July 6, 1943. E. F. MATTHEWS ET AL 2,323,555

WINDOW CLEANING DEVICE

Filed April 24, 1941 3 Sheets-Sheet 1

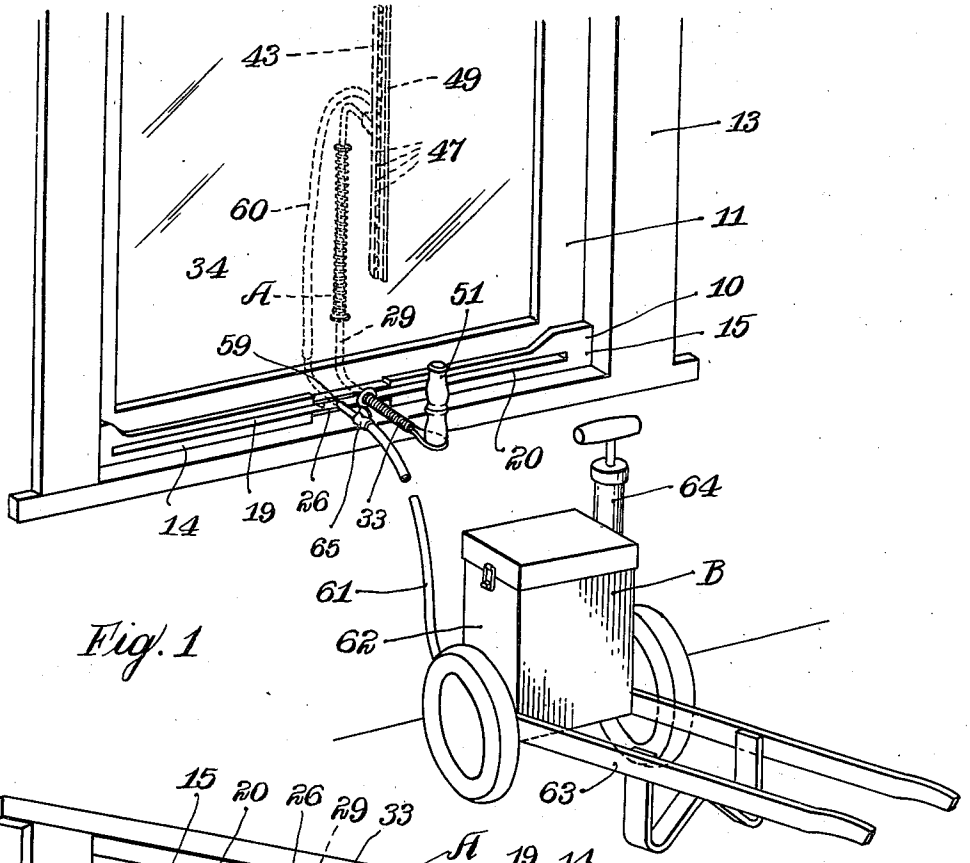


Fig. 1

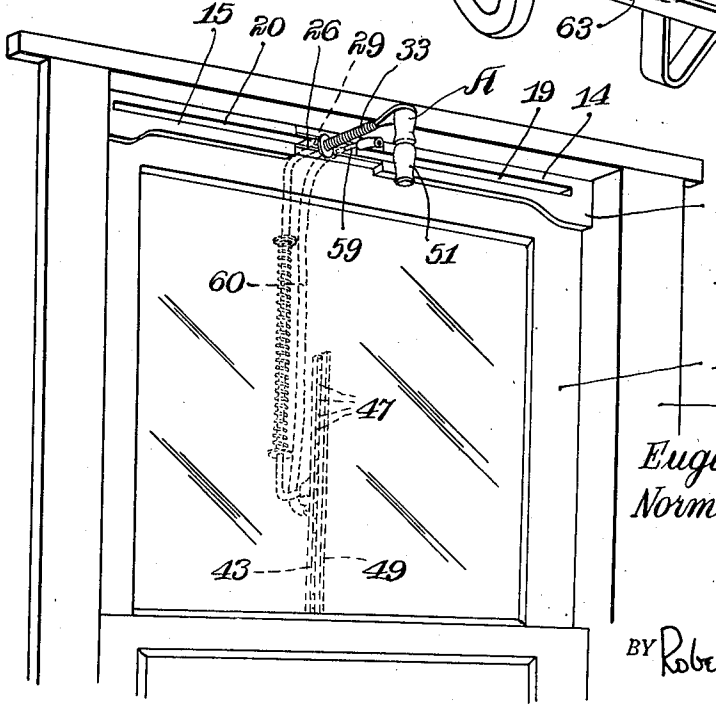


Fig. 2

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Filed April 24, 1941 3 Sheets-Sheet 2

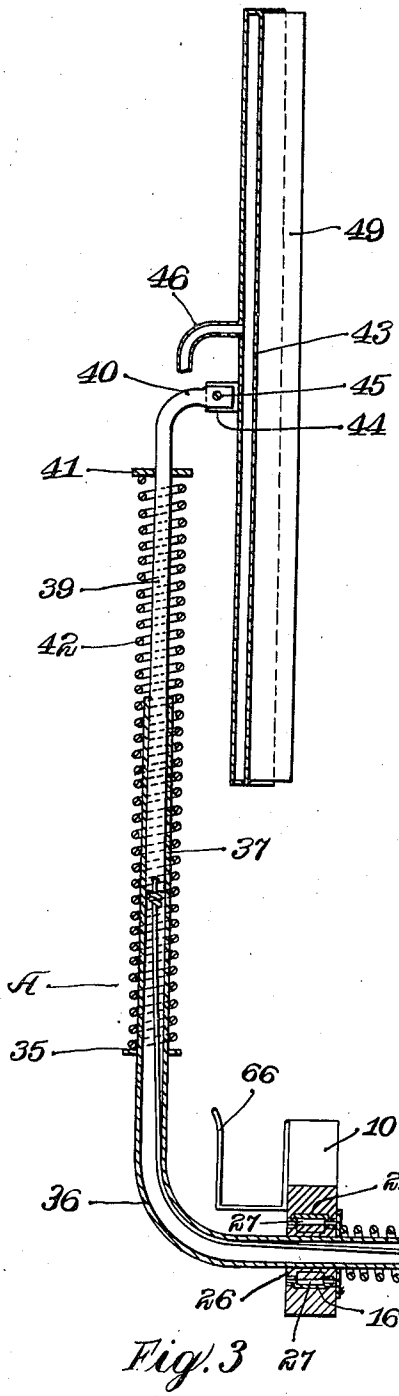


Fig. 3

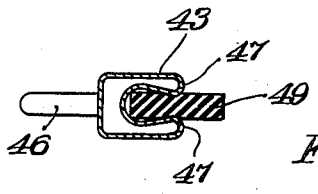


Fig. 4

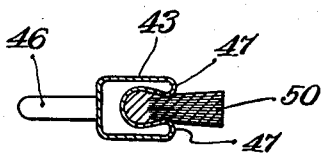


Fig. 5

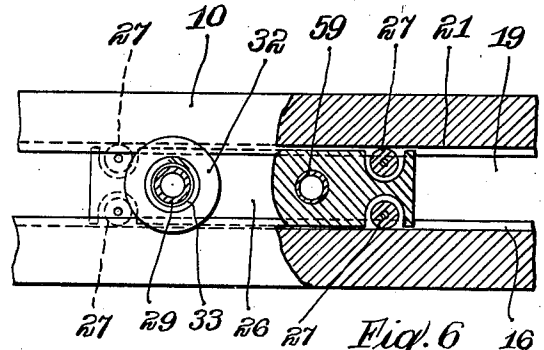
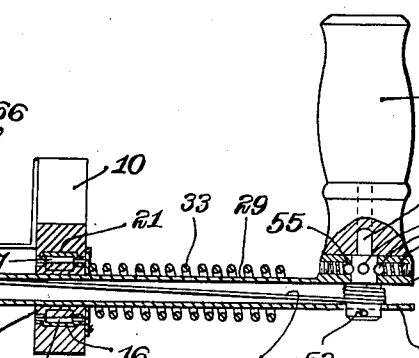


Fig. 6



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WINDOW CLEANING DEVICE

Filed April 24, 1941 3 Sheets-Sheet 3

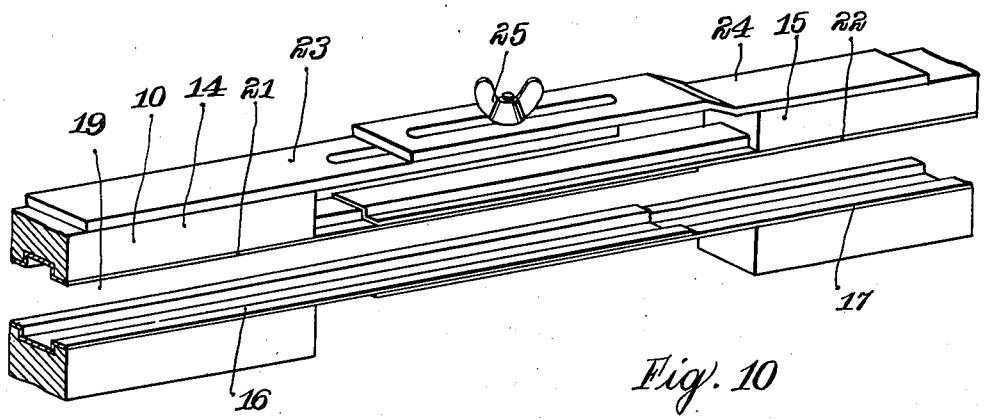


Fig. 10

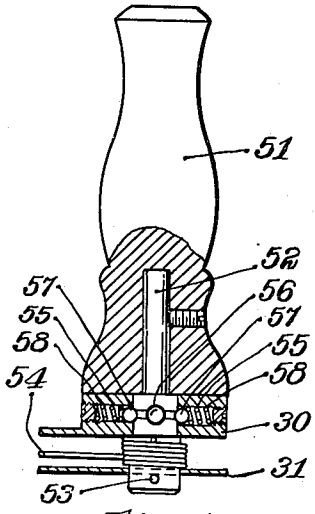


Fig. 7

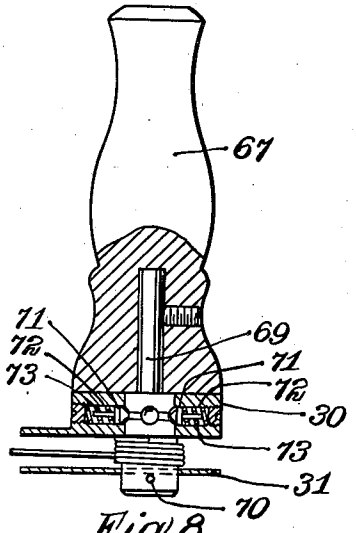


Fig. 8

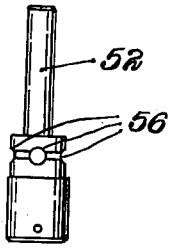


Fig. 9

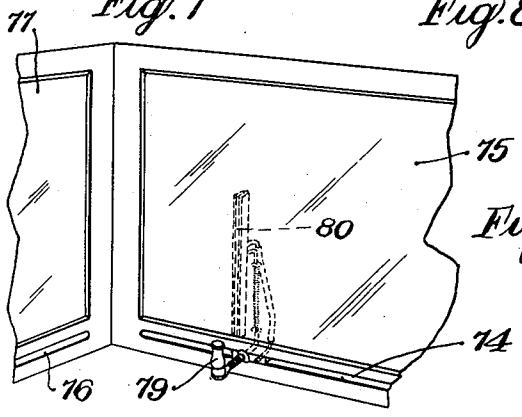


Fig. 11

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Patented July 6, 1943 2,323,555

UNITED STATES PATENT OFFICE

2,323,555

WINDOW CLEANING DEVICE

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Application April 24, 1941, Serial No. 390,046

8 Claims. (Cl. 15—251)

Our invention relates to an improvement in window cleaning apparatus, and more particularly in a window cleaning apparatus in which a cleaning liquid may, if desired, be applied; and with which the outer surface of the window pane, as well as the inner surface, may be washed from within the enclosure in which the pane is situated.

In office buildings and the like, it is difficult to wash the outer surface of the window. It is usually accomplished by a window washer, equipped with a safety belt, standing on the ledge at the base of the building. From time to time accidents occur, either due to faulty equipment or due to carelessness on the part of the window washer. Such accidents are usually fatal due to the height of the windows being washed. Not only are such accidents regretted for personal reasons; they are also costly to the persons employing the worker whose life is lost. Because of the dangers involved, the wages of such workers are high. The cost of the window cleaning operation is thus usually a considerable expense to the owners of the building.

It is the object of the present invention to provide a window cleaning device by means of which the outer surface of the window may be simply and easily cleaned from within the building or enclosure in which the window is situated. Through the use of this device, all of the danger usually present in the window cleaning operation is obviated. Accordingly, the cost of the window cleaning operation may be drastically reduced, and the cleaning of the outer surface of the windows need no longer be considered a hazardous occupation.

It is an object of our invention to provide a device which may be simply and quickly applied to a window to be cleaned, and which may be readily disconnected therefrom when the cleaning operation is complete. With such a device no particular attachments are required on the windows or the window frames; nor do the windows themselves have to be of an unusual construction. Our device is applicable for use upon the common types of windows now in use, and may be used on windows of various sizes throughout the range of operation of the device.

It is a feature of our invention that our device is not only applicable for use on windows of various widths; but for windows of various heights. Thus the same device may be used for windows which vary in dimensions both laterally and vertically.

It is a further feature of our invention that the rubber scraper member, or squeegee device used for removing the water or cleaning liquid from the window need not extend the full height of the window. Our device is so arranged that the squeegee may be raised and lowered; and may thus be used first to wipe the liquid from the upper portion of the pane, and then to wipe off the lower portion of the pane. This is of extreme importance; as a squeegee which is the full height of the window would not operate as satisfactorily near the edges of the pane.

A further feature of our invention resides in the provision of a squeegee holder which will interchangeably support either a rubber squeegee member, or a brush or other dirt loosening device. Accordingly it is possible to first apply liquid and to loosen the dirt on the outer window surface, and next to wipe off the liquid from the pane surface.

A further feature of our invention lies in the means of applying the cleaning liquid to the outer pane surface. This we accomplish by providing a squeegee or brush holding device which embodies a liquid conduit provided with suitable apertures through which the liquid may be sprayed. This conduit is connected to a suitable source of liquid supply, which is preferably under pressure to force the liquid onto the glass pane; although the liquid may feed by gravity in some instances if it is so desired.

It is an object of our invention to provide a support for a squeegee or a brush which is slidably mounted to slide throughout the width of the window; and to pivotally mount the support for pivotal movement about its slidable mounting. With such an arrangement, the squeegee or brush supported may be moved at will to any portion of the surface of the pane simply and easily.

A further feature of our invention resides in the fact that pressure is exerted by the squeegee or the brush against the outer surface of the window. By this means the squeegee or other device is at all times pressed against the pane with just the proper tension to best accomplish the wiping operation.

Another feature of our invention rests in the manner of supporting the squeegee support for slidable and pivotal movement. The movable carriage carrying the squeegee support is mounted in a manner to slide with a minimum of effort on the part of the operator.

An additional feature of the invention resides in the use of a clutch of a special type for holding the squeegee elevated to the desired height.

The squeegee support is so arranged that it always tends to be extended to its maximum length; and is held partially compressed by a clutch, which holds the cable or other flexible means by which the length of the support may be decreased. The clutch holds the support at any set length throughout its range of adjustability, thereby requiring no complicated device to change the effective length of the support.

These and other objects and novel features of our invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of our specification:

Figure 1 is a perspective view of a window with the window cleaning apparatus of our invention attached thereto.

Figure 2 is a perspective view of the upper window of a pair of vertically slidable windows, showing the window cleaning apparatus of our invention in operable relation thereto.

Figure 3 is a vertical section through the window cleaning apparatus.

Figure 4 is a cross-sectional view through the squeegee holder with a squeegee in place therein.

Figure 5 is a view similar to Figure 4, showing a brush in place in the holder.

Figure 6 is an elevation view, partly in section, of the squeegee supporting carriage and its mounting.

Figure 7 is a vertical section through the clutch which is used for holding the squeegee support in any desired extended position.

Figure 8 is a vertical section through a modified form of clutch from that illustrated in Figure 7.

Figure 9 is a cross-sectional view through the clutch, the position of the section being illustrated by the line 9—9 of Figure 7 of the drawings.

Figure 10 is a perspective view of the adjustable portion of the carriage mounting.

Figure 11 illustrates the application of our device to a vehicle.

The window cleaning apparatus includes a window cleaning device indicated in general by the letter A, which is connected to a source of supply of cleaning liquid, which is illustrated in general by the letter B.

The window cleaning device A includes a carriage mounting 10 which is designed to be secured adjacent the lower edge of a lower window 11, or adjacent the upper edge of an upper window 12, of a pair of vertically slidable windows. The carriage mounting is designed to extend the full width of the window 11 or 12 within the window frame 13, as illustrated in Figures 1 and 2 of the drawings.

In preferred form, the carriage mounting 10 includes a pair of relatively adjustable sections 14 and 15 which fit against opposite sides of the window frame 13. These sections have channels 16 and 17 arranged in overlapping relationship, as best seen in Figure 10 of the drawings. The channels 16 and 17 line the lower edge of a transverse slot in the mounting 10. The channel 16 lines the lower edge of a slot 19 in the section 14, and projects beyond the body of the section 14. The channel 17 forms the bottom of a channel slot 20 in the section 15, and projects beyond the body of the section 15 into overlapping relation with the projection portion of the channel 16.

A pair of similar channels 21 and 22 form the upper edges of the slots 19 and 20. The channel 21 is positioned along the upper edge of the slot 19, and projects beyond the body of the section 14. The channel 22 lines the upper edge of the slot 20, and projects beyond the body of the section 15 into overlapping relation with the channel 21.

The sections 14 and 15 are adjustably connected by overlapping plates 23 and 24 projecting from, and connected to, the respective sections. An adjusting bolt 25 permits longitudinal adjustment of the sections 14 and 15, and by this means the channels 16 and 17; and 19 and 20, may be overlapped the desired amount to make the mounting 10 the proper length.

A carriage 26 is mounted for longitudinal movement between the channels, and may move the length of the overlapping channels. The carriage 26 is preferably provided with rollers 27 which engage in the channels and support the carriage in such a manner that it will move throughout the length of the channels with little effort.

A tube 29 extends through the carriage 26. On the inner end of the tube 29 we provide a pair of spaced parallel plates 30 and 31. A washer 32 encircles the tube 29 adjacent the carriage 26. A spring 33 encircles the tube 29 between the plates 30 and 31 and the washer 32. This spring tends to pull the tube 29 inwardly, and causes a spring pressure to be exerted against the window by the squeegee or brush.

The tube 29 bends at substantially right angles at its outer end, to extend substantially parallel to the window pane 34 of the window 11. A washer or collar 35 is secured to the tube 29 above the bend 36. Above this washer or collar 35 the tube is bent to form a hollow square tube 37. The reasons for squaring the tube will be later pointed out in detail; and it is obvious that other constructions could be used to accomplish the same result.

Fitting within the square tube 37 we provide a square rod 39, the upper end 40 of which is bent at substantially right angles to the remainder of the rod. The square shape of the tube 37 and rod 39 prevent relative rotation therebetween. A washer or collar 41 is provided on the rod 39. A spring 42 is interposed between the washers or collars 35 and 41, encircling the tube 37 and rod 39. This spring tends to hold the tube and rod extended.

A hollow channel 43, best illustrated in Figures 3, 4 and 5 of the drawings, is provided with a pair of spaced ears 44 between which the upper end 40 of the rod 39 is pivotally attached at 45. The hollow channel is entirely closed with the exception of an inlet tube 46 and outlet openings 47. An elongated rubber squeegee blade 49 may be frictionally engaged in the channel 43, as illustrated in Figure 4; or an enlongated brush 50 may be frictionally engaged therein, as best illustrated in Figure 5. The squeegee blade 49 and brush 50 are interchangeable.

The operating handle 51 is provided with an axial pivot 52 which extends through the plates 30 and 31 and is held in place by a cotter pin 53 or the like. A small flexible cable or the like 54 is secured to the pivot 52 and is wound about the same. The end of the cable 54 is connected to the lower extremity of the rod 39. Thus, by rotation of the handle 51 and its pivot 52, the cable 54 is wound about the pivot, pulling the rod 39 downwardly, and lowering the position of the channel 43, which forms the squeegee holder.

The plate 30 is of substantial thickness, and is provided with a series of radially extending apertures 55 therein extending outwardly from the enlarged portion of the pivot 52. A series of

angularly spaced indentations 56 are provided in the pivot 52. A ball 57 is provided in one or several of the apertures 55, and the springs 58 bear against the balls 57. As the handle 51 is rotated, each ball 57 is urged into the indentations 55 successively. The clutch formed thereby will operate equally well in both directions, and will hold the handle from rotation with respect to the plate 30 in any set position of the same, to hold the squeegee holder 43 at any desired elevation.

A tube 59 extends through the carriage 26. The outer end of the tube 59 is connected by a flexible tube 60 to the inlet 46 of the hollow channel 43. The inner end of the tube 59 is connected by a flexible tube 61 to a tank 62 containing liquid of any desired type for window cleaning purposes. The tank 62 is shown mounted on a portable carrier 63. The tank 62 is preferably air tight, and pressure may be introduced thereinto by any suitable means such as the pump 64. The liquid may alternately be pumped to the channel 43, or any suitable source of liquid may be used, such as gravity. The amount of liquid may be regulated by any suitable means, such as the valve 65.

The operation of our window cleaning apparatus is believed obvious from the foregoing description. The carriage mounting 10 is adjusted to the proper length, and put into place adjacent a window; the hooks 66 embracing the edge of the window, and the squeegee or brush contacting the outer surface of the window. By manipulation of the handle 51, the squeegee support, channel 43 and squeegee or brush may be moved from one end of the window to the other. If pressure is pumped into the tank 62, liquid is forced through the tubes 61, 59, 60 and into the channel 43, from which it is sprayed through the openings 47 onto the surface of the glass of the windows.

By rotation of the handle 51, the squeegee or brush may be adjusted in height, and the glass brushed and wiped off. The carriage 26 permits the wiper or brush to cover the entire area of the window, and to get to every portion of the panes thereof.

In Figure 8 we disclose a slightly different form of clutch construction. The handle 67 is provided with an axial pivot 69 which extends through the plates 30 and 31, being held in place by a cotter key 70. A plunger 71 is slidably mounted in an aperture 72, and is urged by a spring 73 into the indentations 56 in the pivot 69. As the handle 67 is rotated, the plunger point successively engages in the indentations 56, so that the handle will remain in any set position, to hold the squeegee at any desired height.

Figure 10 illustrates diagrammatically how our construction may be applied to a vehicle. An elongated slot 74 extends the length of the window 75, and a similar slot 76 may extend the length of the window 77. The squeegee may be slidably moved the length of the slot 74 or 76, and may be raised or lowered by the rotation of the operating handle 79. The squeegee 80 may be considered similar to the squeegee 49, and the mounting may be the same. The device may similarly be applied to other types of windows in a somewhat similar manner.

In accordance with the patent statutes, we have described the principles of construction and operation of our window cleaning device, and while we have endeavored to set forth the best embodiments thereof, we desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of our invention.

We claim:

1. A device for cleaning a window having opposed surfaces, comprising a surface engaging device engaging one surface of the window, a supporting device extending around the edge of the window for operation from the side of the window opposite the surface engaged, and means slidably and pivotally supporting said supporting device, said means including a slotted member designed to engage along the edge of the window through which said supporting device extends.

2. An apparatus for cleaning a window having opposed surfaces and a free edge including a surface engaging means engageable with one of said opposed surfaces, a supporting means for said surface engaging means extending around said free window edge and operable from the side of the window opposite the surface engaged, a slotted slide extending along said free window edge, a slidable carriage in said slot, said supporting means being pivotally mounted extending through said carriage.

3. An apparatus for cleaning a window having opposed surfaces and a free edge, including a surface engaging means engageable with one of said opposed surfaces a pair of relatively adjustable telescoping members supporting said surface engaging means, a slotted slide extending along the free edge of the window, means slidably and pivotally supported by, and extending through, said slotted slide supporting said supporting members, and means on the side of the window opposite to that engaged for operating said adjustable telescoping supporting members to adjust the length thereof.

4. An apparatus for cleaning a window having opposed surfaces and a free edge, including a surface contacting means engageable with one surface of said window, a slide mounted longitudinally of said free edge, and normally extended telescopically engaged extendable and contractable supporting means for said surface contacting means, means on said supporting means extending through said slide and being pivotally and slidably mounted therein, said last named means extending to the side of the window opposite to that engaged by said surface contacting means, and means on said last named means for contracting said telescopically engaged supporting means.

5. An apparatus for cleaning a window having opposed surfaces and a free edge, including a surface contacting means engageable with one surface of said window, a slide mounted longitudinally of said free edge, a supporting means for said surface contacting means including a pair of telescopically arranged elements resiliently urged toward one extreme position, means on said supporting means extending through said slide to the side of the window opposite to that engaged by said surface contacting means and slidably and pivotally supported by said slide, and means on the end of said last named means extending through said slide connected to said telescopically arranged elements to move the same toward the other extreme position of movement.

6. A window cleaning device for a window having opposed surfaces and a free edge, including a surface contacting means engageable

with one surface of said window, a supporting standard therefor, a tubular support within which said standard is telescopically engaged, said tubular support extending through a slide and being slidably and pivotally supported by said slide, and flexible means connected to said standard and extending through said tubular support to the side of the window opposite that engaged by said surface contacting means and adjusting the height of said surface contacting means.

7. An apparatus for cleaning a window having opposed surfaces and a free edge, including a surface contacting means engageable with one surface of said window, a slide mounted longitudinally of said free edge, a supporting standard secured to said surface contacting means, a tubular support extending in telescoping relation with said standard, resilient means urging said standard toward one extreme position with respect to said tubular support, an end on said tubular support extending at substantially right angles with respect to the remainder of said supporting means, pivotally and slidably supporting said end of said support in said slide, flexible means secured to said standard and extending through said tubular support and moving said standard toward its other extreme position with respect to said support, and means secured to said flexible means for operating the same to rest on lower said standard.

8. An apparatus for cleaning a window having opposed surfaces and a free edge, including a surface contacting means engageable with one surface of said window, a slide mounted longitudinally of said free edge, a supporting standard means for said surface contacting means, a tubular support for said standard arranged in telescopic relation therewith, resilient means normally urging said standard in one direction with respect to said support, said standard having a free end extending at substantially right angles to the remainder of said support, a flexible means extending through said tubular supporting means slidably and pivotally supporting said end of said tubular support in said slide, a handle secured adjacent said end of said tubular support, a rotatable shaft secured for rotation to said handle, said flexible means secured to said shaft and wound thereupon by rotation of said handle, and clutch means secured to said handle for holding said handle in any rotative position.

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