Aug. 22, 1933. A. DIXON 1,923,813

WINDOW CLEANING DEVICE

Filed Aug. 16, 1932 4 Sheets-Sheet 1

Fig. 1.

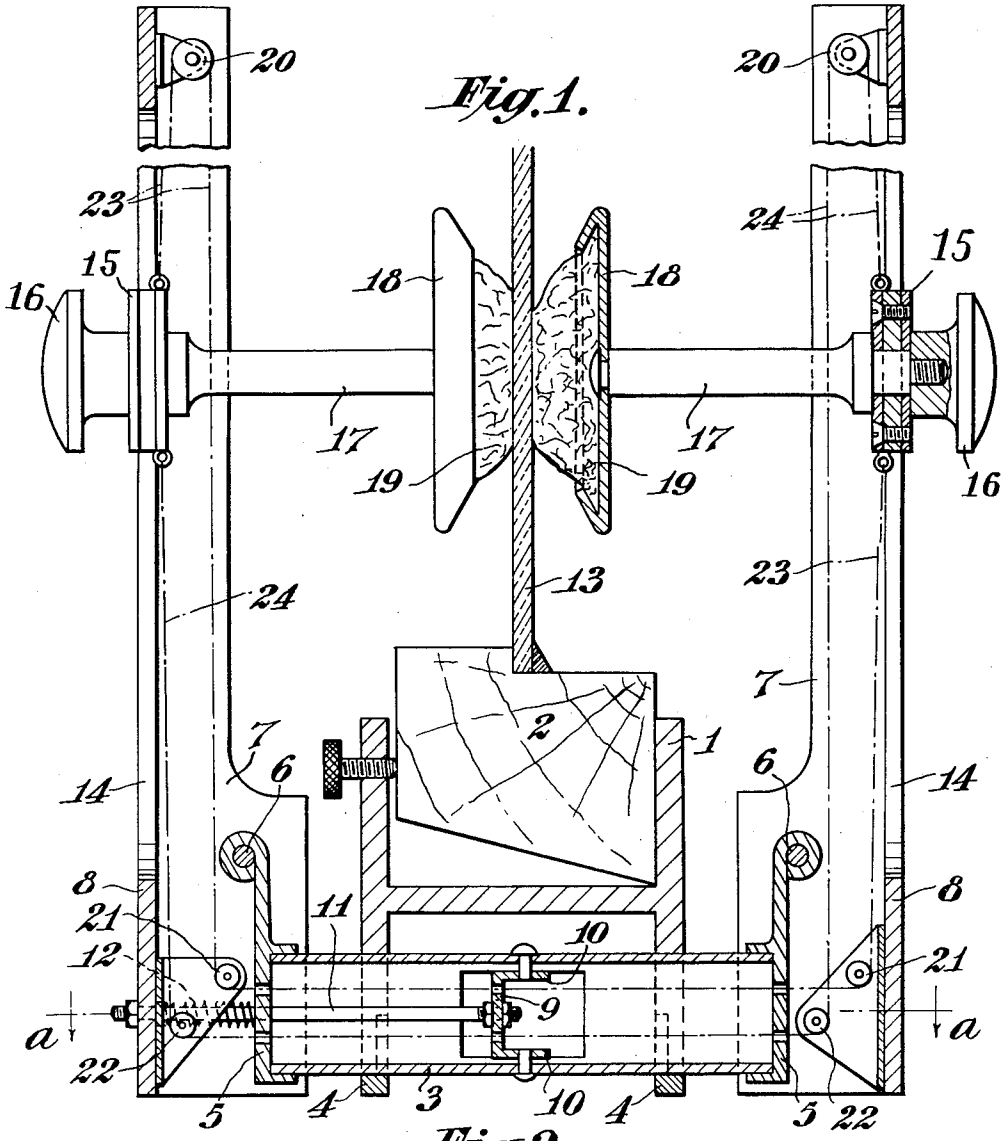
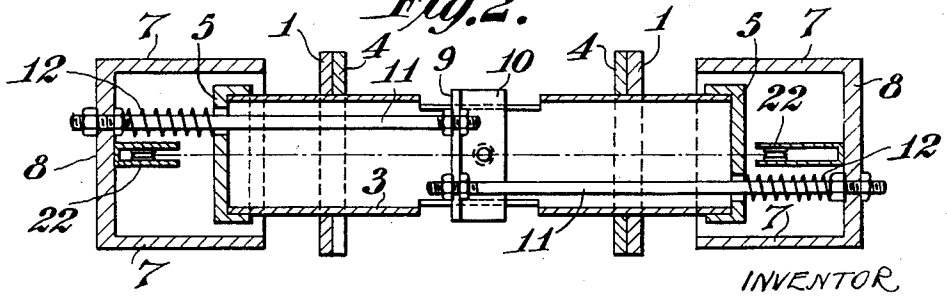


Fig. 2.



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Fig.3.

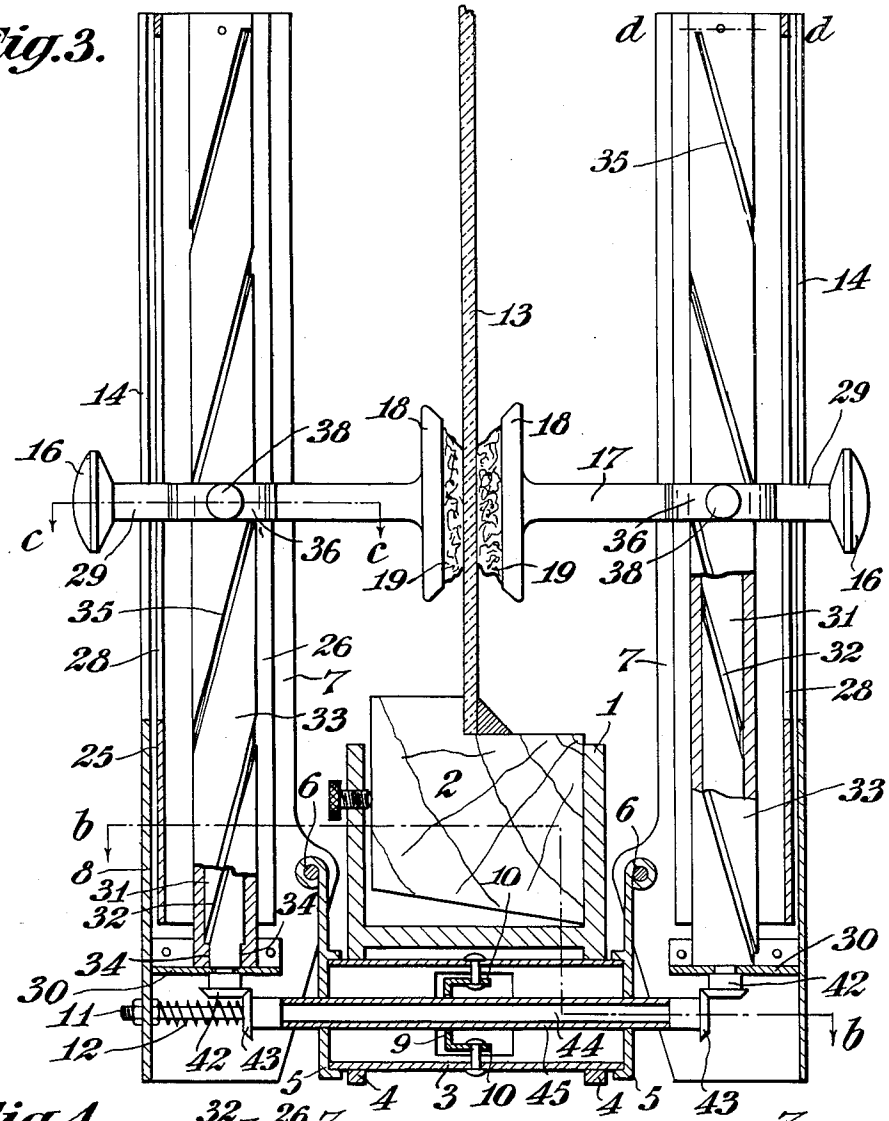
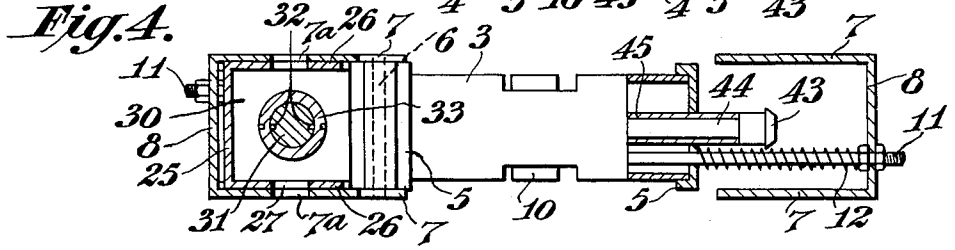


Fig.4.



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WINDOW CLEANING DEVICE

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Fig.5.

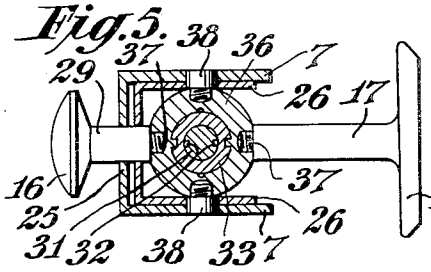


Fig.6.

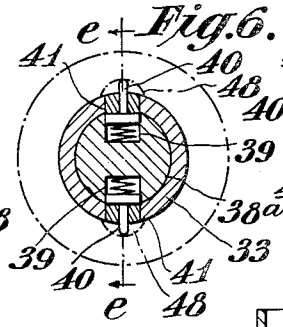


Fig.7.

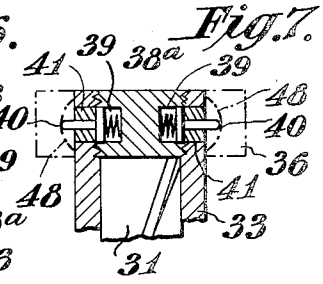


Fig.8.

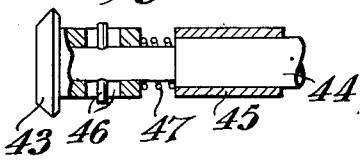
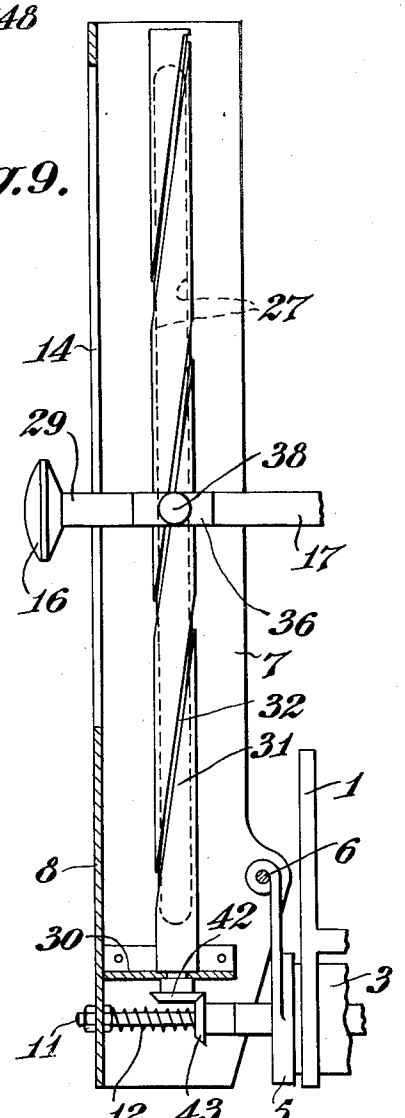


Fig.9.



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Fig. 10.

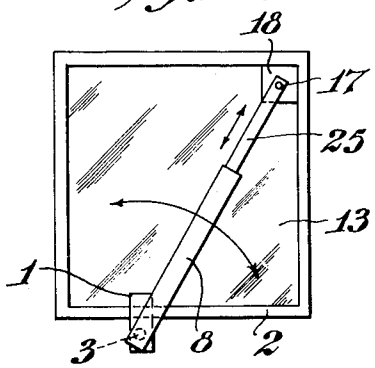


Fig. 11.

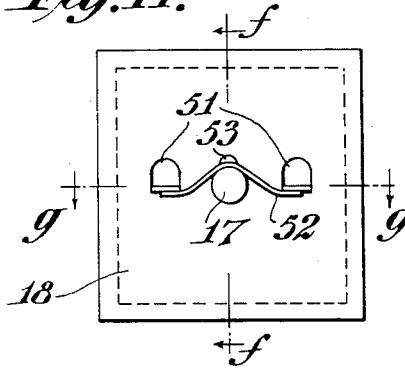


Fig. 12.

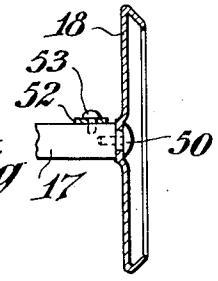
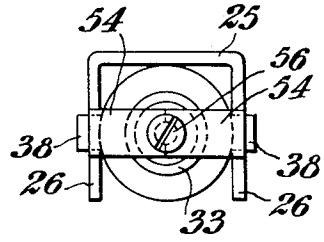


Fig. 14.



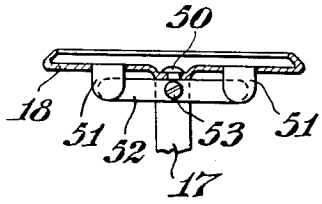


Fig. 13.

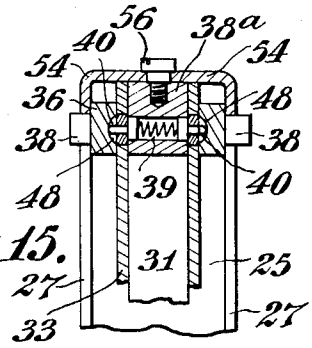


Fig. 15.

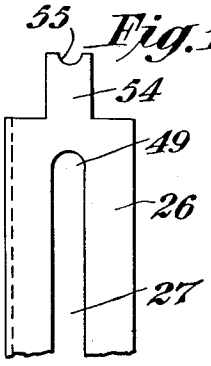


Fig. 16.

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Patented Aug. 22, 1933

1,923,813

UNITED STATES PATENT OFFICE

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WINDOW CLEANING DEVICE

Andrew Dixon, Newcastle-upon-Tyne, England

Application August 16, 1932, Serial No. 629,074, and in Great Britain October 16, 1931

3 Claims. (Cl. 15—252)

This invention relates to window cleaning devices of the kind adapted to be detachably affixed to a sash for effecting, by means of wipers movably carried by the device, the simultaneous cleaning of both the inside and the outside of the window, the device being operated manually from the inside of the window.

The present invention provides a window cleaning device of the kind set forth consisting of a vertically jawed carrier for clamping on to a sash, a tubular member rotatable in said carrier, and extending beyond the ends thereof and a vertically disposed bracket on each end of said tubular member, a vertically disposed channel-section arm pivotally supported from each bracket, spring-controlled means interconnecting the lower ends of the vertical arms for simultaneous movement towards and away from one another, a handle fitted block slidable on each vertical arm, a wiper supported from each block, said wipers facing one another, and means connecting said wipers together so that the up and down movement of the one block effects the simultaneous movement of the other block.

For a ready understanding of the invention, reference is to be had to the following description and accompanying sheets of drawings, wherein:—

Figure 1 is a vertical sectional view illustrative of an embodiment of the invention.

Figure 2 is a sectional plan view taken on line *a—a* of Figure 1.

Figure 3 is a view similar to Figure 1 but illustrative of a modification thereof.

Figure 4 is a sectional plan view taken on line *b—b* of Figure 4, but with the carrier of the apparatus omitted.

Figure 5 is a sectional plan view on line *c—c* of Figure 3.

Figure 6 is a sectional plan view on line *d—d* of Figure 3.

Figure 7 is a vertical sectional view on line *e—e* of Figure 6.

Figure 8 is a longitudinal sectional view of a detail hereinafter referred to.

Figure 9 is a fragmentary vertical sectional view illustrative of a further modified arrangement of the apparatus.

Figure 10 is a diagrammatic view illustrative of the working of the apparatus.

Figure 11 is a front view illustrative of a swivelling form of a wiper carrier.

Figure 12 is a sectional view on line *f—f* of Figure 11.

Figure 13 is a sectional view on line *g—g* of said Figure 11.

Figures 14, 15 and 16 are respectively, a plan view, a vertical sectional view, and a side view illustrative of a detail hereinafter referred to.

Like numerals of reference indicate corresponding parts in the several figures.

In carrying out the invention, and referring first to Figures 1 and 2 of the drawings, the cleaner comprises a vertically jawed carrier member 1 adapted to be clamped on to the bottom rail 2 of the lower sash of a window of the vertically slidable type, and in the slotted lower part of the carrier is mounted a tubular member 3 which extends beyond the ends of the carrier and rests in bearing pieces 4 which are affixed to the carrier and close the ends of the slots, so that the tubular member 3 is held in a pivotal manner in circular bearing holes.

On each end of the tubular member 3 is mounted a vertically disposed bracket 5 which, at its upper end, carries a horizontally disposed pin 6 extending at its ends into the opposite side walls 7 of a vertically disposed channel-section arm 8 near the lower end thereof. Thus, the two arms 8 are pivotally mounted for swinging movement towards and away from each other.

Inside the tubular member 3 midway between the ends thereof is a channel-shaped member or rod holder 9, the arms 10 of which are pivotally connected to the tubular member 3. To the vertical wall of said rod holder 9, and to opposite sides of the pivotal axis thereof, respectively, are suitably loosely connected the inner ends of two horizontally disposed spaced-apart rods 11, whereby longitudinal movement of either rod in either direction effects pivotal movement of the rod holder and consequent longitudinal movement of the other rod 11 in an opposite direction. The rods may be connected to the rod holder as, for example, by being passed loosely through openings in the holder and by having nuts threaded thereon, one to each side of the holder.

These rods 11 extend in opposite directions through the tubular member 3, each through a hole in the related bracket 5 and through a slot in the lower part of the bottom wall of the related vertical arm 8, and the outer end of each rod 11 is threaded and secured in an adjustable manner to its related vertical arm 8 by means of nuts screwed on to said rod one to each side of the bottom wall of said vertical arm 8.

Coil springs 12 encircling the rods 11 between the outer faces of the brackets 5 and the bottom walls of the vertical arms 8 below the pivots 6

thereof, respectively, tend constantly to urge the lower portions of said arms relatively outwardly whereby the upper end portions of said arms are urged constantly inwardly towards the pane 13 of the sash.

Further, in the wall of each vertical arm 8 there is provided a slot 14 which extends nearly to the upper end of said arm, and in said slot there is slidably mounted a block 15 to which is secured an operating knob or handle 16, which extends outwardly through the slot 14, while extending inwardly from each block is a horizontally disposed rod 17 which stands perpendicular to said inner face of the block 15.

Each horizontal rod 17, at its inner or free end, is fitted with a vertically disposed holder 18 for the reception of a wiper pad 19 of any suitable material, said holder 18 being of rectangular shape with recurved edges, one of which is movable for the insertion or removal of the wiper pad 19 aforesaid.

In the upper end of each vertical arm 8 there is mounted a pulley 20, whilst in the lower part of said vertical arm 8 two other pulleys 21 and 22 are also mounted by means of brackets affixed to said arm, the said latter pulleys 21 and 22 being suitably spaced apart and disposed at different levels.

To the upper end of the slide block of the left hand or inside vertical arm 8 there is secured a cord or wire 23 which passes over the pulley 20 at the upper end of said arm 8 down to and under the upper pulley 21 of the two pulleys 21 and 22 in the lower part of the arm 8, thence to and through the socket-fitted tubular member 3 and rod holder 9 therein, to and under the upper pulley 21 of the two pulleys 21 and 22 in the lower part of the other vertical arm 8, and then up and connected to the lower end of the slide block 15 in said latter vertical arm 8.

To the upper end of this latter slide block 15 there is secured another cord or wire 24 which is carried up to and over the pulley 20 in the upper end of the second vertical arm 8, down to and under the lower pulley 22 of the two pulleys 21 and 22 in the lower part of said arm 8, to and through the socket-fitted tubular member 3 and rod holder 9 therein, to and round the lower pulleys 22 of the two pulleys 21 and 22 in the lower part of the first-mentioned arm 8, then up and connected to the lower end of the slide block 15 of said first-mentioned arm 8.

The device is clamped to the bottom rail of the sash so that the wiper pads 19, due to the pressure of the springs 12 exerted on the vertical arms 8, are in contact with both sides of the pane 13 of the sash. The operation of moving the slide block up or down by manipulating the operating knob or handle which faces inwardly towards the room, imparts simultaneous movement through the pulley-carried cords or wires 23 and 24 to the other slide block 15 so that the wiper pads 19 supported from said slide blocks 15 wipe both sides of the pane 13 of the sash in a vertical direction.

By swinging both vertical arms 8 to and fro, i. e. tubular member 3 pivoting in the carrier 1, through 180 degrees, and moving the slide blocks 15 to and fro along the vertical arms 8, the whole area of both sides of the pane 13 of the sash is effectively wiped.

On moving the inside vertical arm 8 away from the sash 13, there is effected, through the rods 11 connected to the rod holder 9 in the tubular member 3, a corresponding movement of the other vertical arm 8 away from the said sash 13, which permits, after unclamping of the carrier, of the removal of the cleaner.

Further, owing to the working parts of the cleaner being in duplicate, said cleaner may be clamped to the sash and used with either vertical arm as the inside arm, such duplicating of the working parts allowing of the cleaner, if desired, being worked from the outside of the window.

For extra large windows, the foregoing device will be modified in the following manner, reference being had to Figures 3 to 8 of the drawings.

The connection between the two vertical arms 8 and the connection of said vertical arms 8 with the tubular member 3 are retained, but the slide blocks 15, pulleys 20, 21 and 22 cords and wires 23 and 24 are dispensed with, and the slots 14 in the vertical arms 8 terminate in open upper ends.

In each vertical arm 8 of the cleaner there is slidably mounted a channel-section extension member 25 somewhat shorter in length than the length of the vertical arm 8, said extension member 25 being provided on both of its side walls 26 and near to the bottom thereof with outwardly projecting studs, the same not being shown in the drawings.

These studs are slidable in vertically disposed slots 7^a in the opposed side walls 7 of the vertical arms 8, and the extension members 25 are each provided with a vertically disposed slot 28 for the passage therethrough, of the stem 29 of the operating knob or handle 16 of the device.

Below each extension member 25 and inside each vertical arm 8, there is fixedly secured a bracket 30 in which is rotatably mounted the reduced-diametered lower end of a vertically disposed spindle 31 which is spirally grooved or threaded with two grooves or threads 32 which extend the length of the spindle and are of quick-pitch.

Over each spirally grooved spindle 31, and on the supporting bracket 30 thereof, there is rotatably mounted a hollow spindle 33, the same at its lower end being provided with two inwardly extending teeth 34, see Figure 3 which engage in the spiral grooves 32 of the inner spindle 31, and each outer spindle 33 is spirally grooved, two grooves 35 in the exterior surface thereof, said spiral grooves 35 having the same pitch as the grooves 32 of the inner spindle 31.

Each outer spindle 33 has slidably mounted thereon a nut 36 the same being the equivalent of a slide block 15 of the previously described cleaner, said nut 36 having two diametrically opposite studs 38 which engage in the grooves 27 of the side walls 26 of the extension member 25, and also two diametrically inwardly facing teeth 37 which engage in the spiral grooves 35 of the outer spindle 33, see Figure 5.

In each nut 36 is screwed the end of the horizontal wiper carrying rod 17 and also the stem 29 of an operating knob or handle 16, the said stem 29 extending through the slots 28 and 14 in the bottom walls of both extension member 25 and vertical arm 8, thereby preventing the rotation of the nut 36.

Further, in the upper end of each outer spindle 33 there is fitted a flat disc-like member 38^a (see Figures 6 and 7), the same having formed therein two diametrically disposed recesses 39 in each of which is housed a spring-pressed plunger, the stems 40 of the plunger being adapted to be each extended through a centrally dis-

posed hole in a nipple 41 screwed into the wall of the outer spindle 33.

To the reduced lower end of each inner spindle 31, and below the supporting bracket 30 thereof, there is fixedly secured a bevel pinion 42 and said bevel pinions 42 each mesh with a bevel pinion 43 mounted one on each end of a rod 44 rotatable in a tube 45 which extends through the socketed tubular member 3 of the carrier 1 of the cleaner.

These latter bevel pinions 43 are each, as shown in Figure 8, slidably mounted on the ends of the rod 44 by pin and slot means 46, and said pinions 43 are each spring-pressed, by a spring 47, to maintain them in mesh with the pinions 42 of the inner spindles 31 when said spindles 31 and the vertical arms 8 are moved to bring the wipers 19 out of engagement with the pane 13 of the sash.

On upwardly moving the knob or handle-fitted nut 36 of the left-hand or inner vertical arm 8, the outer spindle 33 is caused to rotate and in turn effect the rotation of the inner spindle 31, which through the bevel gears 42 and 43 imparts rotary motion to the inner spindle 31 of the other outside vertical arm 8 with consequent rotation of the outer spindle 33, of said arm 8 and the upward travel of the nut 36 of said outer spindle 33.

The nuts 36 travel upwardly until they reach the upper ends of the outer spindles 33, whereupon the spring-pressed plungers 40 of said outer spindles 33 move forwardly and engage in notches 48 in the nuts 36, as shown in dot-dash-dash lines in Figures 6 and 7, and hold the outer spindles 33 against rotation, and, at the same time, the stems 29 of the operating knobs or handles 16 engage in the upper ends 49 of the slots 28 in the extension member 25.

On further upward movement, the stems 29 of the knobs or handles 16 lift the extension member 25, whilst the nuts 36 exert an upward pull on or lift of the outer spindles 33, with the result that said outer spindles 33 still continue to rotate the inner spindles 31 although said outer spindles 33 are themselves prevented from rotating.

Downward movement of the inside operating knob or handle 16 and consequently the outer spindle 33 thereof, effects the rotation of the inner spindle 31, and, through the bevel gears 42 and 43, the rotation of the other inner spindle 31 with consequent downward movement of the outer spindle 33 of said latter inner spindle 31 and with it its nut 36 and the outside operating knob or handle 16.

This downward movement of the outer spindles 33 and nuts 36 may continue until the lower ends of said outer spindles 33 contact with respective brackets 30 and the spring-pressed plungers are inwardly pressed by and slip out of engagement with the notches 48 of the nuts 36, thereby freeing the same from the outer spindles 33 so that the same are free to be rotated.

At this point, the stems 29 of the operating knobs or handles 16 contact with the lower ends of the slots 28 in the bottom walls of the extension member 25 so that continued downward movement of the inside operating knob or handle 16 effects the rotation of the spindles 33 and 31 of the inner vertical arm 8 and downward travel of its extension member 25, and through the bevel gears 42 and 43 corresponding movements to the spindles 31 and 33, operating knob or handle 16 and extension member 25 of the outer vertical arm 8 until said operating knobs or handles 16 reach the end of their downward travel.

Referring now to Figure 9, which is illustrative of a further embodiment of the invention, the extension members 25 and the spirally grooved outer spindles 33 and their spring-pressed plungers 40 are dispensed with, and each vertical arm 8 of the cleaner is provided with a single vertical spindle 31, the same having spiral grooves 32 to receive the knob or handle-fitted nut 36 which carries the arm 17 and wiper pad, the said vertical spindles 31 being each fitted with a bevel pinion 42, as in the above described arrangement of the cleaner.

To enable the wipers to accommodate themselves to the corners of a sash, each wiper or pad holder 18 is, as shown diagrammatically in Figure 10, and in detail in Figures 11, 12, and 13, spring-controlled and pivotally mounted on its wiper-carrying rod 17 which is mounted either in the extension member 25 of an arm 8, as shown in Figure 10, or on the slide block of an arm 8, as the case may be.

The wiper holder is formed with a centrally disposed bossed aperture to engage the free end of the rod 17 and is rotatably held thereto by means of a headed screw 50 screwed into the outer end of the rod 17 aforesaid. Two tongues 51 disposed equally spaced from the rod 17 are struck up from the holder 18, and with said tongues 51 engage the ends of a blade spring 52 which is secured to the rod 17 by means of a screw 53, the spring 52 allowing of the angular movement of the wiper holder 18 in relation to the rod 17, whilst the tongues 51 act as stops.

Further, the extension members 25 of the second described embodiment of the invention may be affixed to the spirally grooved outer spindles 33 in the following way, as shown in Figures 14, 15 and 16 of the drawings.

That is to say, the side walls 26 of each extension member 25 are each formed with a tongue 54 at its upper end and each tongue 54 is formed with a semi-circular recess 55 in its outer end. The tongues 54 are bent over towards one another to meet and form a circular hole to receive a headed stud 56 which is screwed into the upper end of the disc-like member 38^a which is screwed into the upper end of the grooved outer spindle 33, thereby holding the extension member 25 to said outer spindle 33.

The spring-controlled plungers of the spindle 33 may either be housed in a common recess 39 in the disc 38^a to engage in the notches 48 of the nut 36, or they may be disposed as described with reference to the Figures 6 and 7 of the drawings.

I claim:—

1. A window cleaning device of the character described comprising a carrier to be engaged with a sash, a horizontal member rotatable in said carrier, a bracket at each end of said member, a vertical arm pivoted adjacent to but above its lower end to each bracket, yieldable means connecting said arms below their pivots and tending constantly to urge the lower end portions of said arms apart thus to urge the upper end portions of said arms relatively inwardly, a block slidable along each arm above its pivot, wipers carried by said blocks, and means connecting said blocks operable when either of the same is slid along its related arm to impart corresponding sliding movement to the other block.

2. A window cleaning device of the character described comprising a carrier to be secured to the bottom of a window sash, a tubular member extending transversely of said carrier and rotat-

ably mounted therein, a pair of vertical arms pivotally mounted adjacent to their lower ends on opposite end portions of said tubular member, respectively, the pivotal axes of said arms being disposed at right angles to the axis of rotation of the tubular member, a lever element pivoted intermediate its ends to the tubular member and disposed within said member, a pair of rods connecting opposite end portions of said lever element to said arms, respectively, a coil spring surrounding each rod between the related arm and the adjacent end of the tubular member, and engaged therewith so that the upper end portions of the arms are urged constantly inward, a wiping element mounted on each arm for movement therealong, and means connecting said wiping elements operable when either element is moved along its related arm to impart corresponding movement to the other wiping member.

3. A window cleaning device of the character described comprising a carrier to be secured to the bottom of a window sash, a transverse horizontal member rotatable in said carrier, a pair of vertical arms, pivotally mounted adjacent their lower ends on the ends of said member, respectively, the pivotal axes of said arms being disposed at right angles to the axis of rotation of the member, means connecting said arms operable when either arm is swung on its pivot to impart swinging movement to the other arm in an opposite direction, yieldable means cooperating with said connecting means and tending constantly to swing the arms relatively inward, wiping means mounted on each arm for movement therealong, and means connecting the respective wiping means operable when either wiping means is moved along its related arm to impart corresponding movement to the other wiping means, said connecting means comprising a spirally grooved member carried by each arm, a gear connection between said members whereby they are rotatable in unison, a second spirally grooved member telescoped over each first mentioned grooved member and connected therewith to be rotated thereby and to be moved longitudinally thereof when the second mentioned member is held against rotation, and connections between the wiping elements and the second mentioned spirally grooved members respectively whereby movement of either wiping element in a direction longitudinally of its related outer spirally grooved member effects rotation thereof, thereby to rotate the related inner spirally grooved member and also the spirally grooved members related to the other wiping element.

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