

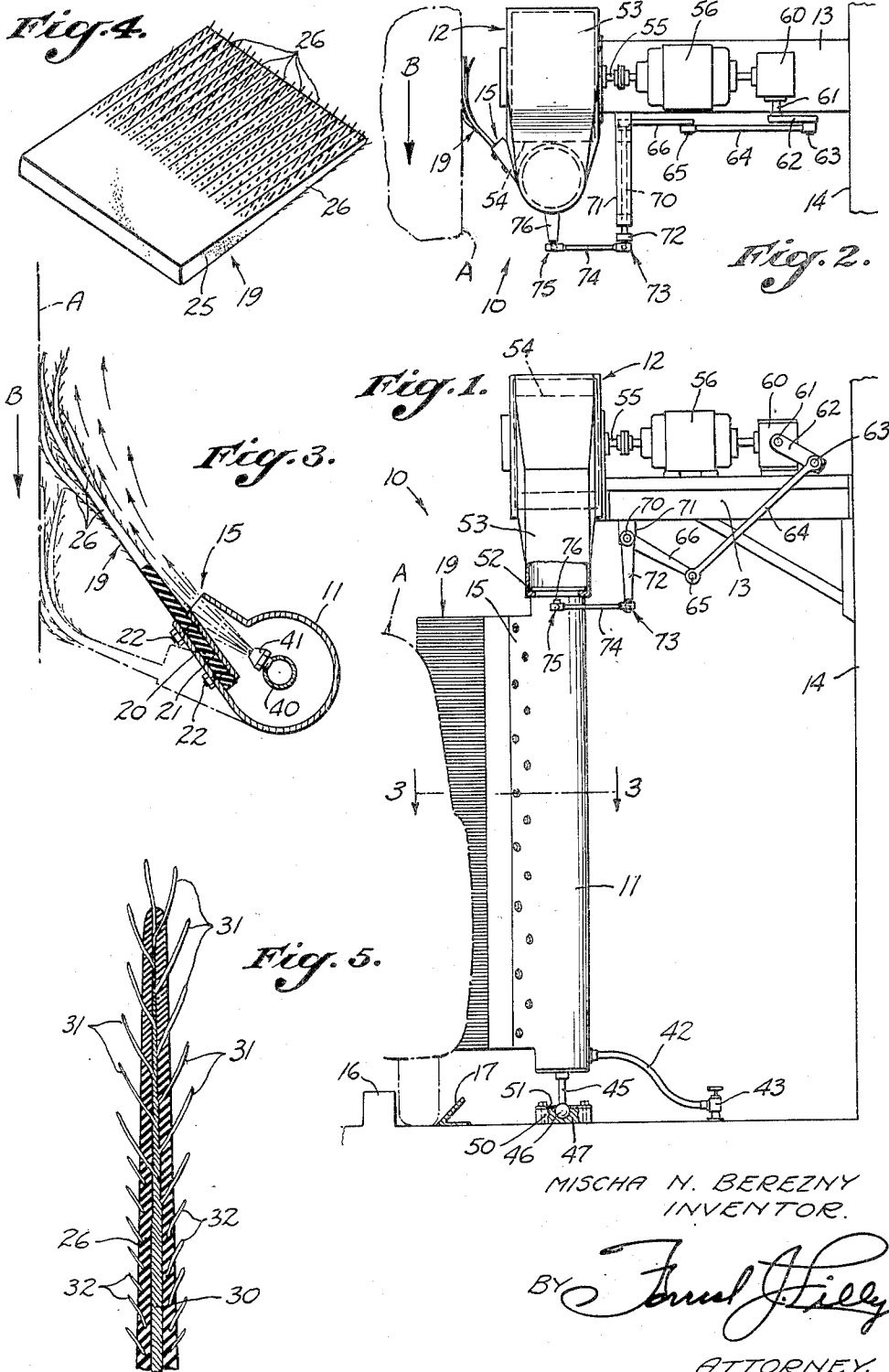
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AUTOMATIC CAR WASHER WITH AIR-ACTUATED AGITATOR

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AUTOMATIC CAR WASHER WITH AIR-ACTUATED AGITATOR

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The present invention relates generally to automatic washers of the type used primarily to wash automobiles, and is of a general type wherein the surface to be washed is sprayed with a strong detergent solution and then scoured or scrubbed by the beating action of the tip ends of a plurality of closely spaced, relatively thin strips of soft, flexible material which are whipped into a fluttering vibrational movement by a high velocity stream of air or liquid, or by mechanical means.

In this type of machine there is employed a fringe-like member of rubber or other soft and resilient material, one edge of which is attached to a supporting air conduit structure, and the other edge being slit to form long slender strips. A blast of air issuing from a nozzle extending along the length of the conduit carries the free ends of the strips out with it, yieldingly pressing the same against the surface to be washed, and at the same time whipping the tip ends of the strips into a fluttering vibration so that the said tip ends are caused to beat against the surface. This beating action of the tip ends of the strips, together with a certain amount of rubbing action against the surface which has been found to take place, produces a scouring or scrubbing effect similar to that obtained with a rotary brush.

I have found that the effectiveness of this type of washer is greatly increased by oscillating or reciprocating the fringe-like scrubber with respect to the surface to be washed as the latter moves through the machine; due, apparently, to the increased rubbing or wiping action of the tip ends of the strips against the surface which results from such movement. It is the primary object of the present invention, therefore, to provide a washer of the type referred to, wherein the fringe-like scrubber is mounted for movement relative to the surface to be washed, and wherein means is provided for moving the same constantly while the machine is in operation. In the preferred form of my invention, as disclosed herein, this motion of the scrubber relative to the surface is obtained by oscillating the air conduit on which the scrubber is mounted, although it will be self-evident that a reciprocatory movement could be used to equal advantage, with the air conduit being suitably mounted for reciprocation parallel to the path of travel of the automobiles.

Another discovery that I have made is that the effectiveness of the fringe-like scrubber is considerably improved if each of the strips is

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roughened, as by tasseling or bristling its free end, either by slitting the end of the strip to form a plurality of thread-like strips, or by providing fibrous threads or bristles at the end of the strip; said threads being either cemented to or embedded in the strips with just their ends exposed, or being fastened as tufts to the ends of the strips. The beating and rubbing of these tasseled or bristled ends of the strips against the surface to be washed produces a gentle yet thorough scrubbing and wiping action that effectively loosens and removes all soil over the entire surface, leaving the surface spotlessly clean. Another object of the invention, therefore, is to provide a scrubbing device for automatic car washers of the class described, comprising a plurality of closely spaced, relatively thin strips of soft, flexible material, such as rubber, wherein the free ends of the strips are tasseled or bristled with threads or fibers or otherwise roughened.

The foregoing and other objects and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiment thereof, reference being had to the accompanying drawings, wherein:

Figure 1 is an elevational view of one of the side units of an automatic car washer, embodying the principles of the invention;

Figure 2 is a top plan view of the same;

Figure 3 is a transverse sectional view through the air conduit structure and fringe-like scrubber, taken at 3—3 in Figure 1;

Figure 4 is a perspective view of a portion of the flexible scrubbing member removed from the air conduit; and

Figure 5 is an enlarged sectional view taken through the tip end of one of the strips of the flexible scrubbing member, showing one method whereby fibrous threads or bristles may be attached to the strip.

In the drawings, the side unit of the automatic car washer is designated in its entirety by the reference numeral 10, and is seen to comprise a vertically disposed air conduit 11 of relatively large diameter which is connected to a motor driven blower 12 mounted on a bracket or shelf 13 projecting outwardly from a wall 14. Formed along one side of the conduit 11 is a longitudinally extending nozzle portion 15 which is directed so as to discharge a blast of air against the surface of an automobile A as the latter is pulled through the machine. A typical installation for an automatic car

washer of the type referred to is illustrated and described in more detail in my pending application, Serial No. 76,011, now abandoned, to which reference may be had. It is believed that a more detailed description of the car washing installation is unnecessary here, other than to add that there is another side unit similar to unit 10 located on the other side of the automobile, while a third unit is suspended overhead, transverse to the line of travel of the automobiles, to wash the top surfaces thereof. The automobiles are drawn through the car washer between the side units 10 by a conveyor chain running in a channel in the floor; the said conveyor chain being connected to the bumper of the automobile by a short length of tow chain which is adapted to be hooked over the bumper, in a manner well known in the art. A low concrete curb 15 projects upwardly from the floor parallel to the conveyor chain, and engages the inside wall of the tires on one side of the car to guide the same through the washer. On the outside of the tire is an angle iron guide rail 17 which engages the outside wall of the tire to hold the wheels to their course.

The fringe-like scrubbing member of the invention is designated in its entirety by the reference numeral 19, and is preferably, although not necessarily, attached to the inside surface of a lip 20 forming one side of the nozzle 15. The member 19 is illustratively shown as being clamped to the lip 20 by a plate 21 which is clamped tightly against the member 19 by bolts 22.

The preferred form of the fringe-like scrubbing member 19 is best shown in the perspective view of Figure 4, wherein it will be seen that the member comprises a relatively flat strip 25 of soft rubber or other flexible, rubber-like material which tapers in thickness from one edge to the other. The thicker or base edge portion of the member 19 is attached to the nozzle lip 20, and the thinner edge thereof projects for a considerable distance beyond the nozzle, as best shown in Figure 3. The body 25 of the member 19 is slit back for a considerable distance from the thin edge thereof, forming a plurality of long, relatively narrow, closely spaced flexible strips or whips 26 which are adapted to contact the surface to be washed.

The strips 26 may take any of several forms. For example, they may be smoothly tapered out to their tip ends, or provided with knob-like enlargements on their ends, such as I have shown in my aforementioned application; the purpose of such enlargements being to increase the mass at the outer ends of the strips so that the tip ends of the strips beat against the surface to be washed with greater force than would otherwise be the case. However, I have found that the effectiveness of the fringe-like scrubber 19 is considerably improved if each of the strips 26 is roughened on its outer surfaces, or if the strips are bristled with coarse, fibrous threads, or tasseled with tufts of fibrous threads.

The strip illustrated in Figure 5 is typical of the preferred form of my invention, and shows a twisted, multi-strand cord 30 that is embedded centrally in the strip 26 and extends lengthwise thereof. Adjacent the outer end of the strip, the strands of the cord 30 are progressively unwound and brought out through opposite sides of the strip 26, forming projecting bristles or threads 31 which are preferably about one inch in length, although the exact length is not believed to be important. The bristles 31 may be stiffened by impregnating them with rubber or one of the

resins, either natural or synthetic, or they may be left soft and pliable. Preferably, the long bristles 31 project outwardly from the surface of the strips 26 for about one-third of the length of the strip back from the outer tip ends thereof. Above this point, each of the strips 26 is bristled for the balance of its length with shorter bristles or fibers 32 which are preferably embedded in the strip at the time the member 19 is molded. The shorter bristles 32 may be only one-eighth to one-quarter of an inch in length, and therefore are relatively stiffer than the longer bristles 31.

When a blast of air issues from the nozzle 15, the strips 26 are carried outwardly with the stream and are agitated violently, setting up a fluttering, whipping action of the strips which causes the tip end portions thereof to beat against the surface of the automobile. The direction of travel of the automobile A through the machine is indicated by the arrow B, and it will be noted from Figures 2 and 3 that the fringe-like scrubbing member 19 is directed rearwardly against the side of the automobile and at an angle thereto, with the outer end portions of the strips 26 lying flat against the side of the automobile. The snapping fluttering motion of the ends of the strips 26 causes the latter to beat and rub against the surface of the automobile, producing a scouring or scrubbing effect similar to that of a rotary brush, so that any loosened particles of soil are dislodged and either carried away by the air stream or rinsed off by the rinsing spray which is also discharged against the side of the automobile.

In the broadest aspect of the invention, it is contemplated that the whipping vibration of the strips 26 might also be produced by the action of a high velocity jet of water or other fluid discharged alongside the strips, or by mechanical means. In the case of mechanical vibration of the strips, it would be necessary, of course, to provide sufficient stiffness in the strips 26 to maintain the tip end thereof in yielding contact with the surface to be washed. It should be understood also that the strips 25 need not necessarily be joined to a common body 25, but might be entirely separate from one another.

Preferably, the car washer is provided with a series of spray nozzles (not shown) arranged ahead of the apparatus depicted in Figures 1 and 2, which spray the car with strong detergent solution so that grease, road oil, and other surface films are emulsified and loosened before the car is advanced to the scrubbing station. Each of the units 10 is preferably, although not necessarily, provided with a liquid supply pipe 40 having spray nozzles 41 connected thereto at intervals. The pipe 40 extends parallel to the conduit 11 and may be located on the inside of the conduit, as shown in Figure 3, or it may be attached to the outside thereof by suitable mounting brackets. In either case, the nozzles 41 are directed into the blasts of air issuing from the nozzle 15, so that the liquid spray is mingled with the stream of air and carried thereby to the surface being washed.

The liquid supply pipe 40 may carry detergent solution to aid in emulsifying stubborn grease or oil films or it may carry clear rinse water which serves to rinse off the detergent solution applied previously, together with particles of soil loosened by the beating and rubbing of the strips 26 against the surface of the automobile. If the liquid supply pipe 40 carries detergent solution, it will be necessary, of course, to provide a rinsing station

beyond the apparatus shown in Figures 1 and 2, which might consist either of a series of nozzles arranged to direct a spray of clear rinse water at the car from all sides, or the rinsing station might consist of another arrangement of conduits 11, fringe-like scouring members 19, and rinse water supply pipes 40, together with nozzles 41. In each case, the bottom end of the liquid supply pipe 40 is bent to pass outwardly through the wall of the conduit 11, and is connected by a flexible hose 42 to a liquid supply valve 43.

The conduit 11, with its attached scrubber 19, is pivotally mounted for oscillation about its longitudinal axis. To this end, there is a shank 45 fixed to the bottom end of the conduit 11 and projecting downwardly therefrom, and mounted on the bottom end of the shank 45 is a ball 46 which is seated in a socket 47 in a base plate 50. A cover plate 51 is bolted to the top surface of the base plate 50, and confines the ball 46 to its socket.

The top end of the conduit 11 is rotatably held by a collar 52 at the discharge end of the housing 53 of blower 12. Blower 12 is preferably of the centrifugal type, and comprises a squirrel cage rotor 54 mounted within the housing on a shaft 55 which is operatively connected to the drive shaft of an electric motor 56.

The other end of the motor drive shaft is connected to a right-angle-drive, speed-reduction gear box 60, the output shaft 61 of which has a crank 62 mounted thereon. At the outer end of the arm 62 is a crank pin 63, to which is attached one end of a connecting rod 64. The other end of the connecting rod 64 is attached to a pin 65 on a bell crank arm 66, the latter being mounted at one end of a shaft 70. The shaft 70 is journaled on a bracket 71 projecting outwardly from one side of the shelf 13, and fixed to the outer end of the shaft is a downwardly extending arm 72. The outer end of the arm 72 is connected by a flexible ball and socket joint 73 to one end of a rod 74; the other end of said rod being connected by another ball and socket joint 75 to the outer end of an arm 76 fixed to and projecting outwardly from the top end of the conduit 11.

Operation of the electric motor 56 drives the blower 12, forcing a large volume of air at high velocity down into the conduit 11 and out through the nozzle 15, and thereby causing the strips 26 to beat against the side of the automobile.

At the same time, the crank arm 62 is driven by the motor 56 at a reduced speed, and the rotary motion of the crank arm is transmitted by the connecting rod 64, bell crank arms 66, 72, rod 74, and arm 76, to the conduit 11 to oscillate the same, preferably through an angular distance in the neighborhood of about 30°. The range of oscillation is typically illustrated in Figure 3, wherein the solid line portion of the drawing shows the conduit at one end of its angular travel, while the phantom line portion of the drawing shows the same at the other extremity of its angular travel. It will be noted in Figure 3 that the outer ends of the strips 26 tend to lie flat against the outside surface of the automobile A, although it will be understood that the strips are fluttering and whipping violently in the air stream, with the tip ends of the strips beating and rubbing against the automobile surface. The oscillatory movement of the conduit 11 causes the strips 26 to rub against the surface of the automobile, giving a brushing action which is extremely effective in dislodging stubborn soil.

While I have shown and described an apparatus wherein the conduit 11 is disposed with its axis

perpendicular to the floor, it is also contemplated that the conduit might be inclined along a vertical plane parallel to the line of travel of the automobile, or it might be inclined inwardly toward the car. It is also contemplated that the crank arm 62 for oscillating the conduit 11 might be independently driven by separate motors, and that the linkage for oscillating the conduit 11 might be entirely different from that shown.

Inasmuch as the embodiment described herein is merely one illustrative form of the invention, it will be obvious that various other changes may be made in the shape and arrangement of the several parts without departing from the broad scope of the invention, as defined in the appended claims.

I claim:

1. An automatic washer of the class described comprising an air conduit adapted to be arranged generally parallel to the surface to be washed, said conduit being mounted for movement with respect to said surface, a nozzle extending lengthwise of said conduit and directed so as to discharge a blast of air against said surface, a plurality of closely spaced, relatively thin strips of soft, flexible material attached at one end to said conduit adjacent said nozzle, the free ends of said strips being adapted to be carried outwardly and agitated violently by said blast of air, thereby producing a whipping vibration at the tip ends of said strips, said air conduit when in operative position being disposed at a distance from the surface to be washed such that the outer end portions of said strips contact said surface, whereby the beating and rubbing action of said strips acts to scrub said surface, and means for moving said conduit continuously so as to rub said strips against said surface.

2. An automatic washer of the class described comprising an air conduit adapted to be arranged generally parallel to the surface to be washed, said conduit being mounted for oscillation about its longitudinal axis, a nozzle extending lengthwise of said conduit and directed so as to discharge a blast of air against said surface, a plurality of closely spaced, relatively thin strips of soft, flexible material attached at one end to said conduit adjacent said nozzle, the free ends of said strips being adapted to be carried outwardly and agitated violently by said blast of air, thereby producing a whipping vibration at the tip ends of said strips, said conduit when in operative position being disposed at a distance from the surface to be washed such that the outer end portions of said strips contact said surface, whereby the beating and rubbing action of said strips acts to scrub said surface, and means for oscillating said conduit through a limited angular distance so as to rub said strips against said surface.

3. An automatic washer of the class described comprising an air conduit adapted to be arranged generally parallel to the surface to be washed, said conduit being mounted for oscillation about its longitudinal axis, a nozzle extending lengthwise of said conduit and directed so as to discharge a blast of air against said surface, a fringed scrubbing member of flexible material attached along one edge to said conduit adjacent said nozzle, the opposite edge of said member being slit into a plurality of long, relatively narrow strips that are adapted to contact said surface with their tip ends, said strips being so positioned relatively to said nozzle as to be in the path of said blast of air, whereby a whipping action is obtained at the tip ends thereof,

and motor-driven means for oscillating said conduit through a limited angular distance so as to rub said strips against said surface.

4. An automatic car washer of the class described comprising an air conduit adapted to be arranged generally parallel to one of the outside surfaces of a car as the latter is advanced through the machine, said conduit being mounted for oscillation about its longitudinal axis, a nozzle extending lengthwise of said conduit and directed so as to discharge a blast of air against said surface, a fringed scrubbing member of flexible material attached along one edge to one lip of said nozzle, the opposite edge of said member being slit into a plurality of long, relatively narrow strips that are adapted to contact said surface with their outer ends, said strips being so positioned relatively to said nozzle as to be in the path of said blast of air, whereby a whipping action is obtained at the tip ends thereof, an arm projecting outwardly from said conduit, and a motor-driven crank operatively connected by link means to said arm, whereby said conduit is oscillated through a limited angular distance so as to rub said strips against said surface.

5. The invention defined in claim 4, including

a blower connected to said conduit, and wherein the crank for oscillating the conduit is driven through a speed-reduction gear box by a motor also connected to drive the blower.

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