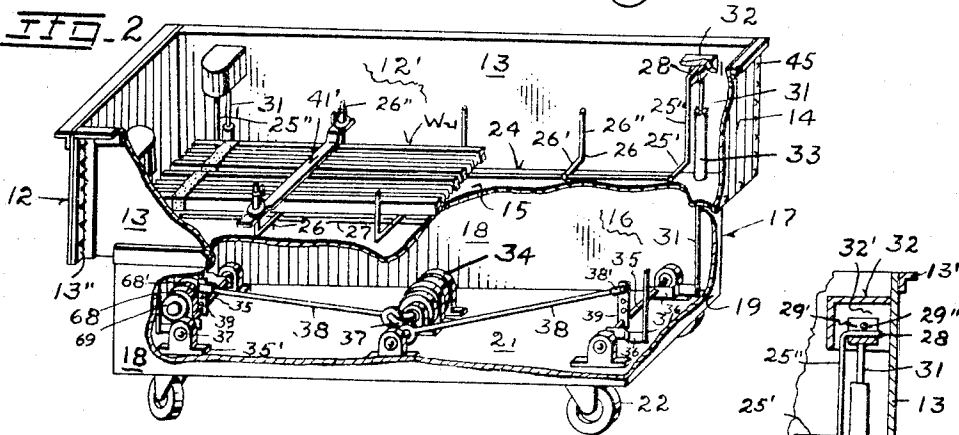


FIG. 3

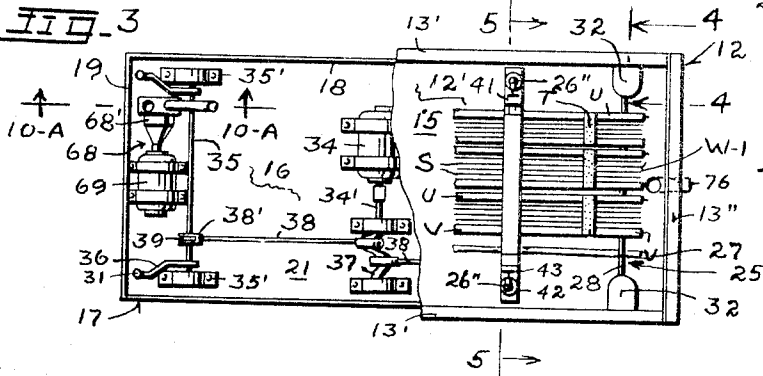


FIG. 4

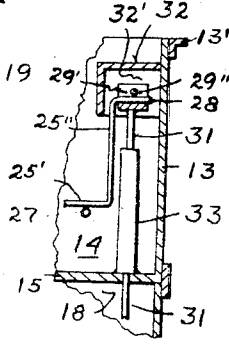
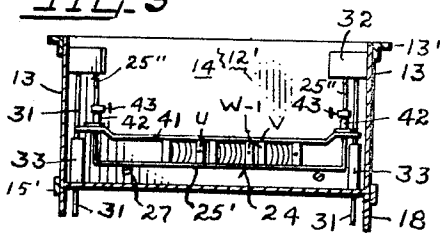


FIG. 5



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FIG. 6

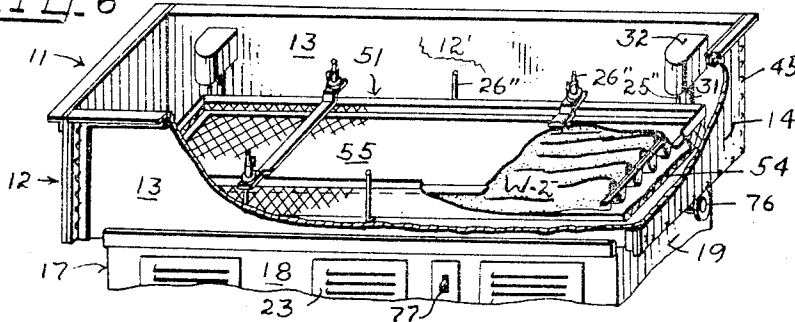


FIG. 7

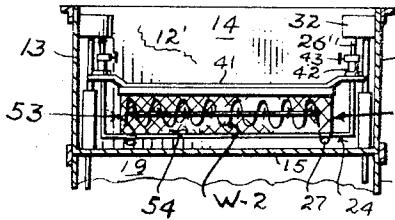


FIG. 8

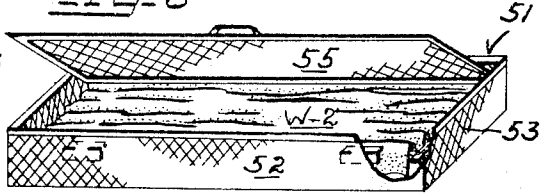


FIG. 9

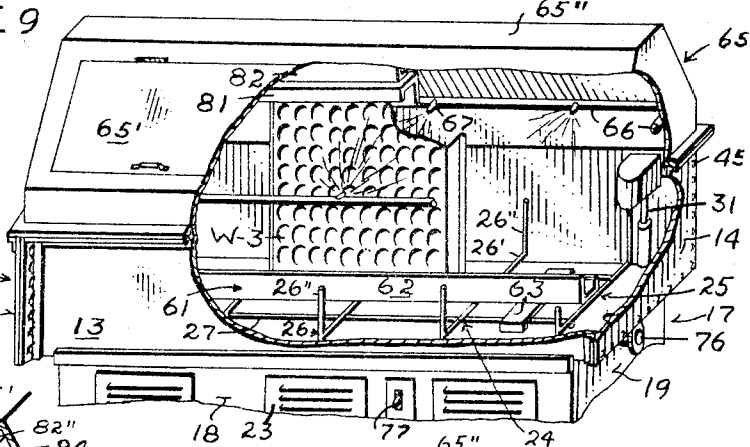


FIG. 10-A

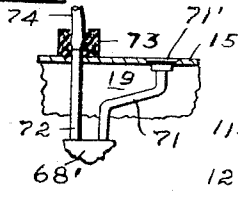


FIG. 10

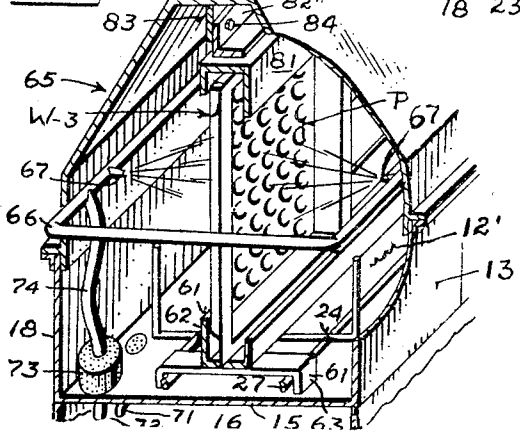
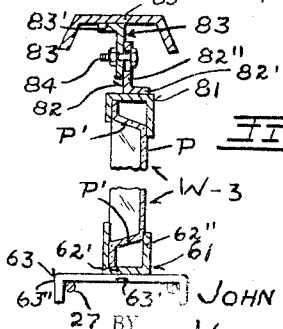


FIG. 10-B



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WASHING UNIT PROVIDING AN UP-AND-DOWN MOVEMENT OF A WORKPIECE IN A CLEANING BATH

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Continuation of application Ser. No. 308,175, Sept. 11, 1963. This application Mar. 8, 1965, Ser. No. 446,453
3 Claims. (Cl. 134—164)

The invention relates to a unit for use in washing and/or otherwise effecting a liquid treatment of more-or-less flexible unitary articles, and this application comprises a continuation of my prior application, Ser. No. 308,175, filed September 11, 1963, now abandoned.

Experience has shown that the hand washing of such more-or-less fragile and unitary interior building fittings, such as Venetian blinds or Fiberglas drapes or light-diffusing plates or other unitary articles, frequently results in irreparable damage to or an imperfect treatment of such articles by reason of a lack of facilities for best handling or washing the articles, and the present unit has been particularly designed for effecting a mechanical washing or other procedure in a safe and thorough and time-saving manner.

A general object is to provide a unit of the character described which is arranged to fully receive and hold and treat workpiece articles in a particularly effective manner.

Another object is to provide a unit for use in washing an article of the character described by a particularly effective method and means.

A more specific object is to provide a washing unit of the character described which is particularly adapted or adaptable for the washing cleaning of Venetian blind assemblies.

A further object is to utilize a present unit to provide a particularly effective washing treatment of drapery units of fiberglass or the like.

An additional object is to utilize the present unit for washing a relatively rigid light-diffusing plate of a lighting fixture.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth or be apparent in the following description of a typical embodiment and different uses thereof, and in the accompanying drawings, in which,

FIGURE 1 is a perspective view of a present cleaning unit providing a basin in which various workpiece units may be treated.

FIGURE 2 is a fragmentary and broken-away perspective view of the unit as employed for the washing of a Venetian blind assembly which is fixedly mounted on a movable rack disposed within the washing basin of the unit.

FIGURE 3 is a stepped plan view of the structure of FIGURE 1.

FIGURE 4 is an enlarged upright and fragmentary section taken at the line 4—4 in FIGURE 3.

FIGURE 5 is an enlarged fragmentary view taken at 5—5 in FIGURE 3.

FIGURE 6 is a broken-away perspective view showing a drapery unit enclosed in an opened retaining cage member mounted on the rack and disposed for its washing in the basin of the unit.

FIGURE 7 is a fragmentary transverse section taken from an upright plane through the line 7—7 in FIGURE 6.

FIGURE 8 is a perspective view of the drapery-carrying cage of FIGURES 5 and 6 in slightly opened condition.

FIGURE 9 is a broken-away and side perspective view indicating the projection of jets of a cleaning liquid

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against a plate element which is mounted in upright position on the article-supporting rack of the unit.

FIGURE 10 is a broken-away end perspective cross-section view of the operating assembly of FIGURE 9.

FIGURE 10-A is a fragmentary view taken from a longitudinal upright plane through the longitudinal line 10-A—10-A in FIGURE 3.

FIGURE 10-B is a fragmentary central sectional end view taken from FIGURE 10.

Essentially, the features of a present cleaning unit 11 are provided in association with a rectangular upper liquid-holding basin 12 defined at the top part of the unit 11 and having mutually connected sides 13 and ends 14 extending from a bottom 15 in sealed relation thereto. The bottom 15 of the basin space 12' overlies and defines the top of a space 16 provided by a unitary base structure 17 which carries the basin 12 at a convenient height from a supporting floor surface, and the space 16 of the base 17 is jointly defined by side walls 18 and connecting ends 19 extending from a bottom 21 provided with unit-supporting caster wheels 22 depending therefrom adjacent the corners thereof. The base sides 18 provide access openings at which displaceable louvered ventilating closures 23 are suitably mounted, and the base space 16 accessibly contains mechanism for oscillatably supporting a workpiece-carrying rack 24 in the basin.

The work-mounting rack 24 comprises unitarily connected transversely aligned and parallel terminal and intermediate members 25 and 26 respectively having straight support portions 25' and 26' of like length integrally connecting upstanding side portions 25'' and 26'', whereby said members comprise U-shaped elements of the rack. The support portions 25' and 26' of the members 25 and 26 are unitarily connected in mutually aligned and spaced parallel relation by tie rods 27 mutually connecting them adjacent their upright parts to provide the rack 24 as a relatively rigid unitary assembly. As shown, the portions 25 and 26 of the rack 24 comprise shaped relatively rigid bars of uniform cross-section, with the tie members 27 comprising straight bars integrally connecting the portions 25' and 26' thereof, as by welding, at the under sides thereof, whereby elongated workpieces or containers thereof may be directly supported on and along the planar rack bottom jointly defined by the upper sides of the connected support elements 25' and 26' and between the side portions 25'' and 26'' of the respective elements.

Coaxial rack-support trunnions 28 extend oppositely toward the basin sides 13 from the side portions 25' of the rack elements 25 in the planes of the members, and comprise integral extensions from the tops of the member side portions 25' which are journaled in bearing-block members 29 fixedly carried at the tops of upright support rods 31 which depend therefrom through and from the basin bottom 15 to a suitable rod-reciprocating means provided within the base space 16. As is brought out in FIGURE 5, the present bearing blocks 29 provide upwardly-opening saddle grooves 29' which journal the trunnions 28 and removably carry transverse hold-down pins 29'' removably extending above and across the journaled trunnions for preventing an unseating thereof. Operator-protecting guard members 32 mounted on the basin sides 13 extend fixedly and inwardly into the basin space and provide downwardly-opening recesses 32' in which the bearing blocks 29 carried by the rods 31 are constantly enclosed from above. Sleeve members 33 guidedly receiving the rods 31 extend upwardly from the basin bottom 15 in fixed sealed relation thereto and to a point above the desired level of a cleaning liquid in the basin, whereby to prevent a gravity escape of the liquid from the basin about the rod.

It will now be noted that the present means for reciprocating the rack-supporting rods 31 comprises a rotary

electric motor 34 mounted on the base bottom 21 and having its shaft 34' disposed midway between and parallel to the planes of the rods 31 at the different rack ends and cooperatively connected with and between mutually parallel rock-shafts 35 journaled in bearings 35' mounted on the bottom 21. The shafts 35 provide radial arms 26 which are fixedly related to the shafts and are oscillatably swingable between limiting positions at opposite sides of the common horizontal plane of the shafts and are terminally connected with the bottom ends of the pairs of rods 31 for like movements of the rods in effectively upright lines. As shown, the motor shaft 34' is connected with a coaxial crank shaft 37 which provides offset crank pins at diametrically opposite sides thereof and from which connecting rods 38 of adjustable effective length extend to adjustable connections 38' (as by the indicated clevis-and-pin means) with arms 39 extending radially and fixedly upwardly from the rock-shafts 35 in perpendicular relation to the shorter arms 36 whereby a continuous rotation of the latter shaft by the motor 34 will rock the arms 36 for reciprocating the rods 31.

By particular reference to FIGURES 1 to 4 inclusive, it will now be noted that the rack 24 of the washing unit 11 is shown as carrying a dismantled and longitudinally collapsed Venetian blind assembly of a usual type comprising a workpiece W-1 carried thereon for its washing in the unit, with the operatively mounted said blind assembly comprising a usual set of like elongated slats S supported on laterally spaced cross-tapes (not shown) similarly connecting flexible tapes T which connect the opposite edges of an upper trunnion-carrying tilt-board U and a lower lift-board V opposite the longitudinal side edges of the slats on the cross-tapes. The bracket-mounted tilt-board U of the mounted blind assembly is tiltably controllable by a cord (not shown) extending around a pulley (not shown) fixed to an end of the board U coaxially thereof, and the lift-board V is supportable on lift cords (not shown) extending from pulleys above the mounted tilt-board and freely through interior cross-slots through the slats, all in a usual Venetian blind arrangement which permits the collapse of the assembly in its plane with a retention of the associated cords to provide the workpiece W-1.

By reason of the generally rapid up-and-down reciprocation provided for the rack 24, a means is preferably provided for securing workpieces in place on the rack bottom jointly provided by the portions 25' and 26' of the rack members 25 and 26. Accordingly, and as particularly shown, hold-down bars 41 are mounted on at least the upstanding portions 26' of selected intermediate rack members 26 for connecting said portions in more-or-less clamping position across a rack-mounted workpiece such as the illustrated collapsed Venetian blind W-1. As illustrated, a bar 41 essentially comprises a flat and relatively rigid strip of metal, or other suitable material, of slightly greater length than the distance between the portions 26' of the rack members 26 to be connected, with transverse holes provided in bar portions adjacent the bar extremities for simultaneously and freely receiving the upright portions 26' of rack members 26, it being understood that two or more hold-down bars 41 would be provided as elements of a work-supporting rack 24.

The lower ends of sleeve members 42 slidably mounted on the portions 26' of the intermediate rack elements 26 above the ends of an engaged bar 41 are arranged for their seated engagement with the opposed bar end portions, and carry set-screws 43 for operating against the received member portions while the bar clampedly and intermediately engages the upper edges of the tilt-boards U and lift-boards V of one or more supported collapsed Venetian blinds, comprising the workpieces W-1 and having their tilt and lift boards of like width. In this manner, a desired amount of relative freedom is providable for the blind slats between the tilt-board U and a cooperatively lift-board V for facilitating the access of the treating

liquid to the slat and tape surfaces and to the control cords which are conveniently disposed transversely outwardly of said boards. Also, for facilitating their use with elongated workpiece articles of various dimensions, the hold-down bars 41 are shown as being formed with straight intermediate work-engaging offset portions which are parallel to the plane of the connected bar ends, it being understood that bars 41 may be applied to and across horizontally disposed workpieces W-1 on the rack with its intermediate portion either above or below said plane.

When a Venetian blind, comprising the workpiece W-1, and having the described usual characteristics, is fully collapsed longitudinally thereof, the slats S thereof are in mutually transverse parallel opposition in transverse relation to a common plane, and are then mutually spaced by at least the thickness of the cross-tapes and of the inwardly-directed folds of the tapes T, whereby a collapsed and dismantled blind assembly immersed in a treating liquid in the basin 12 is subject to a working penetration and flow of the liquid between and laterally across the slat side faces. It will be further understood that, particularly by reason of the sloshing or "dunking" motion produced on a workpiece W-1 comprising a collapsed blind mounted on the vertically reciprocating rack 24, such an up-and-down movement of a rack-mounted blind workpiece W-1 in a required charge of liquid in the basin 12 assures a complete working contact of the liquid with all surfaces of the blind assembly for assuring a uniform treatment thereof by a treating liquid, which liquid may comprise or contain a detergent or a dyeing ingredient, or comprise only a rinsing liquid.

By particular reference to FIGURES 5 to 7 inclusive, it will now be noted that the present washing unit is also readily adaptable for providing a washing or other liquid treatment of decorative drapes or the like, and particularly laterally collapsed units of a fiberglass fabric or other relatively fragile materials. Because of the relative flexibility of drapery fabrics, one or more laterally collapsed drapery units of a usual pleated structure having their pleats brought close together to provide collapsed workpiece units W-2 are disposable in a suitable cage member 51 which is arranged to receive one or more of the collapsed drapery units and be mounted on the present rack 24. As particularly shown, the cage member 51 has a rigid frame of rectangular form mounting side and end and bottom panels 52 and 53 and 54, respectively, of mesh material and provided with a free lid 55 comprising a rigid rectangular frame enclosing a relatively rigid liquid-pervious mesh panel for placement within the cage 51 from its open top and with the lid 55 disposed and held upon the enclosed drapery units W-2 by means of one or more installed hold-down bars 41, as for collapsed rack-mounted Venetian blinds comprising workpieces W-1.

The illustrated article-washing basin 12 has been designed and proportioned to freely receive longitudinally collapsed Venetian blind workpieces W-1 having like slats S of appropriate lengths for use opposite and across wall openings of usual width and to receive laterally collapsed drapery workpieces W-2 of usual heights, but a lengthened basin space 12' may sometimes be needed for longer workpieces. Accordingly, the basin sides 13 are formed with oppositely upturned flanges 13' and 13'' at their top and end edges respectively, and are integrally connected to the sides of the bottom 15 which is provided with downwardly-directed end flanges 15' continuous with the end flanges 13'' of the sides 13. Noting that the present basin ends 14 comprise flat plates releasably fixed in sealed relation to the top and end flanges 13' and 13'' of the basin sides and the bottom end flanges 15' by bolts 45 or the like extending through and along registering flange openings and clampedly fixing the ends 14 to the basin bottom and sides, it will be understood that one or both of the flat basin ends 14 may be readily replaced with a tank-extending section (not shown) pro-

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viding a closed end sealedly and unitarily connecting side and bottom portions of like length and provided at its open end with coplanar outturned flanges corresponding to the flanges 13' and 13'' and 15' of the present basin assembly, whereby substituted basin-extending sections would provide an increased basin capacity for longer workpieces and more treating liquid as needed, all without effecting the construction or size or operation of the rack 24 and the reciprocating means therefor, while avoiding the use of unnecessarily large charges of the treating liquid within the unextended basin.

While the described Venetian blind and drapery workpieces W-1 and W-2 comprise collapsible flexible articles for cleaning, it will be noted that a present unit is also adapted for use in washing other workpieces mounted on the rack 24. Thus, and as particularly illustrated in FIGURES 9 and 10B inclusive, a means is provided for adapting a present washing unit to the cleaning of elements or assemblies such as more-or-less elongated panes or panels of rigid translucent light-diffusing material used in lighting fixtures; as particularly shown, the present washing unit is arranged for the spray washing of a workpiece W-3 comprising a light-diffusing pane P of a lighting fixture (not shown).

For supporting a workpiece W-3 on the rack 24, a support base structure 61 is provided and includes a channel member 62 having its web portion 62' mounting elongated like U-shaped members 63 having their intermediate portions 63' flat and intermediately fixed to and across and beneath the web portion 62' of the channel member 62 at spaced points therealong, with the mutually opposed end portions 63'' of the member 63 downturned and so spaced as to closely and spaningly engage the longitudinal rods 38 at the bottom of the rack 24 for mounting the pane-support assembly 61 on the rack. As indicated, the upwardly-opening groove of the member 62 defined between the flanges 62'' thereof is preferably at least as wide as the effective thickness of the offset edge portion P' of a pane P to be received therein and a blocking strip (not shown) of resiliently yielding material may be provided and compressedly applied between a flange 62'' and the opposed face of the received pane edge portion P' for securing the installed workpiece pane W-3 in fixed upright relation to the mounting member 62, and within a splash-catching hood 65 for retaining deflected liquid mounted on the outturned top-edge flanges of the basin sides 13, and having a hingedly attached front closure 65'.

A workpiece pane P secured on the rack 24 in fixed upright position is arranged to have jets of cleaning liquid directed transversely against it from opposite sides thereof for cleaning the pane of a workpiece W-3, and the splash-catching and downwardly-opening hood 65 of suitable form is preferably mounted on the planar top rim of the basin 12 for laterally enclosing the upper portion of a workpiece W-3 during its cleaning. As shown, the hood 65 interiorly and fixedly mounts a suitable U-shaped manifold pipe 66 providing jet nozzles 67 for discharging jets of a cleansing liquid transversely against both sides of a pane or panes mounted on the rack 24, and the present manifold pipe is of U-shaped planar form and is suitably fixed to and within the hood at and along two sides and an end thereof, with the nozzle-directed jets discharging transversely against panes P mounted on the rack. The cleansing liquid projected from the nozzles 67 against panes P mounted on the rack 24 is derived from the liquid charge in the basin 12 by effecting a pressure recirculation of the liquid to the manifold pipe 66 through a pumping unit 68 comprising a pump 68' and an electric drive motor 69 mounted on the bottom 21 of the space 16 of the base 17.

As is brought out in FIGURES 2 and 3 and 10 and 10-A, a pipe 71 leads downwardly from a strainer 71' at an outlet opening in the basin bottom adjacent the

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pumping unit 68 to the intake of the pump 68' in sealed relation to the bottom, and a closing plug (not shown) of resilient material is preferably provided for application at said opening when the pumping unit 68 is not in use. A discharge pipe 72 extends from the pump through the basin bottom in sealed and upwardly-extending relation thereto, and the extending upper end of the pipe 72 is arranged for its sealed connection, when the hood 65 is cooperatively mounted upon the basin, by a suitable coupling means 73 with a riser pipe 74 depending from the hood-mounting manifold pipe 66. As particularly indicated, the coupling means 73 comprises a tubular member of resilient material coaxially mounted on the extending end of the pipe 72 in fixed sealed relation thereto and to the pipe 72 and having the upper portion of its bore arranged to grippingly and removably receive the lower end of the riser pipe 74 for sealedly connecting the ducts of the connected pipes 72 and 74 when the hood is seated upon the basin rim.

It will now be noted that while the hood 65 is dismounted from the basin 12 for a use of the present washer unit with workpieces not requiring the jet application thereto of a treating liquid, the upper end of the bore of the coupling member 73 is closable by a suitable plug (not shown), or left open for the recirculation of the liquid charge in the basin by operating the liquid-circulating motor 69. The basin 12 is conveniently chargeable with a treating liquid through a hose (not shown) delivering the liquid thereto over the basin rim, and the basin may be drained of the treating liquid therein at a suitable valved outlet 76 in the bottom 15, preferably at the opposite end thereof from the coupling 73 for facilitating a clean draining of the basin. Power for mutually independent actuations of the rack-oscillating motor 34 and of the pump-operating motor 69 is under control of switches 77 and 78 which are conveniently locatable on a side wall 18 of the basin-supporting base 17, and a suitable power connection 79 is shown as provided on the same basin wall for connecting the motor control switches 77 and 78 in parallel with a common power circuit (not shown) for the motors.

When mounted on the basin 12, the hood 65 provides a means for positively engaging the top portion of a workpiece pane P carried on the rack 24 against transverse movements thereof, and the present such means comprises a channel element 81 disposed beneath a central horizontal top portion 65'' of the hood in lateral guiding relation to the pane and having its trough directed downwardly for positionably receiving and positioning the upper portion of the pane edge top P'. Since, however, rack-carried workpiece panes P may vary somewhat in their effective heights from the support rack channel 62, the channel element 81 is shown as depending from and beneath the top portion 65'' of the hood to gravitally ride on the upper portion of the pane edge P'. As particularly shown, the laterally acting guiding means for the element 81 comprises lower and upper angle members 82 and 83 having flange portions 82' and 83' suitably fixed to and along the web portion of the pane-supported element 81 and the top portion 65'' of the hood 65 respectively, with their other flanges 82'' and 83'' upright and retained in adjustable opposition by means of bolts 84 connecting the flanges at registering upright slots there-through, whereby the untightened bolts may provide for an up-and-down guided movement of the flange 82'' in a fixed plane with respect to the hood-mounted flange 83'' during a reciprocative movement of the pane-carrying rack 24.

Understanding that the impact of jets discharged from the nozzle 67 of the manifold pipe 66 will tend to transversely vibrate a workpiece pane P mounted on the rack 24 in the described manner, while striking the pane at substantially fixed points thereof, it will be understood that the simultaneous imparting to the rack and pane of the up-and-down movement provided therefor will

generally assure a more effective treating application of the liquid to the pane sides, whereby the simultaneous use of the rack-oscillating means with the bolts 84 just tight enough to provide for a free relative sliding engagement of the flanges 82" and 83" will usually be desirable. However, for treating rack-mounted panes while the rack is static, the bolts 84 engaged through the flanges 82" and 83" may be tightened to fixedly space the channel webs for facilitating the reception of workpiece panes P of a particular width between the pane edges to be received in the lower and upper channel elements 62 and 81. In the latter event, and as shown in FIGURES 10 and 10-B, the flanges of the different opposed and mutually adjusted channels 62 and 81 may have different widths with the respective outer and inner flanges thereof narrower for facilitating the dismounting and mounting of a pane P between the elements 62 and 81 while the side-access hood closure is in open position.

In view of the foregoing descriptions of certain embodiments of my invention, and the features and some typical uses thereof with appropriate adaptations for different types of articles, it will be understood that the rack 24 which is vertically oscillatable in a charge of treating liquid in the basin 12 which is provided with a straining and circulating means for the continuous use of an original liquid charge, is equally utilizable and adaptable for the described and illustrated liquid treatments of such building accessories as Venetian blinds and drapes and light-diffusing plates of light fixtures, as well as for corresponding treatments of other elements which lend themselves to liquid treatments by similar operations. Also, while the applied treating liquid might most usually comprise a washing liquid of detergent qualities, it will be understood that the present machine is generally adaptable to the application of dyeing or coating liquids, whereby the provision for the continued use of an original liquid charge in the basin is both practically and economically advantageous and desirable. Accordingly, it will be understood that the stated and other objects of my invention are accomplishable in particularly facilitated and efficient manners by the use of the disclosed arrangements.

From the foregoing description taken in connection with the accompanying drawings, the advantages and general utility of the present washing unit assemblies will be readily understood by those skilled in the art to which the invention appertains. While I have shown and described a basic structure and adaptations thereof which I now consider to comprise preferred embodiments of my invention, I desire to have it understood that the disclosures are primarily illustrative, and that such changes and developments may be made, when desired, as fall within the scope of the following claims.

I claim:

1. In a machine for continuously applying a treating liquid to a unitary workpiece, a tank providing a basin adapted to contain a charge of the liquid, a relatively rigid

open rack mounted in the tank basin for its up-and-down movement in a liquid charge therein and adapted to support a said workpiece, at least two side rods of the rack extending upwardly from opposite rack side points, a clamp member replaceably and adjustably carried by a said side rod of the rack for cooperation with a workpiece mounted on the rack for clampedly engaging and securing the rack-carried workpiece in fixedly secured relation upon the rack, and a power-actuated means on the machine beneath the basin bottom cooperative with said side rods of the rack for continuously supporting and oscillating said rack in solely an up-and-down direction through a charge of the treating liquid in the basin and comprising support rods extending upwardly through the basin bottom to a supporting contact with upper points of the side rods of the rack and disposed through upstanding and imperforated guide sleeves extending above the liquid level in the basin in liquid-retaining sealed relation thereto.

2. In a machine for continuously applying a washing liquid to a unitary workpiece, a tank providing an elongated basin adapted to contain and retain a charge of the liquid, a relatively rigid open workpiece supporting rack mounted in the tank basin for an up-and-down sloshing movement of a carried workpiece in a liquid charge in the basin, at least two pairs of side rods extending upwardly from mutually opposite rack sides, support rods extending upwardly through the basin bottom to supporting contacts with the side rods of the rack and disposed through mutually parallel upstanding and imperforate guide sleeves extending above the liquid level in the basin bottom in liquid-retaining sealed relation thereto to supportedly engage said side rods above said liquid level, and a power-actuated means on the machine cooperative with said support rods for similarly supporting and continuously reciprocating the rack by reason of the engagement of the support rods with side rods of the rack.

3. The combination of claim 2 having hold-down members adjustably carried by the said side rods of the rack for cooperation with the rack-mounted workpiece to fixedly secure the engaged workpiece to the rack.

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