Sept. 21, 1954 G. BIEK 2,689,369

SQUEEGEE FOR CLEANING CURVED AND STRAIGHT SURFACES

Filed Aug. 5, 1952

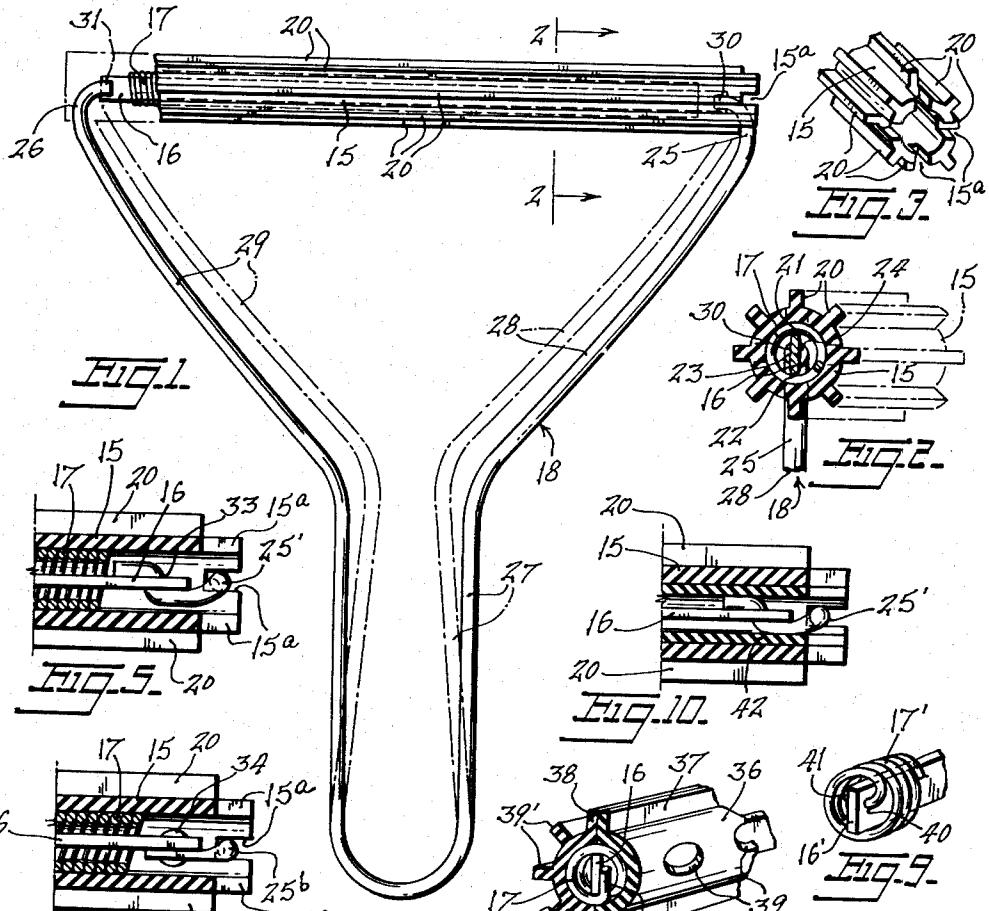

Fig. 1.

Fig. 3.

Fig. 2.

Fig. 5.

Fig. 10.

Fig. 6.

Fig. 8.

Fig. 9.

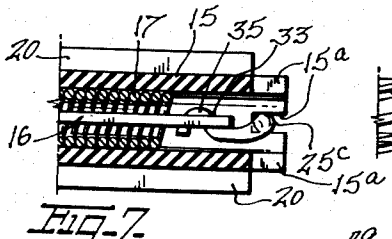

Fig. 7.

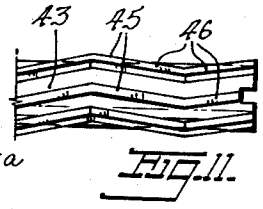

Fig. 11.

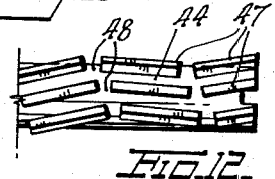

Fig. 12.

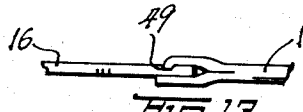

Fig. 13.

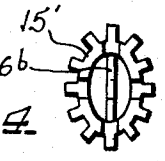

Fig. 4.

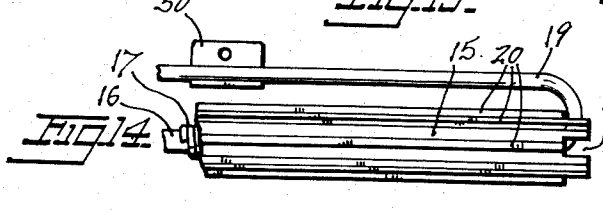

Fig. 14.

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UNITED STATES PATENT OFFICE

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SQUEEGEE FOR CLEANING CURVED AND STRAIGHT SURFACES

George Biek, Long Island City, N. Y.

Application August 5, 1952, Serial No. 302,790

19 Claims. (Cl. 15—245)

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This invention relates to new and useful improvements in squeegees for cleaning or clearing curved as well as straight surfaces.

More particularly, the present invention proposes the construction of an improved squeegee which can be used as a hand surface cleaner for both straight and curved surfaces such as plate glass windows or store fronts with equally successful results.

Another object of the present invention proposes forming the squeegee with a rubber or other resilient tube having a flexible bar therein to keep it straight when drawn across a flat surface and to permit it to bend only over a curved surface.

Still further, the present invention proposes constructing the squeegee so that the blade bearing tube will not collapse when bent and can be easily changed when the blades become nicked or worn.

As a further object, the present invention proposes arranging the blade bearing tube so that it will cover all internal structure and prevent any inadvertent scratching of surfaces when using the squeegee.

The present invention further proposes a novel squeegee structure, simple and inexpensive to make, with an improved blade structure and with the blade holding tubular member having the minimum resistance to bending for cleaning curved surfaces.

For further comprehension of the invention and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is an elevational view with parts broken away illustrating the squeegee of the present invention in a frame for hand use, the curved surface cleaning position of the handle being indicated in dot-dash outline.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1 with the curved surface cleaning position being shown in dot-dash outline.

Fig. 3 is a fragmentary perspective end view of the squeegee member.

Fig. 4 is an end view showing a modified form of squeegee used in this device.

Fig. 5 is a fragmentary detail view showing one end of the frame removably attached to the flexible bar mounting the other structure.

Fig. 6 is a view similar to Fig. 5 but illustrating a permanent attachment of the frame with the flexible bar.

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Fig. 7 is a view similar to Fig. 6 illustrating another permanent attachment.

Fig. 8 is a fragmentary detail perspective view showing a modified form of blade holding tube and indicating one anchoring means for a coil spring inside the tube to keep it from collapsing when bent.

Fig. 9 is a fragmentary detail perspective view illustrating another way the coil spring may be anchored to prevent it from rotating.

Fig. 10 is a view similar to Figs. 5, 6 and 7 but showing a modification of the present invention.

Fig. 11 is a fragmentary view showing a blade holding tube having the wiping blades in modified form.

Fig. 12 is a view similar to Fig. 11 but illustrating a further modification of the blade structure.

Fig. 13 is a fragmentary detail view illustrating how the flexible bar may be fastened to a windshield wiper holder.

Fig. 14 is another fragmentary detail view similar to Fig. 13 but showing further details.

The squeegee of the present invention consists of but three parts, a blade bearing tube 15, a flexible bar 16 and a coil spring 17. Means, however, must be provided to hold the flexible bar from turning and to permit it to be flexed. Such means may either be a frame 18 (Figs. 1 to 7) or a windshield wiper holder arm 19 (Figs. 13 and 14). In this manner, a squeegee is formed, a squeegee being a device with a handle and a transverse piece at one end of it set with a strip of leather or rubber and used for drying surfaces such as decks, windows, store fronts and the like by squeezing off superfluous moisture, transferring materials evenly to surfaces, etc.

The squeegee, in accordance with the first form of the invention illustrated in Figs. 1 to 7 has a blade bearing tube 15 in the form of a resilient normally straight hollow cylindrical blade bearing member with axially disposed rib wiping blades 20 thereon. The blade bearing member 15 preferably is a rubber tube having the rib wiping blades 20 molded on its outer surface extending outwardly of the tube. If desired, the tube may be made of shape retaining somewhat stiff rubber and the blades 20 of softer rubber. Any number of blades may be provided extending in spaced relation entirely around the tube 15.

Flexible bar 16 fits inside the blade bearing tube 15. The bar 16 is flat having side edges 21 and 22 of less thickness than the width of

its side faces 23 and 24 so that the bar will tend to be rigid edgewise in the plane of its width, but can be flexed in a plane transverse its width. Bar 16 is preferably a spring bar made of spring steel or similar material.

The ends of the bar 16 are held by the two spaced free ends 25 and 26 of frame 18. The frame 18 is a one piece wire forked frame. The continuous piece of spring wire is bent to form a handle portion 27 below the branched arms 28 and 29. The ends of the tubular member 15 are provided with end slots 15a adapted to be engaged by the ends 25 and 26 of the frame 18, to prevent rotation of the tube 15 and enabling the tube to extend at least to a point flush with the frame extremities.

Free end 25 of the frame 18 is provided with a vertical slot 30 positioned in a plane parallel to that in which the two arms 28 and 29 and the handle 27 of the frame lies. Free end 26 has a similarly disposed slot 31. The two slots, 30 and 31 receive the ends of the bar 26, the arms 28 and 29 being pulled apart to separate the free ends 25 and 26 and then released when the bar is between these ends 25 and 26 so that the slots 30 and 31 engage the ends of the bar. The spring tension of the wire frame 18 holds the bar in the slots 30 and 31. The spring bar is disposed with its side faces 23 and 24 parallel to the plane of the frame.

Coil spring 17 fits over the bar 16 between the bar 16 and the blade bearing tube 15 forming a resilient stiff tubular member between the blade bearing member 15 and the bar 16 to keep the tubular member 15 from collapsing when bent. Preferably, coil spring 17 is anchored to the bar 16 as by having one end 32 bent over on one side of the bar 16 as shown in Fig. 8. Both ends of the spring may be similarly anchored if desired. The coil spring fits tightly inside the blade bearing tube 15 to keep the tube from rotating when drawn across a surface.

The tube 15 preferably extends over the ends of the coil spring and flush with the outer extremities of arms 28 and 29 so there is no chance for the spring, bar, or arms to scratch a surface when the wiper blades are cleaning it.

In cleaning or clearing curved surfaces, the bar 16 will flex and the blade bearing tube 15 will bend to conform to the curved surface but the bar will hold the tube straight for flat or straight surfaces. Handle portion 27 of the wire frame 18 will force the resilient tube 15 into the curved shape indicated by the dot-dash lines of Figs. 1 and 2 for cleaning curved surfaces.

In Fig. 4 the resilient tube 15' is shown to be of elliptical or oval shape in which a corresponding bar 16b is shown, the longer dimension of the oval accommodating the width of the bar.

Fig. 5 indicates how the frame may be removably attached to the bar so that the blade bearing tube may easily be replaced. Bar 16 is provided with an opening 33 at each end and the free ends of the wire frame are bent as end 25' shown in Fig. 5 so as to fit through the openings and engage the bar, the wire spring tension of the frame holding them tightly against the bar and putting the bar in tension.

In the modifications shown in Figs. 6 and 7, the frame ends are secured as end 25b shown by a rivet 34 in Fig. 6 and by a punched up portion 35 on the bar extending through opening 33 and riveted over at the top of the bar as shown at the frame end portion 25c.

The modification illustrated by Fig. 8 is characterized by the flexible blade bearing tube 36 (corresponding to tube 15) being formed of two sections or portions 37 and 38. Portion 37 is provided with openings 39 to permit the tube to bend easily, the open weakened structure offering less resistance to bending. The mating portion 38 of tube 36 is provided with rib blades 39' and the two sections or portions 37 and 38 are cemented, vulcanized or otherwise secured together. Coil spring 17 inside the tube 36 prevents it from collapsing when bent.

Another anchoring means is shown for the coil spring 17' in Fig. 9. Bar 16' is provided with a marginal opening 40 and one end 41 of the coil spring is bent downwardly across the end of the coil to extend through this opening and bear against the bar. Both ends of the coil spring and bar may be so arranged.

In place of the coil spring 17, a resilient tube 42 of rubber, plastic or the like may be provided as shown in Fig. 10.

The modifications illustrated in Figs. 9 and 10 are characterized in that the blade bearing tubes 43 (Fig. 11) and 44 (Fig. 12) have their blade ribs formed in a new manner. In Fig. 11, the raised rib blades 45 are not straight for the entire length of the tube but consist of a plurality of short parallel spaced portions 46 each disposed at an angle to the adjacent portion of the same continuous rib to present a tread effect. In Fig. 12, the rib blades 47 consist of short broken lengths having openings 48 through the ribs, the openings 48 being spaced out of alignment.

Figs. 13 and 14 illustrate how the squeegee may be held for use as a windshield wiper. Bar 16 is provided with end openings 49 (only one end opening being shown) and a windshield wiper holder arm 19 engages the bar clamping in these openings. The arm 19 is also provided with a bracket 50 for connection to wiper mechanism, not shown.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. A squeegee for curved surfaces comprising a resilient normally straight hollow blade bearing member having axially disposed rib wiping blades thereon, a flat flexible bar in said member to keep it straight when drawn across a flat surface and to permit it to bend only over a curved surface, a resilient stiff tubular member between the blade bearing member and the bar to keep said member from collapsing when bent, and means to hold the ends of the flexible bar for drawing the blade bearing member over the surface to be cleaned, whereby the flexible bar maintains said blade bearing member straight over a flat surface and curved over a curved surface in conformance therewith.

2. A squeegee for curved surfaces comprising a resilient normally straight hollow cylindrical blade bearing member having axially disposed rib wiping blades thereon, a flat flexible bar in said member to keep it straight when drawn across a flat surface and to permit it to bend only over a curved surface, a resilient stiff tubular member between the blade bearing member and the bar

to prevent said member from rotating on the bar and from collapsing when bent, and means to hold the ends of the bar and prevent the bar from turning.

3. A squeegee for curved surfaces comprising a resilient normally straight hollow cylindrical blade bearing member having axially disposed rib wiping blades, a flat flexible bar inside said hollow member to keep it straight when drawn across a flat surface and to permit it to bend only over a curved surface, a resilient stiff tubular member between the blade bearing member and the bar to prevent said member from rotating on the bar and from collapsing when bent, and means releasably and rigidly to hold the ends of the bar for drawing the rib blades of the blade bearing member over the surface to be cleaned.

4. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades on it, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, and means rigidly to hold the ends of the bar with the bar disposed in the tube with the width of the bar in a plane preventing the tube from bending in that plane for cleaning flat surfaces and the depth of the bar in a plane permitting the bar to flex and the tube to bend over curved surfaces.

5. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said bar extending between the spaced free ends of the frame and having its ends fastened to said ends of the frame.

6. A squeege for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat spring bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said spring bar extending between the spaced free ends of the frame and having openings to receive said ends, said spaced free ends of the frame being bent to pass through said openings in the bar when the spring frame is squeezed and its spaced free ends are moved toward one another and to engage the bar when the squeezing pressure on the spring frame is released.

7. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat spring bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said spring bar extending between the spaced free ends of the frame and having openings to receive said ends, said spaced free ends of the frame being bent to pass through said openings in the bar when the spring frame is squeezed and its spaced free ends are moved toward one another and to engage the bar when the squeezing pressure on the spring frame is released, and means to anchor the coil spring to the bar to prevent it from rotating, said coil spring being of a diameter frictionally to prevent the tube in which it fits from rotating.

8. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat spring bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said spring bar extending between the spaced free ends of the frame and having openings to receive said ends, said spaced free ends of the frame being bent to pass through said openings in the bar when the spring frame is squeezed and its spaced free ends are moved toward one another and to engage the bar when the squeezing pressure on the spring frame is released, and means to anchor the coil spring to the bar to prevent it from rotating, said coil spring being of a diameter frictionally to prevent the tube in which it fits from rotating, said coil spring anchoring means being an end portion of the coil spring bent to underlie the bar.

9. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat spring bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said spring bar extending between the spaced free ends of the frame and having openings to receive said ends, said spaced free ends of the frame being bent to pass through said openings in the bar when the spring frame is squeezed and its spaced free ends are moved toward one another and to engage the bar when the squeezing pressure on the spring frame is released, and means to anchor the coil spring to the bar to prevent it from rotating, said coil spring being of a diameter frictionally to prevent the tube in which it fits from rotating, said coil spring anchoring means being an end portion of the coil spring bent across the end of the coil spring, said bar having an opening to receive said bent end of the coil spring.

10. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat spring bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said spring bar extending between the spaced free ends of the frame and having its ends riveted to the free ends of the frame.

11. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a flexible plastic tube around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said bar extending between the spaced free ends of the frame and having its ends fastened to said ends of the frame.

12. A squeegee for curved surfaces comprising

a rubber tube having axially disposed rib wiping blades thereon, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said bar extending between the spaced free ends of the frame and having its ends fastened to said ends of the frame, said rubber tube extending beyond the coil spring and the frame to prevent surface scratching by the spring or the frame.

13. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades on it, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, and means rigidly to hold the ends of the bar with the bar disposed in the tube with the width of the bar in a plane preventing the tube from bending in that plane for cleaning flat surfaces and the depth of the bar in a plane permitting the bar to flex and the tube to bend over curved surfaces, said rubber tube having two half sections secured together with the rib wiping blades formed on one section and spaced openings in the other section to provide less resistance to binding.

14. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said bar extending between the spaced free ends of the frame and having its ends fastened to said ends of the frame, said rubber tube having two half sections secured together with the rib wiping blades formed on one section and spaced openings in the other section to provide less resistance to binding.

15. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades on it, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, and means rigidly to hold the ends of the bar with the bar disposed in the tube with the width of the bar in a plane preventing the tube from bending in that plane for cleaning flat surfaces and the depth of the bar in a plane permitting the bar to flex and the tube to bend over curved surfaces, said rib wiping blades being a plurality of spaced ribs having short parallel portions each disposed at an angle to the adjacent portions of the same rib.

16. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said bar extending between the spaced free ends of the frame and having its ends fastened to said ends of the frame, said rib wiping blades being a plurality of spaced ribs having short parallel portions each disposed at an angle to the adjacent portions of the same rib.

17. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades on it, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, and means rigidly to hold the ends of the bar with the bar disposed in the tube with the width of the bar in a plane preventing the tube from bending in that plane for cleaning flat surfaces and the depth of the bar in a plane permitting the bar to flex and the tube to bend over curved surfaces, said rib-wiping blades being a plurality of spaced ribs having openings through the ribs, said openings being spaced out of alignment.

18. A squeegee for curved surfaces comprising a rubber tube having axially disposed rib wiping blades thereon, a flat flexible bar inside the rubber tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a one piece bent wire forked frame having two spaced free ends and a handle portion, said bar extending between the spaced free ends of the frame and having its ends fastened to said ends of the frame, said rib-wiping blades being a plurality of spaced ribs having openings through the ribs, said openings being spaced out of alignment.

19. A windshield wiper blade comprising a rubber tube having axially disposed rib wiping blades thereon, a flat spring bar inside the tube to support it and keep it straight when drawn across a flat surface, a coil spring around the bar between the bar and the tube to prevent the tube from collapsing when bent, a windshield wiper holder having free ends secured to the ends of the bar to draw said tube across a windshield with a curvature conforming to the surface thereof and means on the holder to fasten it to the windshield wiper activating mechanism on a vehicle.

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