Nov. 10, 1942. A. BIALY 2,301,849

WINDOW CLEANING DEVICE

Filed Nov. 12, 1940 2 Sheets-Sheet 1

Fig. 1.

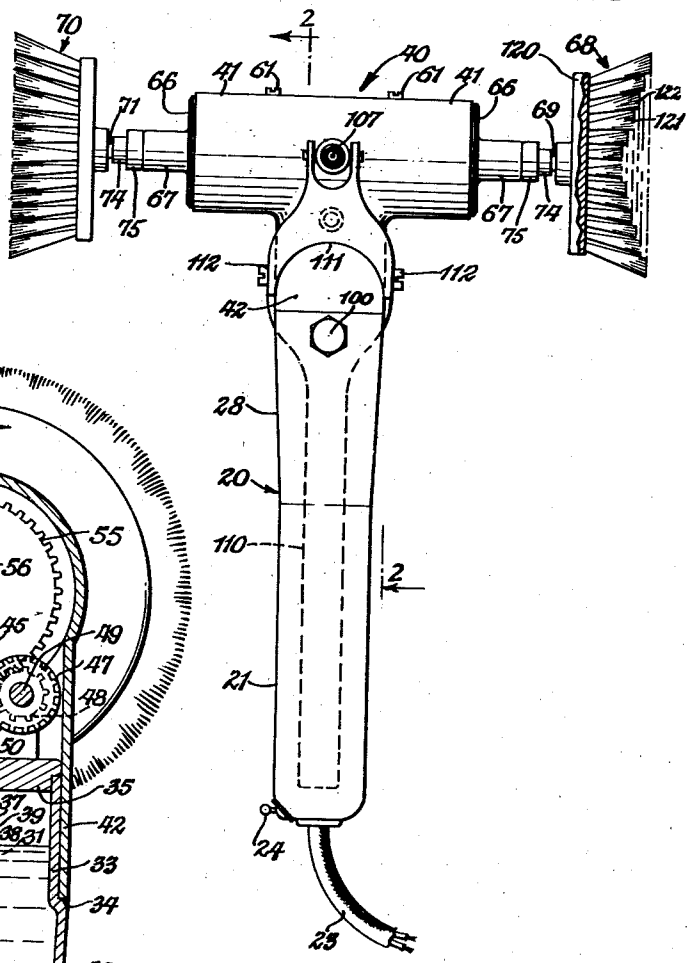
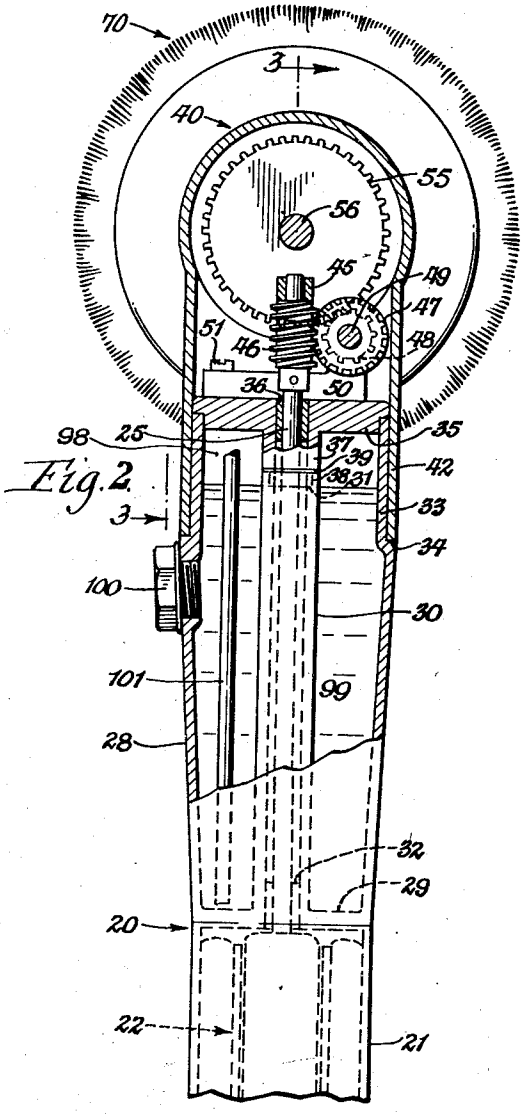


Fig. 2.



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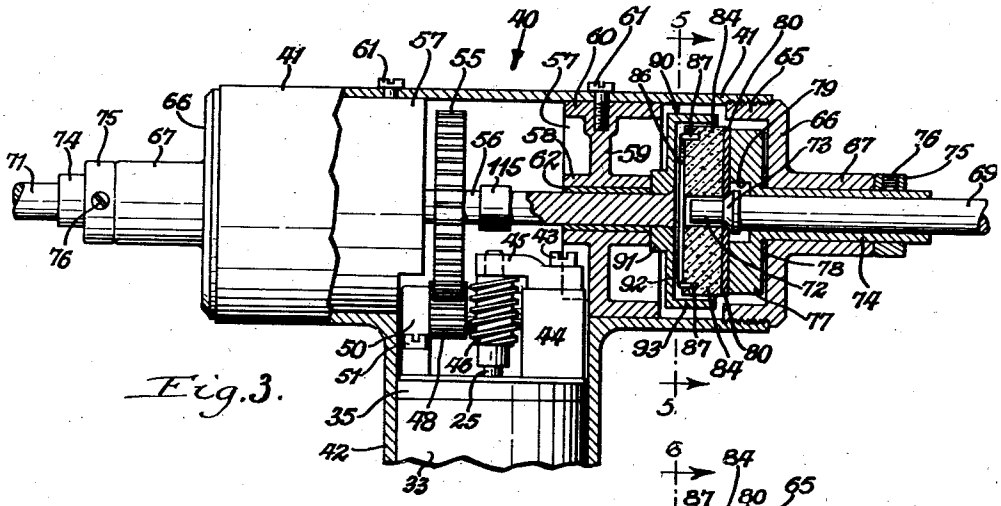


Fig. 3.

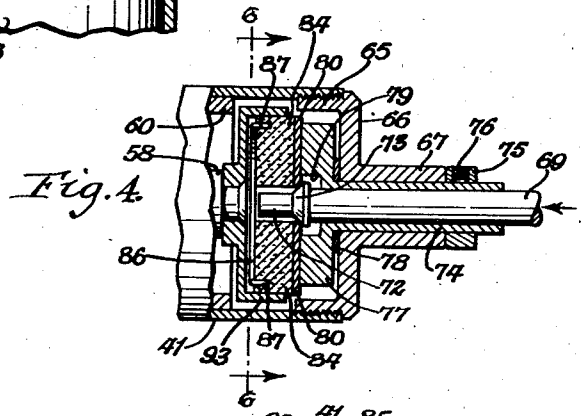


Fig. 4.

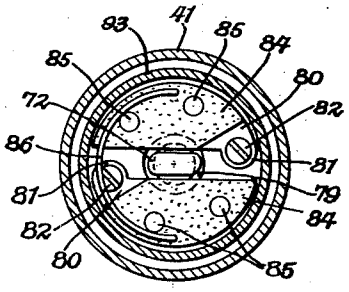


Fig. 5.

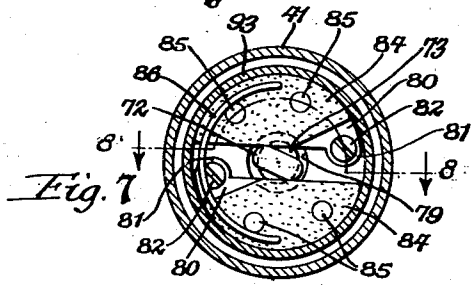


Fig. 7

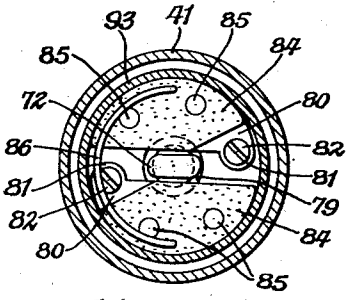


Fig. 6.

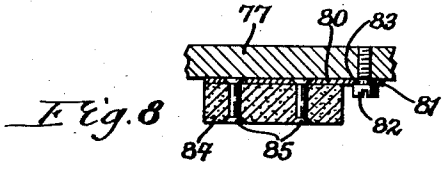


Fig. 8

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UNITED STATES PATENT OFFICE

2,301,849

WINDOW CLEANING DEVICE

Andrew Bialy, Buffalo, N. Y., assignor of fifty-one per cent to Charles G. Duffy, Jr., Buffalo, N. Y.

Application November 12, 1940, Serial No. 365,251

2 Claims. (Cl. 15—28)

This invention relates to rotary cleaning devices and more particularly to a power driven rotary window cleaning device adapted to be manually used.

The principal object of the present invention is to provide a power driven window cleaning device which can be held in the hand of the operator and readily manipulated to clean and polish both sides of a window in a rapid and efficient manner, this device including a pair of brushes each of which is mounted on the end of a power driven shaft and one of these brushes being adapted to wash or clean the window and the other brush being adapted to buff or polish the window. Each of the brushes is disposed in a lateral direction of the handle of the device and either brush can be put into its operable position by the operator merely turning the device in his hand. To clean the outside of the window with this cleaning device the operator merely extends his arm through the partially opened window and pushes or presses the cleaning brush against the outside of the window. The pressure against this brush actuates clutch means which operate to rotate the brush and if this pressure is removed, as when the brush is pulled out of contact with the window, the brush ceases to rotate. After this first cleaning step has been completed, the operator merely turns the device around in his hand and pushes the polishing brush against the window, this brush also being rotated by clutch means actuated by the pressure on the brush. It will therefore be seen that the outside of a window in a building can be efficiently cleaned and polished from the inside of the building in one operation without the operator continually withdrawing and extending his arm through the open window in separate operations for the cleaning and polishing steps and without requiring the operator to be physically present on the outside of the building. As presently practiced, the cleaning the windows of buildings, especially the windows of high office buildings, generally requires the window cleaner to be physically present on the outside of the building which involves great hazard and risk of injury and loss of life, all of which is eliminated by the use of the present invention since all operations involved in the cleaning and polishing of the outside of the window can be performed from the inside of the building.

A further object is to provide such a cleaning device which is low in cost, light in weight, simple in construction and which will not get out of order under conditions of severe and constant use and wear.

Further objects of the invention will appear from the following detailed description of the same, wherein:

Fig. 1 is a side elevation of the power driven cleaning device embodying my invention.

Fig. 2 is an enlarged, fragmentary, vertical, transverse section, taken generally on line **2—2**, Fig. 1 and showing the pump and its associated parts for discharging a quantity of cleaning liquid.

Fig. 3 is an enlarged, fragmentary, vertical, longitudinal view, partially in section, taken generally on line **3—3**, Fig. 2.

Fig. 4 is a fragmentary view, similar to Fig. 3, and showing the initial engagement of the clutch means which controls the rotation of one of the brush shafts, this initial clutch engagement being effected by the inward dispacement of the brush shaft.

Fig. 5 is a vertical, transverse section, taken on line **5—5**, Fig. 3.

Fig. 6 is a vertical, transverse section, taken on line **6—6**, Fig. 4 and showing the initial engagement of the clutch.

Fig. 7 is a view similar to Fig. 6 but showing the driving engagement of the clutch with the flattened end of the corresponding brush shaft.

Fig. 8 is a fragmentary, horizontal, transverse section, taken on line **8—8**, Fig. 7.

In its general organization, the cleaning device comprises a handle upon the top of which is transversely mounted a head. The handle houses a power unit which actuates a pair of rotary brushes arranged at the opposite ends ofthe head, each of these brushes being mounted on an individual shaft adapted to be operatively connected to the power unit. Clutch means are interposed between each brush shaft and the power unit and operate to rotate each brush only when an inward pressure is exerted upon the brush shaft causing the same to be displaced slightly inwardly of the head, such as when the brush is held or pressed against the window being cleaned. When the brush is not being used, the clutch means operate to disengage the brush shaft with the power unit and thereby prevent rotation of the brush.

The handle, indicated generally by the numeral **20**, may be of any suitable form but preferably includes a cylindrical base section **21** which houses the power unit **22**. Any suitable power unit can be employed and as shown an electric motor is suitably mounted within the base section **21**. The electric motor **22** is connected to a source of electrical energy by a line **23** which preferably passes through an opening provided in the bottom of the handle **20**, as best shown in Fig. 1. A manually operable switch **24** is also preferably arranged adjacent the bottom of the handle and serves to turn the motor **22** on and off. The electric motor **22** is provided with a motor or driving shaft **25** which extends upwardly centrally of the handle **20**.

An intermediate handle section 28 is arranged on top of the base section 21 and constitutes an upward handle extension of the base section 21. The outer wall of this section 28 preferably tapers outwardly from its bottom 29 towards its upper end and this section is also internally and centrally provided with an integral upstanding sleeve 30 which preferably terminates at a point short of the upper end of the outer wall of the section 28. The upper end of the sleeve 30 is formed to provide an internal annular shoulder 31. A bushing 32 is interposed between the motor shaft 25 and the sleeve 30 adjacent its bottom portion and serves as a bearing for the motor shaft. The upper portion of the outer wall of the intermediate section 28 is formed to provide an upstanding, slightly contracted annular neck 33 thereby providing an external annular shoulder 34. A cap or top 35 closely fits and is supported on the upper end of the neck 33 thereby providing a leak tight chamber within the intermediate section 28 which chamber is utilized for a reservoir for the cleaning liquid.

The cap 35 is provided with a central bore which receives a bushing 36 which serves as an upper bearing for the motor shaft 25. The cap 35 is also formed to provide a central depending annular neck 37 the lower end of which is formed to provide a contracted annular extension 38 which is adapted to engage the internal annular shoulder 31 provided on the upper end of the sleeve 30. In order to insure a leaktight joint at this point a gasket 39 is interposed between the end of the sleeve 30 and the end of the neck 37.

A casing head, indicated generally by the numeral 40, is mounted on the upper end of the handle 20, this head being of generally T-shaped form and including two laterally extending cylindrical branches or extensions 41, 41 and a downwardly extending cylindrical portion 42. The portion 42 provides the upper handle section and the lower end portion of this section is fitted over the neck 33 and secured thereto in any suitable manner, such as by being sweated thereon. The lower end of the upper handle section 42 abuts against the shoulder 34 provided on the intermediate section 28.

To the cap 35 is secured in any suitable manner, such as by a cap screw 43, a bracket or support 44 having a laterally extending arm 45 which is provided with a bore adjacent its outer end. The extreme upper end of the motor shaft 25 is journaled in this bore so as to provide a support for the end of the shaft. A worm gear 46 is fast to the motor or driving shaft 25 and serves to drive a worm wheel 47 which in turn is keyed to a pinion 48. The worm wheel 47 and the pinion 48 are rotatably mounted on a stationary horizontal stub shaft 49 which is supported at one end by the bracket 44 and at its opposite end by a bracket or support 50. The bracket 50 is also carried by the cap 35 and is secured to the same by the cap screw 51.

The pinion 48 drives a gear 55 which is fast to a driven shaft 56, the opposite end portions of the latter being journaled in trunnion members 57, 57. Each trunnion member 57 comprises a hub 58, a web 59 and an outer annular rim 60, the rim of each trunnion member being cut away adjacent the corresponding bracket 44 or 50, as best shown in Fig. 3. The trunnion members 57, 57 are each held in place within the casing head 40 and secured to the same by cap screws 61, 61. A bushing 62 is interposed between the hub 58 of each trunnion member and the driven shaft 56 so as to provide suitable bearing surfaces for this shaft. It will therefore be seen that the shaft 56 is continuously driven by the motor 25 through the worm 46, worm wheel 47, pinion 48 and gear 55.

Clutch means are provided which operate to rotate each cleaning means or brush only when it is being used as, for example, when the brush is held or pressed against a window and which render the brush inoperative when it is not being used as, for example, when the brush is withdrawn or pulled away from the window. The clutch means controlling the operation of each of the brushes is identical and therefore a description of one is deemed to apply to both. The outer end of each cylindrical branch 41 of the casing head 40 is internally threaded to receive the externally threaded, inwardly extending, flange 65 of an end head 66. An outwardly extending sleeve 67 is centrally provided on the end head 66. A brush or other suitable cleaning means 68 is suitably mounted on the outer end of a brush or cleaner shaft 69 and a brush or other suitable cleaning means 70 is also suitably mounted on the outer end of its corresponding brush or cleaner shaft 71, the latter shaft being identical with the brush or cleaner shaft 69 and hence a description of one shaft is deemed to apply to both shafts.

The inner end portion 72 of the brush shaft 69 is flattened or distorted to an out of round or noncircular shape and is of generally oblong form. Adjacent this oblong end portion 72, the brush shaft is formed to provide a conical enlargement 73. An elongated bearing sleeve 74 is interposed between the sleeve 67 and the brush shaft 69 and in order to prevent inward longitudinal movement of the sleeve 74 relative to the surrounding sleeve 67 a collar 75 is secured to the outer end of the sleeve 74 by a set screw 76. The collar 75 abuts against the outer end of the sleeve 67. The inner end of the sleeve 74 is formed to provide an enlarged annular supporting head 77, a washer 78 being preferably interposed between the outer face of the supporting head and the inner face of the end head 66. The inner end of the bore of the supporting head 77 is enlarged, as indicated at 79, to accommodate the conical enlargement 73 on the brush shaft.

Each of a pair of flat, generally segmental shaped, backing plates 80, 80 is pivotally mounted on the supporting head 77. For this purpose each plate 80 is provided at one corner with an ear 81 having a bore therein. A pivot screw 82 pivotally secures the plate 80 to the supporting head 77 and for this purpose preferably includes an annular bearing portion 83 received by the bore of the ear 81, as best shown in Fig. 8. The pair of backing plates 80 is arranged in reversed and opposed relationship to each other. A clutch jaw 84 also of generally segmental form is mounted on each backing plate 80 preferably by means of a pair of rivets 85, 85. The clutch jaws 84, 84 can be made of any suitable material, such as fiber or the like. The outer peripheries of the clutch jaws are normally maintained in concentric relation, as best shown in Fig. 5, by a C-shaped wire spring 86, the opposite ends 87, 87 of which are bent and secured to the clutch jaws.

A clutch drum 90 is secured to each end of the shaft 56 in any suitable manner, this clutch

drum comprising a hub 91, an annular web 92 and an annular flange 93, the inner face of this flange providing a clutch surface frictionally engageable by the peripheral portions of the clutch jaws 84, 84.

It will therefore be seen that when the brush shaft 69 is moved longitudinally inwardly of the casing head 40, as illustrated in Fig. 4, the conical enlargement 73 on the brush shaft will cause the backing plates 80, 80 with their clutch jaws 84, 84 to separate from each other and expand the effective periphery of the frictional engaging surfaces of the jaws, the jaws each being swung about its corresponding pivot screw 82. Since the clutch drum 90 is being continuously rotated by the electric motor 22, it will be seen that the internal peripheral face of the flange 93 will frictionally engage the clutch jaws 84, 84 thereby causing these jaws, the supporting head 77 together with its integral sleeve 74 and the collar 75 fixed to this sleeve to rotate. This initial engagement of the clutch jaws 84, 84 with the clutch drum 90 is best illustrated in Fig. 6. As there shown the clutch jaws have not been rotated as yet. As the clutch jaws continue to rotate the opposing straight edges of these jaws will engage the oblong end portion 72 of the brush shaft 69 at substantially diagonally opposite points, as shown in Fig. 7, and thereby rotate the brush shaft 69. The brush shaft will resist rotation by reason of the fact that the brush on its outer end is being held against a window, the friction between the window and the bristles of the brush tending to resist the rotation of the brush. The effect of this resistance to rotation is advantageously utilized by the cam action of the oblong end portion 72 on the clutch jaws 84, 84 which action tends to urge the jaws to a more expanded condition. This tendency of the clutch jaws for further expansion causes the jaws to exert an increased pressure on the flange 93 of the brake drum and insures a greater frictional engagement between the same. When the brush is withdrawn from the window the increased pressure producing cam action of the oblong end portion 72 on the clutch jaws 84, 84 ceases because there is no frictional resistance to the rotation of the brush and the spring 86 will return the jaws to their inoperative position shown in Fig. 5.

For the purpose of discharging or squirting a quantity of any suitable cleaning liquid on the window to be distributed by the cleaning brush 68.

As shown in Fig. 2 a chamber 98 is provided within the intermediate handle section 28 which contains a body 99 of cleaning liquid which can be replenished through the plug opening provided in the side wall, a threaded plug 100 closing this opening. The cleaning liquid is withdrawn from the supply reservoir or tank 28 by a pipe 101 which connects with the inlet of a pump of any suitable construction mounted on the handle and the liquid is squirted onto the surface to be cleaned by a nozzle 107 projecting laterally from the central part of the casing head and connected with the outlet of said pump. Control of this pump may be effected manually by a lever pivoted on the handle by pins 112 and having a lower arm 110 adapted to be engaged by the hand of the operator and an upper arm 111 operatively connected with a part of the pump for controlling its operation.

Cleaning fluid is sprayed on the window through nozzle 107, as shown in Fig. 1. This nozzle may be supplied with said fluid by a pump of any type desired.

After the operator has employed the pump to discharge a quantity of cleaning liquid on the window, he can simply turn the cleaning device through 90 degrees in either direction and thereby use either of the brushes 68 and 70. However, it is preferred that one brush, such as the brush 68, be used for cleaning the window and the other brush 70 be used as a polishing brush.

From the foregoing it will be seen that the present invention provides a power driven window cleaning device which is easily handled by the operator and manipulable by him to rapidly and efficiently clean and polish windows entirely from the inside of the building.

I claim as my invention:

1. A cleaning device, comprising a handle, a power unit having a driving shaft arranged in said handle, a casing head mounted on said handle, a driven shaft journaled in said casing head, means operatively connecting said driving shaft with said driven shaft, a cleaner shaft journaled in said casing head and extending exteriorly thereof and arranged coaxially with said driven shaft, cleaning means mounted on the outer end of said cleaner shaft, and clutch means arranged in said casing head and between said driven shaft and said cleaner shaft, comprising a clutch drum mounted on said driven shaft, a supporting head rotatably mounted on said cleaner shaft, a pair of clutch jaws pivotally mounted on said supporting head and arranged in coplanar spaced relation to each other, means for rotatably connecting said jaws with said cleaner shaft and means on said cleaner shaft adapted to rotate said jaws about their corresponding pivots into frictional engagement with said drum by the longitudinal displacement of said cleaner shaft inwardly of said casing head thereby to rotate said cleaner shaft.

2. A cleaning device, comprising a handle, a power unit having a driving shaft arranged in said handle, a casing head mounted on said handle, a driven shaft journaled in said casing head, means operatively connecting said driving shaft with said driven shaft, a cleaner shaft journaled in said casing head and extending exteriorly thereof and arranged coaxially with said driven shaft, cleaning means mounted on the outer end of said cleaner shaft, and clutch means arranged in said casing head and between said driven shaft and said cleaner shaft, comprising a clutch drum mounted on said driven shaft, a supporting head rotatably mounted on said cleaner shaft, a pair of backing plates arranged in coplanar spaced relation to each other and each of which is pivotally mounted on said supporting head, clutch jaws secured respectively to said backing plates and rotatable bodily about the axis of said cleaner shaft, spring means for urging said jaws toward each other, a conical enlargement on said cleaner shaft adapted by the longitudinal movement of said cleaner shaft to rotate said jaws about their corresponding pivots into frictional engagement with said drum and a noncircular member provided on the inner end of said cleaner shaft and arranged between said jaws in such manner that said jaws engage said member to rotate said cleaner shaft upon the rotation of said jaws about the axis of said cleaner shaft.

ANDREW BIALY.