Dec. 20, 1966 B. J. WINDORF 3,292,196

AUTOMATIC WINDOW WASHER DEVICES

Filed June 22, 1964 4 Sheets-Sheet 1

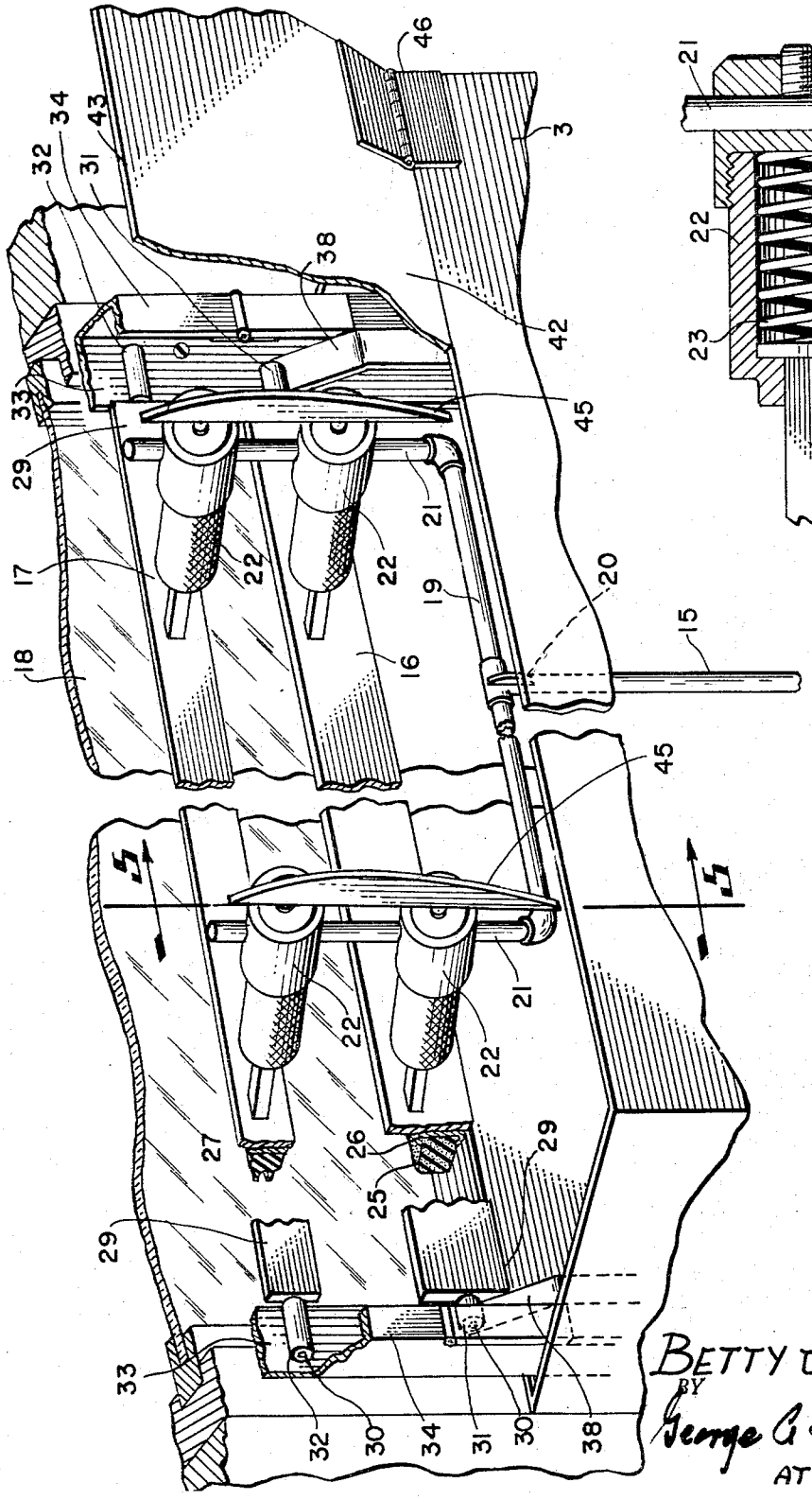


Fig. 1

Fig. 5

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AUTOMATIC WINDOW WASHER DEVICES

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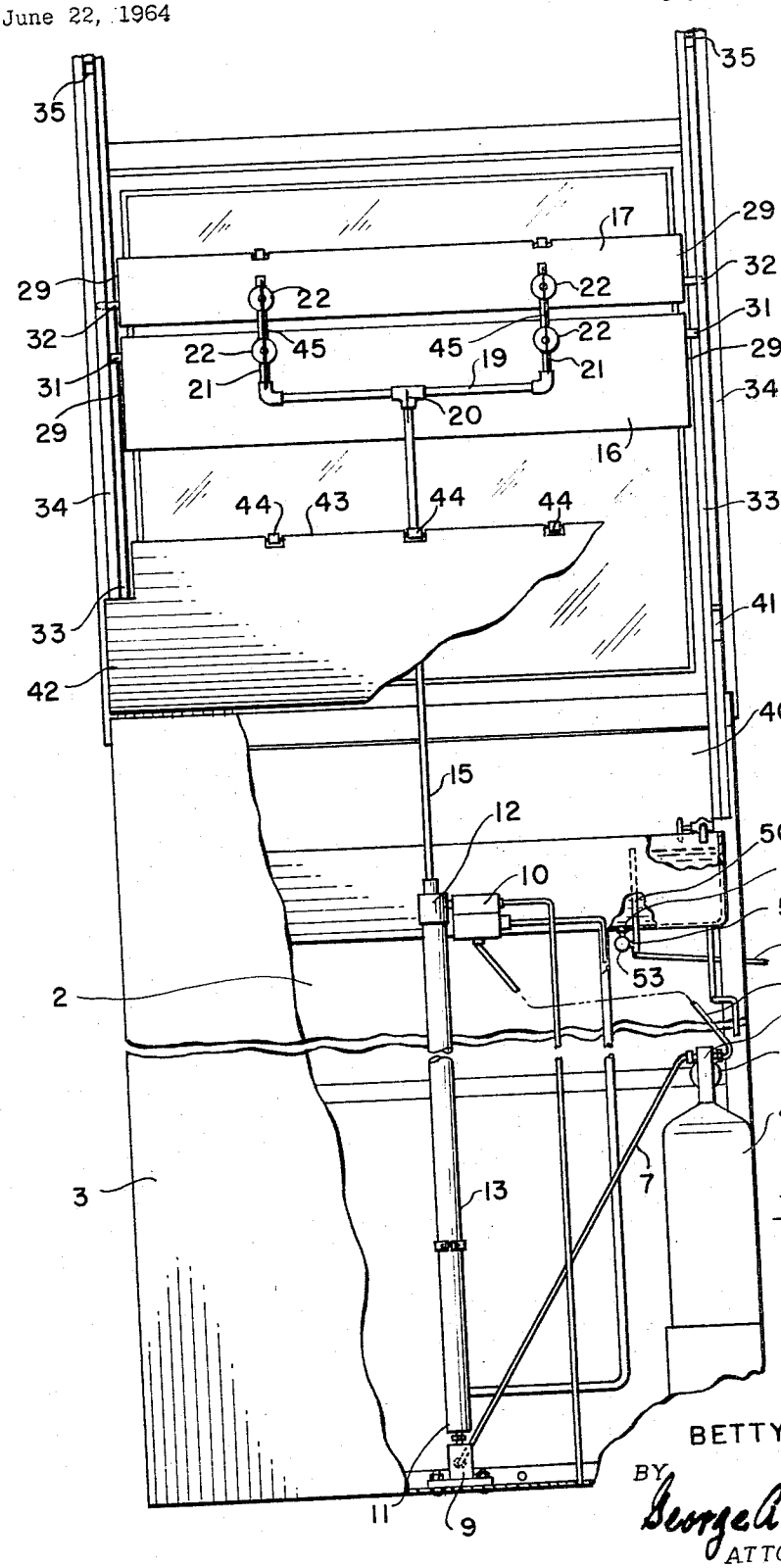


Fig. 2

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AUTOMATIC WINDOW WASHER DEVICES

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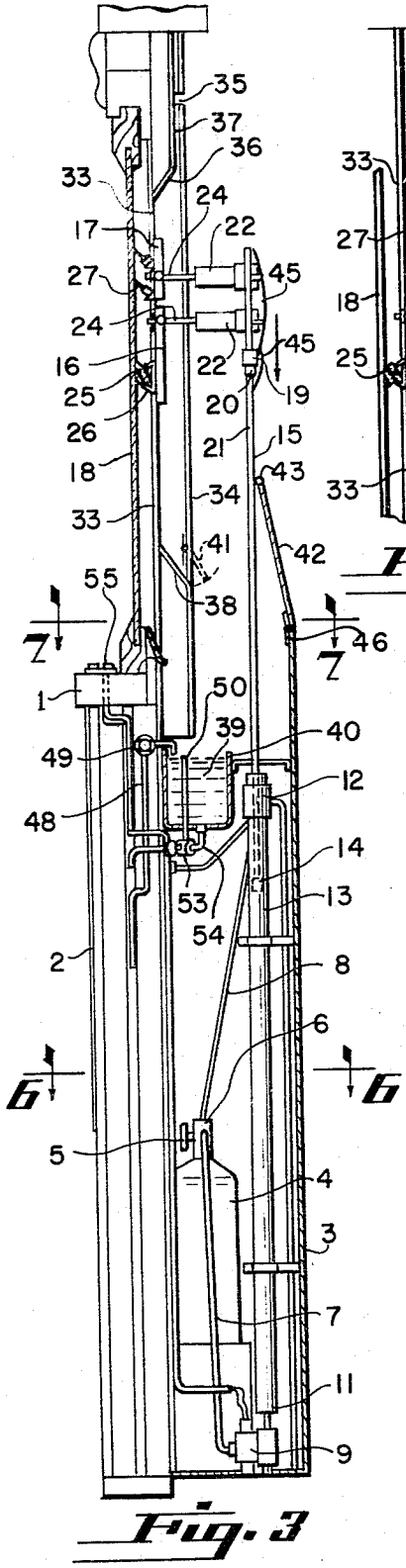


Fig. 3

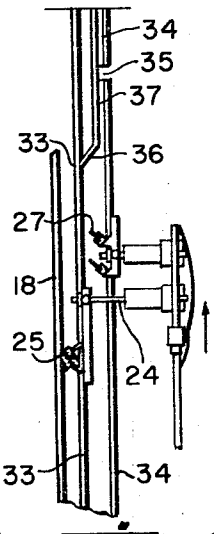


Fig. 4

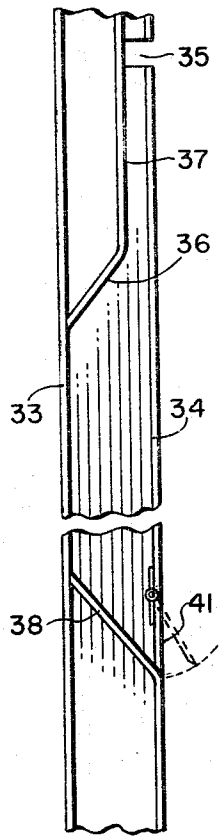


Fig. 8

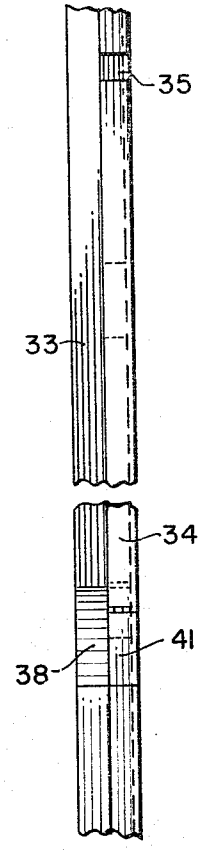


Fig. 9

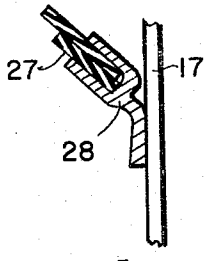


Fig. 10

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AUTOMATIC WINDOW WASHER DEVICES

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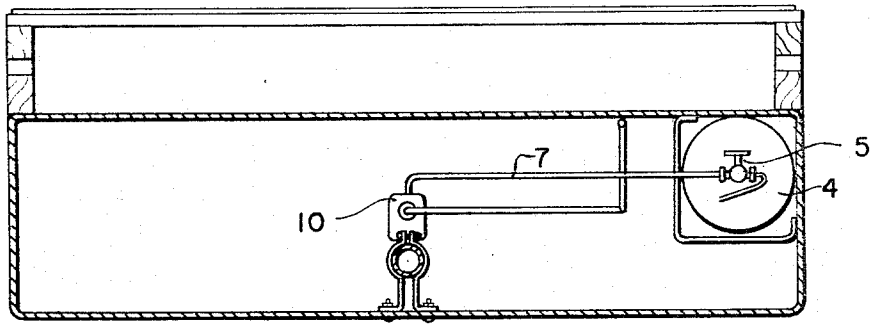


Fig. 6

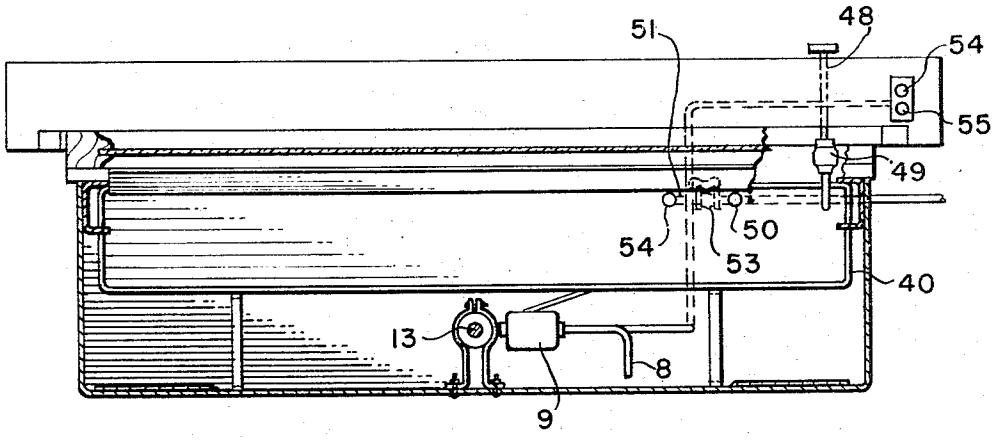


Fig. 7

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United States Patent Office 3,292,196
Patented Dec. 20, 1966

3,292,196

AUTOMATIC WINDOW WASHER DEVICES

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Filed June 22, 1964, Ser. No. 376,756
10 Claims. (Cl. 15—103)

My invention relates to the type of window washer devices that are used to clean the exterior of window glass by remote control from the inside of the window glass.

It is an object of my invention to provide a device whereby one side of a pane of glass can be washed and squeegeed from the other side by remote control.

Another object of my invention is to provide an automatic window washer device whereby cleaning fluid is distributed over the surface of a pane of glass by an upward wiping action and in sequence removing the cleaning fluid by a downward action to wipe off the fluid and dry the surface of the pane of glass being washed.

A further object of my invention is to provide a window washer device and a protective storage cabinet for it that is secured exterior of a window.

Generally, it is an object of my invention to provide a remote controlled mechanical device whereby cleaning fluid is sponged on a pane of glass by one pass of the sponge and then in sequence responge and squeegee the pane of glass on a return pass.

These and other objects will become apparent from the specifications and the drawings comprising this application. The same indicia are used throughout for similar parts of my invention.

In the drawings:

FIGURE 1 is a fragment in perspective showing the squeegee and sponge bars, guides and cabinet.

FIGURE 2 is a plan in elevation showing the outside of a window with my washer attached thereto.

FIGURE 3 is a side view of my window washer attached to the exterior of a window.

FIGURE 4 is a fragmentary section showing the position of a sponge and squeegee during an upward stroke.

FIGURE 5 is a plan in section of one of the mountings for the sponge and squeegee bars taken on line 5—5 of FIGURE 1.

FIGURE 6 is a top plan view looking down on line 6—6 of FIGURE 3.

FIGURE 7 is a top plan looking down on line 7—7 of FIGURES 1 and 3.

FIGURE 8 is a side elevation of guide rails.

FIGURE 9 is a front elevation of guide rails.

FIGURE 10 is an end elevation of a squeegee showing the addition on the ends of the separate flexible squeegee.

Referring to FIGURE 2, there is illustrated an exterior of a window and its frame. Underneath a sill 1 of the window on the inside there is a removable panel 2 for access to a storage space for elements (to be explained) of my window washer. Secured to the exterior of a building structure is a cabinet 3 that houses a compressed air storage cylinder 4 and other elements of my window washer. While I have used an air cylinder to describe my invention it will readily occur to anyone skilled in the art to substitute air or other hydraulic fluid lines that are connected to a common air or hydraulic fluid supply storage tank remote from the windows. When my window washers are applied to a multiple of windows in a building each window will have its own complete window washer. Secured to the compressed air storage cylinder there is a master air supply control valve 5 connected to a fitting 6 secured on the air storage cylinder. Air pipe lines 7 and 8 connect the air storage cylinder to solenoid valves 9 and 10 that alternately by remote electrical control admit air into a bottom 11 or a top 12 through pipes connected to an actuating cylinder 13 that has a reciprocable piston

14 secured to an end of an elongated piston rod 13. The electrical circuit can be arranged to allow the piston to pass in a continuous cycle from down to extreme up and back to rest in a down position. This piston rod actuates a sponge bar 16 and a squeegee bar 17 together simultaneously upwards and or downwards over the surface of a window pane 18. A U-frame 19 is secured to the upper end 20 of the piston rod.

Secured to the vertical arms 21 of the U frame are hollow cups 22 in which are confined compression springs 23 that exert pressure on slidable plungers 24 to force the plungers in the direction towards the window pane. The sponge and squeegee bars are secured to the exterior ends of the slidable plungers which move the bars to and from a window pane. A sponge 25 is secured to the sponge bar within clamps 26 fixed on a face of the sponge bar. The squeegees 27 are secured to the squeegee bar by adjustable clamps 28 and the squeegees are shorter than the space between the side frames of the window pane. Separate flexible extensions to insure cleaning of the window pane up to the moulding are attached to the squeegee ends as shown in FIGURE 10.

The sponge bar and the squeegee bar are arranged to slide independently each to the other to and from the window pane. The sponge and squeegee bars extend across the width of a window pane. Fixed in ends 29 of the bars are studs 30 upon which are rotatable rollers 31 and 32. The distance between the outer faces of the rolling surfaces of the rollers 31 is less than the distance between the outer faces of the rollers 32 to allow the rollers 31 to roll on guides 33 that are positioned on a lower plane level in relation to guides 34 for the rollers 32. There are two guides 33 one on each side of the window and two guides 34 one on each side of the window. The guide 33 allows the sponge to be in contact and wipe the window pane during the upward and the downward strokes while the guides 34 keep the squeegees away from the window pane during the upward strokes as illustrated in FIGURE 4. In the uppermost ends of the guides 34 there are openings 35 through which the rollers 32 pass to allow them to first drop and roll on raised surfaces 37 intermediate of guides 33 and 34 at the instant that the bars reach the end of the upward stroke. Descending slopes 36 are provided between the raised surfaces 37 and guides 33 to bring the rollers 32 on the squeegee bar in the same plane as the guides 33 and thereby bring the squeegees gradually into wiping contact on the window pane after its rollers pass through the opening 35 and descend on to the surfaces 33 during the downward stroke. The spring actuated plungers force the squeegee bar towards the window pane at all times and consequently keep the rollers 31 and 32 against the guide surfaces at all times during the upward and/or downward movement of the bars by the action of the piston and piston rod.

Another sloping surface 38 connects the surface 33 with the surface 34 and is the means for pulling the squeegee bar rollers and the sponge bar rollers back into the plane of the guide surface 34 just prior to the time they come to rest. While at rest the sponge will be immersed in the cleaning fluid 39 in a reservoir 40.

A portion of the surfaces 34 have hinged flaps 41 to allow the rollers to come out from the surfaces 33 and back into the plane of the surfaces 34 just prior to coming to rest on the downward stroke. After the roller gets back on to the plane and surface 34 during the downward stroke the flaps drop back into place, close the openings and thereby provide continuous plane surfaces 34 for the rollers 32 during the upward stroke of the squeegees bar. During the upward stroke the rollers 31 on the sponge bar will roll back over the sloping surface 38 towards the pane but the rollers 32 will remain on the guide 34.

The cabinet 3 has a hinged self-closing cover 42 that has rotatably secured in an end 43 rollers 44 that rotate on cam guides 45 secured to the U frame and piston rod. The cover is opened by the upward motion of the piston rod and closes down over the cabinet when the piston rod with the sponge and squeegee bars come to rest within the reservoir that is also within the cabinet. The cover has a spring hinge 46 that keeps the rollers in the end of the cover in contact with the cam surfaces and piston rod to insure that it will drop down and close the cabinet after completing a cycle of washings.

A water supply line 48 connects to the reservoir and the amount of water supplied to the reservoir is controlled by a valve 49 which is used to wash the inside of the reservoir. Internally of the reservoir there is a standpipe 50 that automatically limits the level of the liquid in the reservoir. The overflow standpipe is connected into a fitting 51 that leads to a drainpipe 52 which is connected to a downspout (not shown). Connected to the fitting 51 is another valve 53 which opens and closes a drainpipe 56 in a bottom of the reservoir. To wash and drain the reservoir the valve 53 is opened and liquid within the reservoir runs off through the drainpipe 52.

Mounted on the window-sill are two control buttons 54 and 55. The buttons are connected to and close electrical switches (not shown) that close electric circuits that supply energy to and actuate the solenoid valves to admit compressed air or hydraulic liquids into the actuating cylinder thereby causing the piston and connecting rod to move the sponge and squeegee bars up or down depending upon which of the two switch buttons are pressed to close the electrical circuits.

Preparatory to washing a window the reservoir is filled with a standard window cleaning liquid of the anti freeze type to the top of the overflow standpipe. Under normal conditions the reservoir will be kept full with the cleaning fluid. The sponge is down in the reservoir and will become saturated with the window cleaning liquid. The up button is depressed and the switch is thereby closed thereby energizing the solenoid which opens the compressed air valve located at the bottom of the actuating cylinder and the compressed air forces the piston with its rod upward as long as the button is depressed. During the upward movement the bars will raise the cover 42 and the rollers in it will ride on the cam surfaces. The cover will remain at an angle as shown in FIGURE 3 during the entire window washing operation. During the upward stroke the rollers on the sponge bar will first roll on the guide surfaces 34 and on surfaces 38 and then on guide surface 33 and the spongle will then come in contact with the glass surface. At the same time the rollers on the squeegee bar will roll on the guide surfaces 34 all the way up to the top of the guide surface. Since the hinge flap 41 is closed the rollers 32 will remain in the plane of the guide surfaces 34 and keep the squeegees away from the glass until the rollers reach the opening at the top of the guide. A vertical scrubbing action by the sponge if desired can be given to the window by alternately pressing the up and down buttons 54 and 55 to impart an up and down jiggling action to the piston rod. The scrubbing action can be affected over short or long distances anywhere between the bottom of the guides and the top openings in the guide 34. The scrubbing action can also be accomplished when the sponge and squeegees are in contact with the glass. When the piston reaches the upper limit of its stroke the circuit to the solenoid supplying compressed air for the up stroke will be de-energized by a limit switch (not shown). This will occur at the instant that the rollers 32 pass through the openings 35 in the guide 34. The rollers will then be forced into contact with the guide surface 37 preparatory to the downward stroke. The down button 55 is actuated to close the switch to the solenoid actuated valve that admits compressed air into the top of the actuating cylinder which will cause the piston and rod to pull the sponge and squeegee bars downward. During the downward stroke the sponge and squeegee bars will be in the same vertical plane because their rollers are rolling on the guide 33 and the sponge and squeegees will be in contact with the glass at the same time. Just prior to the end of the downward stroke the rollers 31 and 32 on the squeegee and the sponge bars will run on the slope 38. The rollers 32 will pass through the hinged flap opening and roll back on to the guide surface 34 while the rollers also come on to the plane of guide 34 for the next upward stroke. The instant that the rollers 32 leave the opening the hinged flap 41 will drop to the level of guide surface 34 and close the opening. Upon reaching the limit of the downward stroke the air will be cut off from the actuating cylinder and the sponge and squeegee bars will come to rest. The sponge will be at rest and immersed in the window cleaning liquid. The cover to the cabinet will have closed down over the squeegee bar, the reservoir and other parts and protect all of the parts of the window washer from the elements and dust in the atmosphere.

Having thus described my invention I claim:

1. A cleaning device for a window pane comprising an hydraulically actuated means, limit switch means adapted to automatically move said hydraulically actuated means through a continuous upward and downward movement; a sponge in contact with pane during said upward and downward stroke of said hydraulically actuated means on a support means movably supported on said hydraulically actuated means adapted to reciprocate perpendicularly to said hydraulically actuated means and a squeegee adapted to be held from contact with said pane during the upward stroke and in contact with said pane during the downward stroke of said hydraulically actuated means having support means movably supported on said hydraulically actuated means adapted to reciprocate perpendicularly to said hydraulically actuated means and window pane and parallel to said sponge support means during an up stroke and a down stroke of said hydraulically actuated means.

2. A cleaning device for a window pane comprising an hydraulic cylinder and a piston slidable in said cylinder with an elongated piston rod extending exterior of an end of said cylinder; a piping system having electrically actuated valves to automatically regulate alternately the flow of hydraulic fluids into end chambers of said cylinder to actuate said piston and rod in a continuous up and down stroke in a vertical plane; a sponge secured to a bar, said sponge and bar being reciprocably supported on said piston rod and adapted to move at an angle to said piston rod while said sponge on said bar is moved to and from said window pane, said sponge adapted to be held resiliently in contact with said pane during the up and down stroke; and a multiplicity of squeegees supported on another bar that is reciprocably supported on said rod adapted to move at an angle to said piston rod and parallel to said bar supporting said sponge during the up and down strokes of said piston rod and away from said pane during the up stroke and in contact with said pane during the down stroke.

3. A cleaning device for a window pane comprising an hydraulic cylinder and a piston slidable in said cylinder with an elongated piston rod extending exterior of an end of said cylinder; a piping system having electrically actuated valves positioned exterior of and adjacent to ends of said cylinder to regulate the flow of hydraulic fluids into end chambers of said cylinder to actuate said piston and rod in a continuous up and down movement in a vertical plane; a sponge secured to a bar, said sponge and bar being reciprocably supported on said piston rod and adapted to move at an angle to said piston rod while said sponge on said bar is moved to and from said window pane, said sponge adapted to be held in contact with said pane during the up and down movement of said rod;

and a multiplicity of squeegees supported on another bar that is reciprocably supported on said rod adapted to move at an angle to said piston rod and parallel to said bar supporting said sponge during the up and down strokes of said piston rod, said squeegee support bar and sponge support bar being slidable relative each to the other and perpendicular to said window pane, and said squeegees adapted to be held from contact with said pane during the upward movement of said piston rod.

4. A cleaning device for a window pane comprising an hydraulic cylinder and a piston slidable in said cylinder with an elongated piston rod extending exterior of an end of said cylinder; a piping system having electrically actuated valves positioned exterior of and adjacent to ends of said cylinder to regulate the flow of hydraulic fluids into end chambers of said cylinder to actuate said piston and rod in a continuous up and down movement in a vertical plane; a sponge secured to a bar, said sponge and bar being reciprocably supported on said piston rod and adapted to move at an angle to said piston rod while said sponge on said bar is moved to and from said window pane, said sponge adapted to be held in contact with said pane during the up and down movement of said rod; and a multiplicity of squeegees supported on another bar that is reciprocably supported on said rod adapted to move at an angle to said piston rod and parallel to said bar supporting said sponge during the up and down strokes of said piston rod, said squeegee support bar and sponge support bar being slidable relative each to the other and perpendicular to said window pane, and said squeegees adapted to be held from contact with said pane during the upward movement of said piston rod while reciprocating relative to said piston rod and said window pane.

5. An hydraulically actuated device for cleaning a window comprising a reciprocating piston rod, a sponge bar and a squeegee bar supported on said piston rod each of said bars adapted to reciprocate at an angle to the piston rod and parallel each to the other; guide means to keep the sponge bar and the squeeegee bar in different vertical planes during an up stroke of said piston rod and other guide means to position said sponge bar and squeegee bar in the same vertical plane during a downward stroke of said piston rod.

6. A cleaning device for washing a window pane with liquids comprising an actuating cylinder having a piston on an elongated piston rod adapted to reciprocate up and down in a vertical plane; a piping system connected to said cylinder to supply hydraulic fluids to said cylinder and actuate said piston and rod up and down; electrical solenoids to actuate valves positioned at ends of said cylinder to control the flow of said hydraulic fluids into ends of said actuating cylinders to cause said piston rod to reciprocate up and down in continuous movement in a vertical plane; push button switches in an electrical circuit to said solenoids to selectively control the flow of hydraulic fluids into said cylinder to actuate said piston rod up and down in a vertical plane; a sponge for applying the liquids to the surface of said pane secured on a sponge bar secured on said piston rod adapted to reciprocate at an angle to said piston rod, said sponge adapted to be held resiliently in contact with said pane during the movement up and down of said piston rod; rollers rotatably mounted on ends of said sponge bar and guide surfaces to keep the said sponge in rubbing contact on a window pane during an up and down stroke of the piston rod; a squeegee bar with a multiplicity of squeegees secured thereto, secured on said piston rod and adapted to reciprocate at an angle to said piston rod and parallel to said sponge bar during the up and down movement of the piston rod; rollers rotatably mounted on ends of said squeegee bar and other guide surfaces to keep said squeegees in a different vertical plane from said first guide surfaces for said sponge bar to keep said squeegees from contact with said window pane during an up stroke of said piston rod and intermediate guide surfaces to direct the squeegees on their said bar onto the said first guide surface to bring the squeegees into the same plane with the sponges and on to the surface of the window pane during a down stroke of the piston rod to squeegee the liquid from the surface of the pane.

7. A cleaning device for washing a window pane with liquid comprising an actuating cylinder having a reciprocatable piston secured on an elongated piston rod adapted to reciprocate up and down with said piston in a vertical plane; a piping system connected to said cylinder to supply hydraulic fluids to said cylinder and actuate said piston and rod up and down; electrical solenoids to actuate valves positioned at the ends of said cylinder to control the flow of said hydraulic fluids into ends of said actuating cylinders to cause said piston rod to reciprocate up and down in a vertical plane; push button switches in an electrical circuit to said solenoids to selectively control the flow of hydraulic fluids into said cylinder to actuate said piston rod up and down in a vertical plane; a sponge for applying said liquid to the surface of said pane secured on a sponge bar, said sponge bar being secured on said piston rod and adapted to reciprocate at an angle to said piston rod; rollers rotatably mounted on ends of said sponge bar and said rollers rotatable on guide surfaces to keep the said sponge in rubbing contact to apply liquid on a window pane during an up and down stroke of the piston rod; a squeegee bar with a multiplicity of squeegees secured thereto, secured on said piston rod and adapted to reciprocate at an angle to said piston rod and parallel to said sponge bar; other rollers rotatably mounted on ends of said squeegee bar and said rollers rotatable on other guide surfaces to keep said squeegees in a different vertical plane from said first guide surfaces to keep said squeegees from contact with said window pane during an up stroke of said piston rod and intermediate guide surfaces to direct the squeegees on their said bar onto the said first guide surfaces to bring the squeegees into the same plane with the sponges and on to the window pane during a down stroke of the piston rod to squeegee the liquid from the surface of the pane; and offset extensions of said first guide surfaces to bring the sponge and squeegee bars into the same plane as that of the other guide surfaces during a down stroke of said piston rod.

8. A cleaning device for a window pane comprising an actuating cylinder having a piston on an elongated piston rod adapted to reciprocate up and down in a vertical plane; a piping system connected to said cylinder to supply hydraulic fluids to said cylinder and actuate said piston and rod; electrical solenoids to actuate valves to control the flow of said hydraulic fluids into ends of said actuating cylinders to cause said piston rod to reciprocate up and down in a vertical plane; push button switches in an electrical circuit to said solenoids to selectively control the flow of hydraulic fluids into said cylinder to actuate said piston rod up and down in a vertical plane; a sponge secured on a sponge bar secured on said piston rod adapted to reciprocate at an angle to said piston rod; rollers rotatably mounted on ends of said sponge bar and guide surfaces to keep the said sponge in rubbing contact on a window pane during an up and down stroke of the piston rod; a squeegee bar with a multiple of squeegees secured thereto, secured on said piston rod and adapted to reciprocate at an angle to said piston rod and parallel to said sponge bar; rollers rotatably mounted on ends of said squeegee bar and other guide surfaces to keep said squeegees in a different vertical plane from said first guide surfaces to keep said squeegees from contact with said window pane during an up stroke of said piston rod and intermediate guide surfaces to direct the squeegees on their said bar onto the said first surfaces to bring the squeegees in the same plane with the sponges and on to the window pane during a down stroke of the piston rod; and offset extensions of said first guide surface to bring the

sponge and squeegee bars into the same plane as that of the other guide surfaces during a down stroke of said piston rod; and a reservoir for cleaning fluids adapted to receive and retain said sponge as said sponge comes to rest at the end of the down stroke of the piston rod.

9. A cleaning device for washing a window pane with liquid comprising an actuating cylinder having a reciprocable piston secured on an elongated piston rod adapted to reciprocate up and down in a vertical plane; a piping system connected to said cylinder to supply hydraulic fluids to said cylinder and actuate said piston and rod; electrical solenoids to actuate valves positioned at ends of said cylinder to control the flow of said hydraulic fluids into ends of said actuating cylinder to cause said piston rod to reciprocate up and down in a vertical plane; push button switches in an electrical circuit to said solenoids to selectively control the flow of hydraulic fluids into said cylinder to actuate said piston rod intermittently up and down in a vertical plane; a sponge for applying liquid to said pane secured on a sponge bar that is secured on said piston rod and adapted to reciprocate at an angle to said piston rod; rollers rotatably mounted on ends of said sponge bar and rotatable on guide surfaces to keep the said sponge in rubbing contact on a window pane during an up and down stroke of the piston rod; a squeegee bar with a multiplicity of squeegees secured thereto secured on said piston rod and adapted to reciprocate at an angle to said piston rod and parallel to said sponge bar; rollers rotatably mounted on ends of said squeegee bar and rotatable on other guide surfaces to keep said squeegees in a different vertical plane delineated from said first guide surfaces to keep said squeegees from contact with said window pane during an up stroke of said piston rod and intermediate guide surfaces to direct the squeegees on their said bar onto the said first surfaces to bring the squeegees into the same plane with the sponge and on to the window pane during a down stroke of the piston rod; and offset extensions of said first guide surfaces to bring the sponge and squeegee bars into the same plane as that of the other guide surfaces during a down stroke of said piston rod; and a reservoir for cleaning fluids adapted to receive and retain said sponge at said sponge comes to rest at the end of the down stroke of the piston rod; and hinged flap means in said other guide means to keep the said squeegee in a plane parallel of said other guide surfaces to inhibit the squeegees from moving in the plane of the sponges in contact with the window pane during an upward stroke of said piston rod.

10. A cleaning device for washing a window pane with liquid comprising an actuating cylinder having a piston adapted to be reciprocated and secured on an elongated piston rod adapted to reciprocate up and down in a vertical plane; a piping system connected to said cylinder to supply hydraulic fluids to said cylinder and actuate said piston and rod; electrical solenoids to actuate valves positioned at ends of said cylinder to alternately control the flow of said hydraulic fluids into ends of said actuating cylinders to cause said piston rod to reciprocate up and down in a vertical plane; push button switches in an electrical circuit to said solenoids to selectively control intermittently the flow of hydraulic fluids into said cylinder to actuate said piston rod part way up and down in a vertical plane; a sponge secured on a sponge bar secured on said piston rod adapted to reciprocate at an angle to said piston rod; rollers rotatably mounted on ends of said sponge bar and rotatable on guide surfaces to keep the said sponge in rubbing contact on a window pane during an up and down stroke of the piston rod; a squeegee bar with a multiplicity of squeegees secured thereto, secured on said piston rod and adapted to reciprocate at an angle to said sponge bar; rollers rotatably mounted on ends of said squeegee bar and rotatable on other guide surfaces to keep said squeegees in a different vertical plane from said first guide surfaces to keep said squeegees from contact with said window pane during an up stroke of said piston rod and intermediate guide surfaces to direct the squeegees on their said bar onto the said first surfaces to bring the squeegees in the same plane with the sponge and on to the window pane to wipe said liquid from the surface of said pane during a down stroke of the piston rod; and offset extensions of said first guide surface to bring the sponge and squeegee bars into the same plane as that of the other guide; and a cabinet enclosing said reservoir, sponge and squeegee bars while said bars are at rest; a hinged cover for said cabinet adapted to be raised during an up stroke of said piston rod and to close after the piston rod comes to rest at the end of a down stroke of the piston rod.

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