A spring loaded brush is adapted for use in relatively inaccessible regions wherein access is obtained through an opening having a relatively small diameter. The brush employs an elongated handle base with a spring extension which is welded to the handle base. A wire harness secures a plurality of bristles and has a distal end with a protective chip. The harness is welded to the spring extension. In one embodiment, the brush tip has an angled array of bristles in linear segments which have are oriented at an angle of 22.5°.
SPRING LOADED BRUSH

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority of U.S. Provisional Patent Application No. 61/502,456 filed on Jun. 29, 2011, the disclosure of which is incorporated by reference in its entirety.

BACKGROUND

[0002] This disclosure relates generally to specialized tools employed in precision cleaning and maintenance technologies. More particularly, this disclosure relates to highly specialized brushes.

SUMMARY

[0003] Briefly stated, a spring loaded brush comprises an elongated handle base defining a longitudinal axis. A spring extension having opposed ends axially extends from the handle along the longitudinal axis. One end of the extension is welded to the handle base. A brush tip has a plurality of bristles and is secured by a wire harness. The brush tip has a distal end with a protective tip and a proximal end which is welded to a second end of the spring extension.

[0004] The brush tip preferably has an angled array of bristles which radially extend from a pair of retaining segments oriented at an acute angle with respect to each other. In one embodiment, the spring loaded brush has an acute angle of approximately 22.5°.

[0005] A spring loaded brush preferably comprises an elongated rod-like handle base defining a central axis. An elongated spring extension having opposed first and second ends axially extends from the handle base. The first end is welded to the handle base. The handle base has a uniform diameter and the spring extension has a uniform diameter which is less than the diameter of the base.

[0006] A brush tip assembly comprises a wire harness having a first end with an integral protective tip and an opposed second end welded to the second end of the extension. The opposed second end has a diameter which is less than the diameter of the extension. The brush tip comprises a plurality of bristles generally radially extending from the wire harness. The bristles preferably extend diametrically from the harness, a radial distance which is approximately equal to the diameter of the handle base.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a diagrammatic side elevational view, partly in idealized form, of a spring loaded brush comprising a spring loaded handle and a brush tip;

[0008] FIG. 2 is a diagrammatic front elevational view, partly in idealized form, of the brush of FIG. 1;

[0009] FIG. 3 is a side elevational view, partly in idealized form, of an alternative embodiment of a spring loaded brush, the other elevational views being substantially identical; and

[0010] FIG. 4 is a perspective view of a representative spring loaded brush.

DETAILED DESCRIPTION

[0011] With reference to the drawings wherein like numerals represent like parts throughout the several Figures, a spring loaded brush is generally designated by the numeral 10. The brush 10 is adapted for application in connection with precision cleaning and removing material from the working surfaces of equipment such as the vanes of a jet engine, wherein access to the surfaces is highly restricted or obstructed. In one example, the brush 10 has particular ability for use for applications for which access to the working surface is obtained through an opening having a diameter of 0.080 inches. The spring loaded brush may also have medical and other applications and be constructed in a wide range of sizes.

[0012] The brush 10 preferably comprises a spring loaded handle 12 comprising a handle base 20 and a spring extension 30, and a working end in the form of a brush tip 40. The handle base 20 is preferably manufactured from steel. The spring extension 30 is preferably manufactured from spring steel.

[0013] In one preferred embodiment, the brush tip 40 may be similar in construction (except for the geometry described below) to a Sanderson MacLeod Z-Tip™ brush manufactured and sold by Sanderson MacLeod, Inc., of Palmer, Mass. and as further described in U.S. Patent Publication No. 2010/1923020. The brush tip 40 preferably includes a plurality of generally radially extending bristles 42 which project outwardly from a wire retaining harness, and at one end, includes an integral protective tip 46 formed on the wire harness for preventing the brush tip terminus from damaging or marring sensitive surfaces. The wire harness 44 and the protective tip 46 are preferably formed from the same materials such as a metallic wire typically comprised of a nickel alloy, a titanium alloy, a stainless steel alloy, a carbon steel alloy, a cobalt alloy, an aluminum alloy or other metallic alloys.

[0014] In one preferred form, an intermediate bend 45 is formed at an angle of 22.5°. The bristles 42 extend from angled segments of the wire harness in two angled arrays 41 and 43. A connector segment 48 integrally connects the harness. With reference to FIGS. 1 and 2, the brush assembly preferably has a vertical dimension L1 of 0.65 inches. The bristles 42 preferably have a diametric span D4 of 0.140 inches and the combined arrays extend a length L4 of 0.400 inches.

[0015] The handle base 20 is preferably an elongated, rod-like member of uniform metallic form. In one embodiment, the handle 12 has a length L2 of approximately 3.00 inches and a maximum diameter D2 of 0.070 inches. Thus, the foregoing handle can fit through an access bore of 0.080 inches in diameter.

[0016] The thin, rod-like spring extension 30 preferably has a length L3 of 0.75 inches and a diameter D3 of 0.055 inches. In one embodiment, the spring extension 30 axially aligns with the handle and at one end 32 is laser welded to one end of the handle. The proximal wire connector 48 of the brush tip is laser welded at the opposed end 34 of the spring extension. It will be appreciated that the terminus of the brush tip preferably has a rounded spherical-type terminus 46 to prevent abrasion or marring of the surface.

[0017] With reference to FIGS. 1 and 2 in a preferred embodiment, brush 10 is dimensioned to have the dimensions as set forth in Table 1 below. The diameter designations D in the drawings are exaggerated for purposes of clarity.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>3.00 ins</td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>0.75 ins</td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>0.650 ins</td>
<td></td>
</tr>
</tbody>
</table>
It will be appreciated that the spring loaded brush may have other dimensions.

The brush 10 functions in a highly efficient manner for very small openings. For example, if the brush tip engages at the interior of the opening, the spring extension will flex to permit positioning of the brush tip and then be radially restored to its original, intended normal state. The bristles, of course, are usable to dislodge or remove the particulate matter from the quasi-blind or blind surfaces as required.

A second embodiment of a spring loaded brush 110 is illustrated in FIG. 3. There is no angle in the brush tip 140. The brush tip 140 is essentially axially aligned with the handle base 20 and the spring extension 30 as illustrated in FIG. 3. FIG. 3 would essentially represent the elevational view of brush 110 from the front, rear and both sides.

1. A spring loaded brush comprising:
   an elongated handle base defining a longitudinal axis;
   a spring extension having opposed ends, one end welded to said handle base and axially extending from said handle along the longitudinal axis; and
   a brush tip having a plurality of bristles and secured by a wire harness and having a distal end with a protective tip and a proximal end which is welded to a second end of said spring extension.

2. The spring loaded brush of claim 1 wherein said brush tip has an angled array of bristles which radially extend from a pair of linear retaining segments oriented at an acute angle with respect to each other.

3. The spring loaded brush of claim 1 wherein the angle is approximately 22.5°.

4. The spring loaded brush of claim 1 wherein said protective tip has a rounded configuration.

5. A spring loaded brush comprising:
   an elongated handle base defining a central axis;
   an elongated spring extension having opposed first and second ends, said first end welded to said handle base and said extension axially extending from said handle base; and
   a brush tip assembly comprising a harness having a first end with an integral protective tip and an opposed second end welded to said second end of said extension, said brush tip comprising a plurality of bristles generally radially extending from said harness.

6. The spring loaded brush of claim 5 wherein said handle base has a first substantially uniform diameter and said spring extension has a second substantially uniform diameter, said second diameter being less than said first diameter.

7. The spring loaded brush of claim 6 wherein said harness has a portion adjacent said second end having a third diameter, said third diameter being less than said second diameter.

8. The spring loaded brush of claim 6 wherein said plurality of bristles extend a radial distance which is approximately equal to said first diameter.

9. The spring loaded brush of claim 5 wherein said brush tip has an angled array of bristles which radially extend from a pair of retaining segments oriented at an acute angle with respect to each other.

10. The spring loaded brush of claim 5 wherein the angle is approximately 22.5°.

* * * * *