

**H-B-771b**

September 29, 1966

**SUPERSEDING**

Int. Fed. Spec. H-B-00771a (Navy—Ships)

April 15, 1963 and

Fed. Spec. H-B-771

December 19, 1961

## FEDERAL SPECIFICATION

# BRUSHES, WIRE, ROTARY, GENERAL PURPOSE

*This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.*

**1. SCOPE AND CLASSIFICATION**

**1.1 Scope.** This specification covers wire brushes for use with pneumatic or electric tools in the removal of rust, scale, paint, or burrs from all types of metal surfaces, such as rivet heads, protruding bolts and lugs, I-beams, angles, channels, and similar items, most commonly used by the Federal Government.

**1.2 Classification.**

**1.2.1 Types, classes, and styles.** Wire brushes covered by this specification shall be of the following types, classes, and styles as specified (see 6.2):

**Type I—Cup.**

Class 1—Crimped wire.

Class 2—Twisted tuft.

Style A—Standard duty, single row.

Style B—Heavy duty, double row.

**Type II—End attachment.**

Class 1—Solid wire filled.

Class 2—Circular, side flare.

Class 3—Pilot bonding.

**Type III—Wheel.**

Class 1—Crimped wire.

Style A—Narrow face section.

Style B—Wide face wheel.

Class 2—Twisted tuft.

**2. APPLICABLE DOCUMENTS**

**2.1 Specifications and standards.** The following specifications and standards of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

**Federal Standard:**

Fed. Std. No. 123—Marking for Domestic Shipment (Civilian Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D.C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, and Seattle, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

**Military Specification:**

MIL-H-15424—Hand Tools; Packaging of.

**Military Standard:**

MIL-STD-105—Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

**2.2 Other publications.** The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

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*National Bureau of Standards (NBS) Handbook:*

**H2S—Screw-Thread Standards for Federal Services.**

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington D.C., 20402.)

### 3. REQUIREMENTS

**3.1 Illustrations.** The illustrations herein are descriptive and not restrictive and are not intended to preclude the purchase of wire brushes which are otherwise in accordance with the requirements of this specification.

**3.2 Qualification.** Types I and III wire brushes furnished under this specification shall be a product which has been tested and passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable qualified products list.

**3.3 Material.** The fill wire shall conform to table I, and shall be free of pits, die marks, rust, excessive scale, scrapes, splits, lubs, cracks, seam, excessive decarburization, and other injurious defects.

**3.3.1 Marking.** All brushes shall be marked in a permanent and legible manner with the manufacturer's name or with a trademark of such a known character that the source of manufacture may be readily determined. In

addition, brushes larger than 3 inches in diameter shall be marked with the maximum safe free speed as hereinafter specified.

**3.4 Design.** Brushes shall be designed and constructed in such a manner as to insure an even distribution of wire throughout the brush to provide good balance. Provisions shall be made for securely holding the fill wire in place and to prevent the wire from breaking due to flexure. Where welded construction is used, the wire shall not be burned, broken, or affected in any way by the welding operation.

**3.4.1 Crimped wire.** Wire with at least four single amplitude, three dimensional crimps to the inch, shall be used for those classes of brushes specifying crimped wire (see 1.2.1, 3.5.2, and 3.7.2).

**3.4.2 Twisted tufts.** Tufts shall consist of U-shaped fill wire passed through or around the retainer and twisted tightly to prevent untwisting when used with conventional pneumatic or electric tools. The tufts shall be uniform in size and weight and shall be equally spaced around the circumference of the brush. When wire-retaining rings are used for retention of tufts, the diameter of the retaining ring wire shall be not less than 0.225 inch.

**3.4.3 Metal arbor adapters.** Where separate metal arbor adapters are used, they shall set properly on the brush to maintain alignment and balance.

**3.4.4 Screw threads.** All screw threads shall be in conformance with the current issue of the NBS H2S.

TABLE I. *Chemical composition and tensile strength of fill wire*

Type of wire	Wire dia. ± 0.001	Chemical composition							Tensile strength (minimum)
		Carbon	Manganese	Phosphorus	Sulphur	Silicon	Chrome	Nickel	
	<i>Inches</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>P.s.i.</i>
Tempered	All sizes	0.60 to 0.80	0.60 to 1.20	0.04	0.04	0.10 to 0.25	-----	-----	280,000
High tensile	do	.70 to .80	.60 to 1.20	.04	.04	.10 to .25	-----	-----	300,000
Untempered	0.005 and smaller	.25 to .75	.90 to 1.20	.04	.04	.10 to .20	-----	-----	220,000
Corrosion-resisting steel hard temper	All sizes	.05 to .20	— to 2.0	.04	.04	1.0	17 to 19	8 to 10	260,000

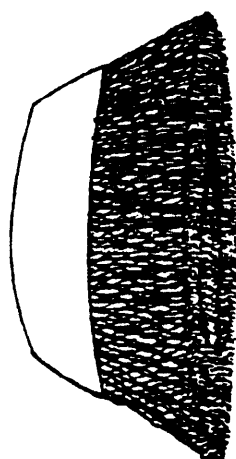
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**3.5 Type I, cup.** Cup brushes shall be suitable for operation on portable, electric, or pneumatic tools, and shall be similar to figure 1. Provisions shall be made to prevent circumferential movement of the fill wire. The fill wire shall be high tensile steel or corrosion-resisting steel, conforming to table I, as specified (see 6.2).

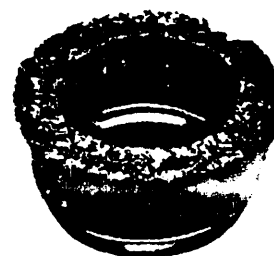
**3.5.1 Arbor hole.** The arbor hole shall be  $\frac{1}{2}$  or  $\frac{5}{8}$  inch diameter and threaded or unthreaded, as specified (see 6.2). When threaded arbor holes are specified, they shall be  $\frac{1}{2}$ -13 NC or  $\frac{5}{8}$ -11 NC thread (see 6.2).

**3.5.2 Class 1, crimped wire cup brush.** Class 1, crimped wire cup brushes shall be similar to figure 1, and shall conform to the requirements of table II.

**3.5.3 Class 2, twisted tuft cup brush.** Twisted tuft cup brushes shall be similar to figure 1, and shall conform to the requirements of table III. The tufts shall be tightly twisted approximately  $\frac{1}{2}$  to  $\frac{3}{4}$  of the tuft length with a left hand helix to prevent untwisting when the outside diameter of the revolving brush contacts the work surface.



CLASS 1. Crimped wire.



CLASS 2. Twisted tuft.

FIGURE 1. Type I, cup brush.

TABLE II. Type I, class 1, crimped wire cup brushes

Outside diameter (approx.)	Wire diameter $\pm 0.001$	Wire trim		Wire points per brush (minimum)	Safe free speed r.p.m. (maximum)
		Minimum	Maximum		
<i>Inches</i>	<i>Inch</i>	<i>Inches</i>	<i>Inches</i>		
4	0.0118	1	1 $\frac{1}{2}$	5,450	6,000
4	.0140	1	1 $\frac{1}{2}$	4,100	6,000
4	.0204	1	1 $\frac{1}{2}$	1,850	6,000
5	.0140	1 $\frac{1}{4}$	1 $\frac{1}{2}$	7,000	5,500
5	.0204	1 $\frac{1}{4}$	1 $\frac{1}{2}$	3,500	5,500
6	.0140	1 $\frac{1}{2}$	1 $\frac{1}{2}$	10,600	5,000
6	.0204	1 $\frac{1}{2}$	1 $\frac{1}{2}$	4,200	5,000
6	.0348	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1,700	5,000
7	.0204	1 $\frac{1}{2}$	2	4,200	4,500

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TABLE III. *Type 1, class 2, styles A and B twisted tuft cup brushes*

Style	Outside diameter	Wire diameter $\pm 0.001$	Wire trim $\pm \frac{1}{8}$ inch tolerance	Number of tufts per brush	Wire points per brush (minimum)	Safe free speed r.p.m. (maximum)
	<i>Inches</i>	<i>Inch</i>	<i>Inches</i>			
A	4	0.0140	$1\frac{1}{4}$	20 to 28	5,000	7,000
A	4	.0204	$1\frac{1}{4}$	20 to 28	2,300	7,000
A	4	.0348	$1\frac{1}{4}$	20 to 28	1,000	7,000
A	5	.0140	$1\frac{1}{2}$	28 to 34	6,000	6,500
A	5	.0204	$1\frac{1}{2}$	28 to 34	3,000	6,500
A	5	.0348	$1\frac{1}{2}$	28 to 34	1,100	6,500
B	5	.0140	$1\frac{1}{2}$	48 to 60	10,000	6,500
B	5	.0204	$1\frac{1}{2}$	48 to 60	5,000	6,500
B	5	.0348	$1\frac{1}{2}$	48 to 60	2,000	6,500
A	6	.0140	$1\frac{3}{4}$	32 to 40	10,000	6,000
A	6	.0204	$1\frac{3}{4}$	32 to 40	4,800	6,000
A	6	.0348	$1\frac{3}{4}$	32 to 40	1,900	6,000
B	6	.0140	$1\frac{3}{4}$	54 to 74	14,000	6,000
B	6	.0204	$1\frac{3}{4}$	54 to 74	7,300	6,000
B	6	.0348	$1\frac{3}{4}$	54 to 74	2,300	6,000

**3.6 Type II, end attachment brush.** End attachment brushes shall be suitable for operation on portable, electric, or pneumatic tools and on drill presses, and shall be similar to figure 2. Each brush shall be provided with a  $\frac{1}{4}$  inch round shank for mounting in chucks.

**3.6.1 Fill wire.** Fill wire shall be crimped. The wire shall be high tensile steel or corrosion-resisting steel conforming to table 1, as specified (see 6.2).

**3.6.2 Class 1, solid wire filled end attachment brush.** Class 1, solid wire filled end attachment brushes shall be similar to figure 2, and shall conform to the requirements of table IV, and shall be capable of operating at a safe free speed of at least 8,000 r.p.m.

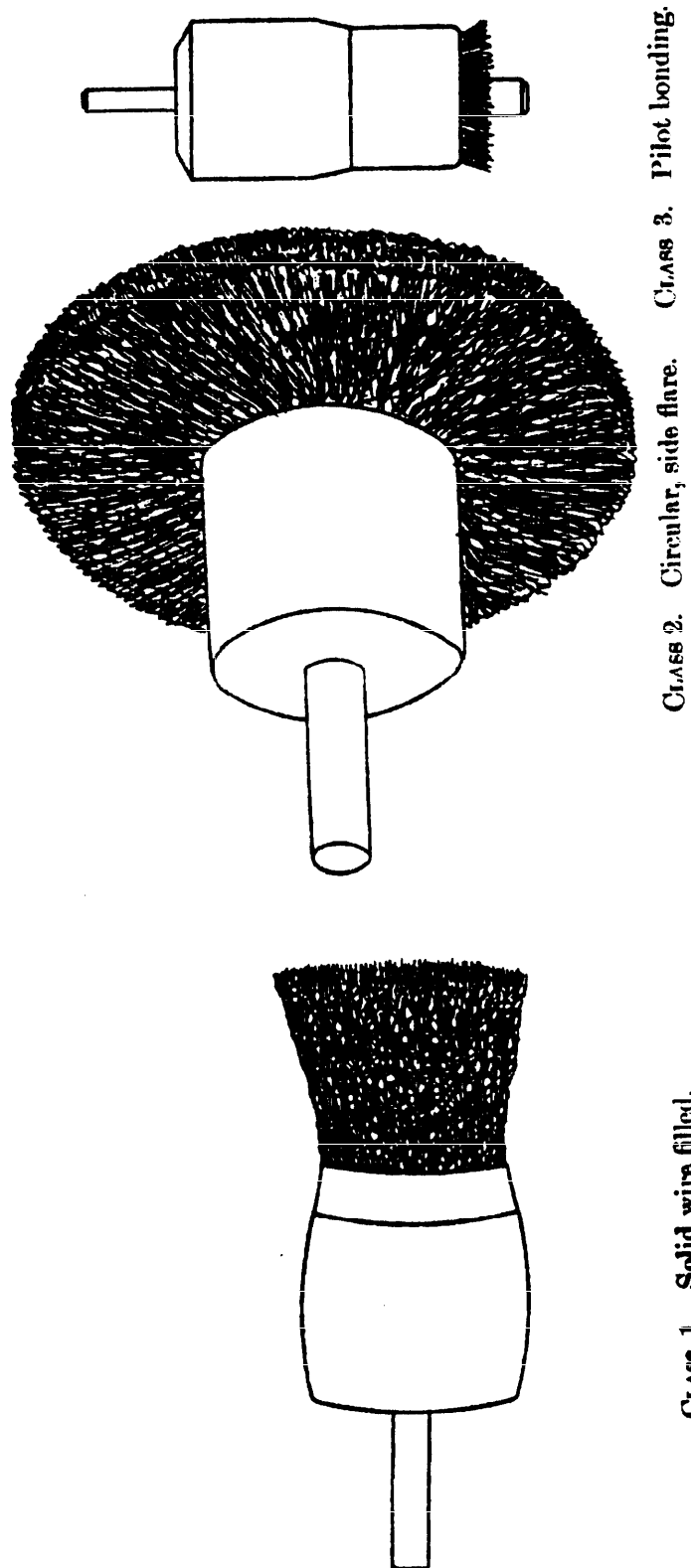
**3.6.3 Class 2, circular, side flare end attachment brush.** Class 2, circular, side flare end attachment brushes shall be similar to figure 2, and shall conform to the requirements of table V. The brushes shall be manufactured in such a way that no metal parts will protrude beyond the fill wire, and shall be capable of operating at a safe free speed of at least 8,000 r.p.m.

TABLE IV. *Type II, class 1, solid wire filled end attachment brushes*

Inside diameter of cup	Wire trim $\pm 1/8 - 0$	Wire diameter $\pm 0.001$
<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
$\frac{1}{2}$ $\left\{ \begin{array}{l} + \frac{1}{32} \\ - 0 \end{array} \right.$	1	0.0050
$\frac{1}{2}$ $\left\{ \begin{array}{l} + \frac{1}{32} \\ - 0 \end{array} \right.$	1	.0104
$\frac{1}{2}$ $\left\{ \begin{array}{l} + \frac{1}{32} \\ - 0 \end{array} \right.$	1	.0204
$\frac{3}{4}$ $\left\{ \begin{array}{l} + \frac{1}{16} \\ - 0 \end{array} \right.$	1	.0050
$\frac{3}{4}$ $\left\{ \begin{array}{l} + \frac{1}{16} \\ - 0 \end{array} \right.$	1	.0104
$\frac{3}{4}$ $\left\{ \begin{array}{l} + \frac{1}{16} \\ - 0 \end{array} \right.$	1	.0204
1 $\left\{ \begin{array}{l} + \frac{1}{8} \\ - 0 \end{array} \right.$	1	.0050
1 $\left\{ \begin{array}{l} + \frac{1}{8} \\ - 0 \end{array} \right.$	1	.0104
1 $\left\{ \begin{array}{l} + \frac{1}{8} \\ - 0 \end{array} \right.$	1	.0204

**3.6.4 Class 3, pilot bonding brush.** Class 3, pilot bonding brushes shall be similar to figure 2, and conform to the requirements of table VI. The brushes shall be capable of operating at a safe free speed of at least 8,000 r.p.m.

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Class 1. Solid wire filled.

Class 2. Circular, side flare.

Class 3. Pilot bonding.

Figure 2. Type II, end attachment brush.

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TABLE V. *Type II, class 2, circular, side flare end attachment brushes*

Inside diameter of cup	Outside brush diameter	Wire diameter $\pm 0.001$
<i>Inch</i>	<i>Inches</i>	<i>Inch</i>
$\frac{3}{4}$	$1\frac{1}{4}$	.0080
$\frac{3}{4}$ } $+\frac{1}{16}$	$1\frac{1}{4}$	.0204
$\frac{3}{4}$ } $-0$	$1\frac{1}{2}$	.0080
$\frac{3}{4}$ }	$1\frac{1}{2}$	.0204
1	$2\frac{3}{4}$	.0080
1 } $+\frac{1}{8}$	$2\frac{3}{4}$	.0204
1 } $-0$	3	.0204
1	4	.0080
1	4	.0204

TABLE VI. *Type II, class 3, pilot bonding end attachment brushes*

Pilot diameter $\pm 0.000$ $-0.001$	Outside brush diameter $\pm \frac{1}{16}$	Wire diameter $\pm 0.001$ $-0.000$	Wire trim $+\frac{1}{16}$ $-0$
<i>Inch</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
$\frac{3}{32}$	$\frac{1}{2}$	.004	$\frac{3}{4}$
$\frac{1}{8}$	$\frac{3}{4}$	.004	$\frac{3}{4}$
$\frac{3}{32}$	$\frac{1}{2}$	.004	$\frac{3}{4}$
$\frac{3}{16}$	$\frac{1}{2}$	.004	$\frac{3}{4}$
$\frac{1}{4}$	$\frac{1}{2}$	.004	$\frac{3}{4}$

3.7 Type III, wheel brush. Wheel brushes shall be capable of operation on stationary

grinders and on portable, electric, or pneumatic tools, and shall be similar to figures 3 and 4. Provisions shall be made to prevent circumferential movement of the fill wire on the ring.

3.7.1 *Metal stampings.* Metal stampings used in the construction of wire wheel brushes shall be of adequate thickness to insure the safe operation of the brush.

3.7.2 *Class 1, crimped wire wheel brush.* Fill wire for both the styles A and B brushes shall be untampered or tempered steel wire or corrosion-resisting steel wire conforming to table I, as specified (see 6.2), except that 0.005-inch and smaller diameter wire shall be untampered when specified (see 6.2).

3.7.2.1 *Style A, narrow face section wheel brushes.* Narrow face section wheel brushes shall be similar to figure 3, and shall conform to the requirements of table VII. The brushes shall be manufactured in such a way that they may be used either singly or adjacent to each other on a common shaft to build up a working surface of any desired width.

3.7.2.2 *Style B, wide face wheel brushes.* The wide face wheel brushes shall be similar to figure 3, and shall conform to the requirements of table VIII. The brushes shall be manufactured as single unit brushes, and shall be provided with a standard 2-inch center opening into which interchangeable metal adapters of the desired arbor hole size may be fitted.

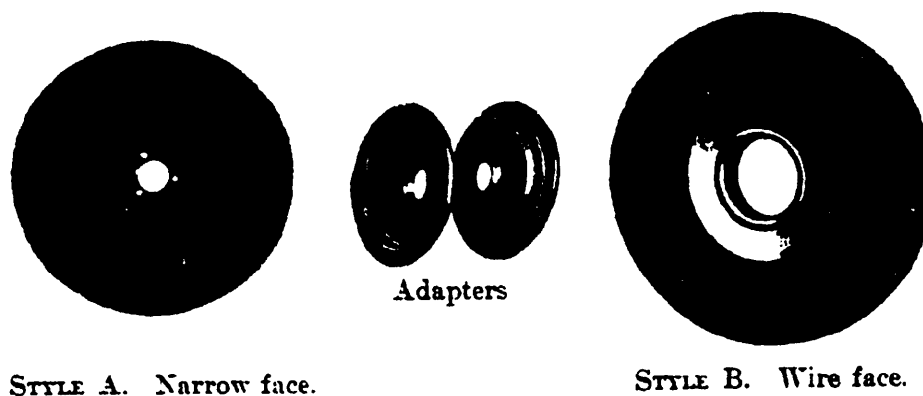


FIGURE 3. Type III, class 1, crimped wire wheel brush.

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TABLE VII. Type III, class 1, style A, narrow face wheel sections

Outside brush dia.	Arbor hole dia.	Wire dia. $\pm 0.001$	Wire trim	Wire points per brush (minimum)	Max. bal. deviation static	Safe free speed r.p.m. (maximum)
Inches	Inches	Inch	Inches		Gram-centimeter (g. cm.)	
1	$\frac{1}{4}$	0.0030	$\frac{1}{4} \pm \frac{1}{16}$	-----	-----	8,000
1	$\frac{1}{4}$	.0050	$\frac{1}{4} \pm \frac{1}{16}$	-----	-----	8,000
1 $\frac{1}{2}$	$\frac{3}{8}$	.0030	$\frac{3}{8} \pm \frac{1}{16}$	-----	-----	8,000
1 $\frac{1}{2}$	$\frac{3}{8}$	.0050	$\frac{3}{8} \pm \frac{1}{16}$	-----	-----	8,000
2	$\frac{1}{2}$	.0030	$\frac{1}{2} \pm \frac{1}{16}$	-----	-----	8,000
2	$\frac{1}{2}$	.0050	$\frac{1}{2} \pm \frac{1}{16}$	-----	-----	8,000
2	$\frac{1}{2}$	.0118	$\frac{1}{2} \pm \frac{1}{16}$	-----	-----	8,000
2 $\frac{1}{2}$	$\frac{1}{2}$	.0030	$\frac{1}{2} \pm \frac{1}{16}$	-----	-----	8,000
2 $\frac{1}{2}$	$\frac{1}{2}$	.0118	$\frac{1}{2} \pm \frac{1}{16}$	-----	-----	8,000
3	$\frac{1}{2}$	.0030	$\frac{1}{2} \pm \frac{1}{16}$	-----	-----	8,000
3	$\frac{1}{2}$	.0118	$\frac{1}{2} \pm \frac{1}{16}$	-----	-----	8,000
4	$\frac{1}{2}$	.0050	$\frac{1}{2} \pm \frac{1}{16}$	13,000	15	4,500
4	$\frac{1}{2}$	.0095	$\frac{1}{2} \pm \frac{1}{16}$	5,600	15	4,500
4	$\frac{1}{2}$	.0118	$\frac{1}{2} \pm \frac{1}{16}$	4,400	15	4,500
4	$\frac{1}{2}$	.0140	$\frac{1}{2} \pm \frac{1}{16}$	2,500	15	4,500
6	$\frac{1}{2}$ or $\frac{3}{4}$ , as specified (see 6.2)	.0030	$1\frac{1}{2} \pm \frac{1}{16}$	35,000	40	4,000
6		.0050	$1\frac{1}{2} \pm \frac{1}{16}$	19,000	40	4,000
6		.0095	$1\frac{1}{2} \pm \frac{1}{16}$	7,600	40	4,000
6		.0118	$1\frac{1}{2} \pm \frac{1}{16}$	5,100	40	4,000
6		.0140	$1\frac{1}{2} \pm \frac{1}{16}$	3,800	40	4,000
8	$\frac{1}{2}$ , $\frac{3}{4}$ , or $1\frac{1}{4}$ , as specified (see 6.2)	.0050	$1\frac{1}{4} \pm \frac{1}{16}$	22,500	65	3,500
8		.0095	$1\frac{1}{4} \pm \frac{1}{16}$	8,000	65	3,500
8		.0118	$1\frac{1}{4} \pm \frac{1}{16}$	6,400	65	3,500
8		.0140	$1\frac{1}{4} \pm \frac{1}{16}$	4,600	65	3,500
8		.0162	$1\frac{1}{4} \pm \frac{1}{16}$	3,000	65	3,500
10	$\frac{1}{2}$ , $\frac{3}{4}$ , 1, $1\frac{1}{4}$ , or $1\frac{1}{2}$ , as specified (see 6.2)	.0050	$2\frac{1}{2} \pm \frac{1}{16}$	31,700	130	3,000
10		.0095	$2\frac{1}{2} \pm \frac{1}{16}$	10,000	130	3,000
10		.0118	$2\frac{1}{2} \pm \frac{1}{16}$	6,400	130	3,000
10		.0140	$2\frac{1}{2} \pm \frac{1}{16}$	4,600	130	3,000
10		.0162	$2\frac{1}{2} \pm \frac{1}{16}$	3,600	130	3,000
12	$\frac{1}{2}$ , 1, $1\frac{1}{4}$ , or $1\frac{1}{2}$ , as specified (see 6.2)	.0050	$3 \pm \frac{1}{16}$	34,200	160	2,750
12		.0118	$3 \pm \frac{1}{16}$	7,400	160	2,750
12		.0140	$3 \pm \frac{1}{16}$	5,400	160	2,750
12		.0204	$3 \pm \frac{1}{16}$	2,800	160	2,750

**3.7.2.2.1 Arbor hole sizes and arbor adapters.**

Each brush shall be furnished with a pair of metal arbor adapters having an arbor hole diameter of  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ , or  $1\frac{1}{2}$  inches, as specified (see 6.2).

**3.7.3 Class 2, twisted tuft wheel brushes.**

The twisted tuft wheel brushes shall be similar to figure 4, and shall conform to the requirements of table IX. The brushes shall be manufactured in such a way that they may be used

either singly or adjacent to each other on a common shaft to build up a working surface of any desired width.

**3.7.3.1 Fill wire.** Fill wire shall be tempered steel or corrosion-resisting steel conforming to table I, as specified (see 6.2). Tufts on 8-inch diameter and smaller brushes shall be twisted at least one full turn, and tufts on 10- and 12-inch brushes shall be twisted at least  $1\frac{1}{2}$  turns.



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TABLE VIII. Type III, class 1, style B, wide face wheel brush

Outside brush diameter	Wire diameter = 0.001	Wire trim	Wire points per brush (minimum)	Maximum balance deviation static	Safe free speed (maximum)
<i>Inches</i>	<i>Inch</i>	<i>Inches</i>		<i>G. cm.</i>	<i>R.p.m.</i>
4 $\frac{1}{4}$	.0050	$\frac{3}{8} \pm \frac{1}{8}$	75,000	30	4,500
4 $\frac{1}{2}$	.0118	$\frac{3}{8} \pm \frac{1}{8}$	13,400	30	4,500
4 $\frac{3}{4}$	.0140	$\frac{3}{8} \pm \frac{1}{8}$	9,000	30	4,500
6	.0050	$1\frac{1}{8} \pm \frac{3}{16}$	59,000	40	4,000
6	.0118	$1\frac{1}{8} \pm \frac{3}{16}$	15,360	40	4,000
6	.0140	$1\frac{1}{8} \pm \frac{3}{16}$	9,000	40	4,000
8	.0050	$1\frac{1}{2} \pm \frac{3}{16}$	68,000	65	3,500
8	.0095	$1\frac{1}{2} \pm \frac{3}{16}$	26,000	65	3,500
8	.0118	$1\frac{1}{2} \pm \frac{3}{16}$	21,000	65	3,500
8	.0140	$1\frac{1}{2} \pm \frac{3}{16}$	14,400	65	3,500
8	.0204	$1\frac{1}{2} \pm \frac{3}{16}$	5,700	65	3,500
10	.0118	$2 \pm \frac{1}{4}$	28,000	115	3,000
10	.0140	$2 \pm \frac{1}{4}$	19,500	115	3,000
10	.0204	$2 \pm \frac{1}{4}$	9,600	115	3,000
12	.0118	$2\frac{1}{4} \pm \frac{1}{4}$	30,000	160	2,750
12	.0140	$2\frac{1}{4} \pm \frac{1}{4}$	22,000	160	2,750
12	.0204	$2\frac{1}{4} \pm \frac{1}{4}$	10,000	160	2,750

TABLE IX. Type III, class 2, twisted tuft wheel brushes

Outside brush dia.	Arbor hole dia.	Wire dia. = 0.001	Wire trim	Number of tufts per brush	Wire points per brush (min.)	Max. bal. deviation static	Safe free speed r.p.m. (max.)
<i>Inches</i>	<i>Inches</i>	<i>Inch</i>	<i>Inches</i>			<i>G. cm.</i>	
4	$\frac{1}{2}$ or $\frac{3}{4}$ , as specified (see 6.2)	.0118	$\frac{3}{8} \pm \frac{1}{8}$	14 to 24	5,400	15	8,000
4		.0140	$\frac{3}{8} \pm \frac{1}{8}$	14 to 24	3,680	15	8,000
4		.0162	$\frac{3}{8} \pm \frac{1}{8}$	14 to 24	2,500	15	8,000
6	$\frac{1}{2}$ or $\frac{3}{4}$ , as specified (see 6.2)	.0118	$1\frac{1}{8} \pm \frac{3}{16}$	24 to 30	7,200	65	6,000
6		.0140	$1\frac{1}{8} \pm \frac{3}{16}$	24 to 30	5,400	65	6,000
6		.0162	$1\frac{1}{8} \pm \frac{3}{16}$	24 to 30	4,600	65	6,000
6		.0230	$1\frac{1}{8} \pm \frac{3}{16}$	24 to 30	2,000	65	6,000
8	$\frac{1}{2}$ , $\frac{3}{4}$ , $\frac{1}{2}$ , or 1, as specified (see 6.2)	.0118	$1\frac{1}{4} \pm \frac{3}{16}$	30 to 38	12,000	95	4,500
8		.0140	$1\frac{1}{4} \pm \frac{3}{16}$	30 to 38	9,000	95	4,500
8		.0162	$1\frac{1}{4} \pm \frac{3}{16}$	30 to 38	6,500	95	4,500
10	$\frac{1}{2}$ , $\frac{3}{4}$ , 1, $1\frac{1}{4}$ , or as specified (see 6.2)	.0118	$2\frac{1}{4} \pm \frac{1}{4}$	38 to 48	17,000	130	4,250
10		.0140	$2\frac{1}{4} \pm \frac{1}{4}$	38 to 48	12,600	130	4,250
10		.0162	$2\frac{1}{4} \pm \frac{1}{4}$	38 to 48	9,200	130	4,250
12	$\frac{1}{2}$ , 1, $1\frac{1}{4}$ , or $1\frac{1}{2}$ , as specified (see 6.2)	.0118	$3 \pm \frac{1}{4}$	38 to 52	19,000	220	3,600
12		.0140	$3 \pm \frac{1}{4}$	38 to 52	13,000	220	3,600
12		.0162	$3 \pm \frac{1}{4}$	38 to 52	10,500	220	3,600
12		.0204	$3 \pm \frac{1}{4}$	38 to 52	6,400	220	3,600



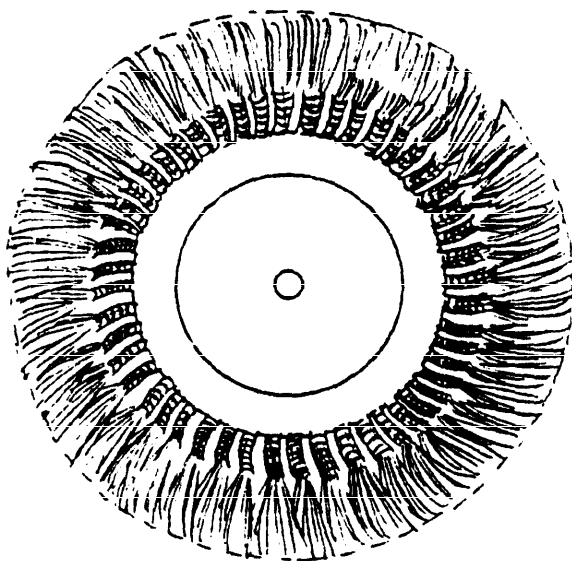


FIGURE 4. Type III, class 2, twisted tuft.

**3.8 Workmanship.** The brushes shall be free from defects which may affect their serviceability.

#### 4. QUALITY ASSURANCE PROVISIONS

**4.1 Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

**4.2 Qualification inspection.** Qualification inspection shall be conducted at a laboratory satisfactory to the Bureau of Ships. Qualification inspection shall consist of the examination as specified in 4.4 and the tests of 4.5, to determine conformance with the applicable requirements of this specification. (For information concerning qualification testing, see 6.5.)

**4.2.1 Samples for qualification tests.** The number of sample brushes of the type, class, style, and size specified in table X shall be fur-

nished for the test in 4.5. The brushes in table X shall be considered representative of all types I and III brushes for qualification purposes. In addition to the sample brushes, approximately 8 feet of straight fill wire representative of the wire used in the sample crimped wire brushes shall be furnished in each of the following diameters: 0.0095, 0.0118, 0.0140, 0.0162, and 0.0348 inch. Approval of brushes with high tensile steel wire filling will include approval of brushes with corrosion-resisting steel wire filling of the composition and tensile strength specified in table I.

#### 4.3 Sampling.

**4.3.1 Lot.** All brushes of the same type, class, style, and size offered for delivery at one time shall be considered a lot for purposes of sampling.

**4.3.2 Sampling for quality conformance inspection.** Sampling for quality conformance inspection shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated herein.

**4.3.3 Sampling for examination.** A random sample of brushes shall be selected from each lot (see 4.3.1), for inspection of visual and dimensional characteristics (see 4.4.1). The sample unit shall be one completely fabricated brush. The inspection level shall be level II, with an acceptable quality level (AQL) of 2.5, expressed in defects per hundred units.

**4.3.4 Sampling for speed and balance tests.** A random sample of brushes shall be selected from each lot in accordance with inspection level I and each brush shall be subjected to the tests of 4.5.1 and 4.5.4. The AQL shall be 4.0 percent defective.

#### 4.4 Inspection.

**4.4.1 Examination.** Each of the sample brushes, selected in accordance with 4.3.3, shall be visually and dimensionally examined to verify compliance with any requirements of this specification not requiring test, such as workmanship, finish, marking, and dimensions. Examination shall be conducted as specified in table XI. If the number of defective brushes in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

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TABLE X. Samples for qualification tests

Quantity	Diameter	Type	Class	Style	Wire size	Contact pressure	Gram loss (avg.) (max.)
	<i>Inches</i>				<i>Inch</i>	<i>Pounds</i>	
4	6	I	2	A	0.0348	20	20
4	4	III	1	A	.0095	5	5
4	4	III	2		.0162	15	12
4	6	III	1	A	.0095	5	4
4	6	III	2		.0162	15	8
4	8	III	1	B	.0095	5	5
4	8	III	2		.0162	15	7
4	10	III	1	B	.0118	5	2
4	10	III	2		.0162	15	2
4	12	III	1	B	.0140	5	3
4	12	III	2		.0162	15	3

TABLE XI. Classification of defects

Categories	Defects
1	Type, class, and style not as specified.
2	Fill wire material nonconforming: not free of pits, die marks, rust, excessive scale, scrapes, splits, laps, cracks, seams, and excessive decarburization.
3	Inside diameter of hub or outside brush diameter (as applicable), not as stipulated (type II only).
4	Diameter of shank, not in accordance with requirements: length not suitable for chucking purposes (type II only).
5	Shank not true and concentric with brush and hub (type II only).
6	Brush outside diameter and wire size not as stipulated: wire diameter not within the required tolerance.
7	Arbor hole not in accordance with requirements (types I and III only).
8	Arbor hole not threaded; thread form and size nonconforming, thread incomplete, crossed, stripped, chipped, or torn (when applicable), (types I and III only).
9	Brush construction nonconforming: not suitable for operation as intended: fails to insure even distribution of wire throughout for good balance.
10	Suitable provisions not made for securely holding fill wire in place or to prevent wire from breaking due to flexure.
11	Wire burned, broken, or affected by welding operation (if applicable).

TABLE XI. Classification of defects—(Continued)

Categories	Defects
12	Crimps per inch of crimped wire less than the allowable minimum (when applicable).
13	Twisted tufts not properly secured and twisted to prevent untwisting during use: tufts not uniform in size and weight or not equally spaced around the circumference of the brush; diameter of the wire retaining rings (when used), less than the allowable minimum (when applicable).
14	Separate metal arbor adapters not provided when required, fail to set properly on brush to maintain alignment and balance. Not interchangeable (when applicable).
15	Suitable provisions not made to prevent circumferential movement of the fill wire (types I and III only).
16	Brushes not capable of being used either singly or adjacent to each other on a common shaft when built up to a working surface of any desired width (type III, class 1, style A, and class 2 only).
17	Wire trim not within stipulated limits (except type II, class 2).
18	Wire points per brush less than the required minimum (types I and III only).
19	Number of tufts per brush not within the allowable limits (type I, class 2, and type III, class 2 only).
20	Marking, manufacturer's name or trademark, and the maximum safe free speed missing, incorrect, illegible, or not permanent.

**4.4.2 Quality conformance tests.** Quality conformance tests shall consist of all the tests of 4.5, except the wear and wire breakage tests of 4.5.2, and wire tension test of 4.5.5.

#### 4.5 Test procedures.

**4.5.1 Free speed test.** Brushes shall be tested to determine conformance with the applicable requirements for safe operation (see 3.5.2, 3.5.3, 3.6.2, 3.6.3, 3.6.4, 3.7.2.1, 3.7.2.3, and 3.7.3).

**4.5.2 Wear and wire breakage tests.** Three of the four brushes in each category listed in table X shall be tested using a machine or device similar to that shown in figure 5. Each of the brushes shall be weighed before mounting on the machine, and the weight recorded in g. Each brush shall be mounted on the spindle shaft shown at the right side of the figure and rotated against a mild steel wear plate under the contact pressure specified in table X. For cup brushes (see fig. 6), a  $\frac{3}{4}$ -inch hexagonal bar of SAE 1020 annealed steel shall be substituted for the wear plate. The longitudinal axis of the bar shall be in the same horizontal plane and on the same horizontal axis of the shaft on which the brush is mounted. The bar shall be positioned at a  $45^\circ$  angle to the face of the brush so that the brush will cut across one flat of the hex bar. In testing wheel brushes, the wear plate shall be oscillated through an arc of  $60^\circ$  at 10 cycles per minute by means of a mechanism shown in figure 5. In testing cup brushes, the hexagonal test bar shall remain stationary. All brushes from 4 through 8 inches in diameter shall be rotated at 3,400 r.p.m. Ten- and twelve-inch diameter brushes shall be rotated at 1,750 r.p.m. Each type III wheel brush shall be tested under the contact pressure specified in table X, for 30 minutes. The type I cup brushes shall be tested under the contact pressure specified in table X, for 10 minutes. For acceptability, the average weight loss (in g.) shall not exceed the values specified in table X. In addition, for type I cup brushes, the amount of stock removed from the hex bar by each brush during the test shall be measured by weighing the hex bar before and after each 10 minute test. For acceptability, the average

amount of stock removed by the three brushes tested shall be not less than 3.0 g. per brush.

**4.5.3 Static balance test.** Wheel brushes shall be tested for balance deviation on a suitable balancing device or machine. Before the balance deviation is determined, the brushes shall be rotated at the following r.p.m.: 4, 6, and 8 inch at 3400; 10 and 12 inch at 1750. The balance deviation shall not exceed the values specified in tables VII thru IX for the respective classes of wheel brushes. One acceptable method of testing for balance deviation is to place the brush to be tested with a balancing mandrel through the arbor hole on balancing ways that are level and with parallel surfaces. A movable counterweight on a calibrated arm shall be attached to the mandrel in a manner that the counterweight opposes the heavy side of the brush. The counterweight shall be adjustable on the scale so as to provide a counterpoise in the same number of gram-centimeters as the balance deviation of the brush. The brush shall be rotated and the counterweight placed at the correct position to counterpoise the balance deviation.

**4.5.4 Wire tension test.** Eight sample lengths of straight wire, representative of the wire (type and size), used for each brush under test, shall be subjected to a tension test in a Scott Testing Machine or its equivalent, to determine compliance with 3.3. The load shall be applied at a rate not to exceed 8 inches per minute. The load shall be applied until the wire fractures (breaks), and the tensile strength computed. Computed tensile strength values below those specified shall be cause for rejection of the brush. Any wire fracturing in the holding device of the machine shall be eliminated, and a new sample substituted therefor.

**4.5.5 Chemical analysis.** Wire brushes submitted for qualification or quality conformance inspection shall include the manufacturer's certification that the fill wire chemical composition is in conformance with table I.

**4.6 Examination of preparation for delivery.** An examination shall be made to determine that preservation, packaging, packing, and marking as required by section 5 are complied with. Defects will be scored as specified below.

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The sample unit shall be one shipping container fully prepared for delivery. The lot size shall be the number of containers in the inspection lot. The inspection level shall be level II with an AQL of 4.0 defects per hundred units.

Examination	Defects
Markings (exterior and interior)	Omitted; incorrect, illegible; of improper size, location, sequence, or method of application.
Preservation	Preservative improperly applied or missing.
Materials	Component missing, damaged, or otherwise defective affecting serviceability.
Workmanship	Inadequate application of components such as incomplete closure of case liners, container flaps, loose strapping, inadequate stapling; bulging or distortion of containers.
Weight	Gross weight exceeds requirements.

### 5. PREPARATION FOR DELIVERY

**5.1 Preservation, packaging, and packing.** Preservation, packaging, and packing shall be in accordance with MIL-H-15424. Levels of preservation, packaging, and packing shall be as specified (see 6.2).

#### 5.2 Marking.

**5.2.1 Military agencies.** In addition to any special marking specified in the contract or order or herein, interior and exterior shipping containers shall be marked in accordance with MIL-H-15424.

**5.2.2 Civil agencies.** Marking for shipment shall be in accordance with the standard marking of Fed. Std. No. 123.

### 6. NOTES

**6.1 Intended use.** This specification covers wire brushes for use with pneumatic or electric tools in the removal of rust, scale, or paint from all types of metal surfaces, such as rivet heads, protruding bolts and lugs, eye beams, angles, channels, and similar items.

**6.2 Ordering data.** Purchasers should select the preferred options offered herein and in-

clude the following data in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Type, class, and style required (see 1.2).
- (c) Brush diameter and wire size required (see applicable table).
- (d) Type steel wire required (see table I, 3.5, 3.6.1, 3.7.2, and 3.7.3.1).
- (e) Size of thread for threaded arbor holes, if required (see 3.5.1).
- (f) Arbor hole diameter required (see 3.5.1, table VII, 3.7.2.2.1 and table IX).
- (g) If 0.005 and smaller diameter wire is required to be untempered for type I, class 1 (see 3.7.2).
- (h) Levels of preservation, packaging, and packing required (see 5.1).

**6.3 Wire trim.** Wire trim is defined as the length of wire extending beyond the fill wire retainer or flange.

**6.4 Supersession data.** This specification includes the requirements of MIL-B-19888.

**6.5** With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion on Qualified Products List QPL-H-B-771, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy, Washington, D.C., and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification". (Copies may be obtained from the Commanding Officer, Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa., 19120.)

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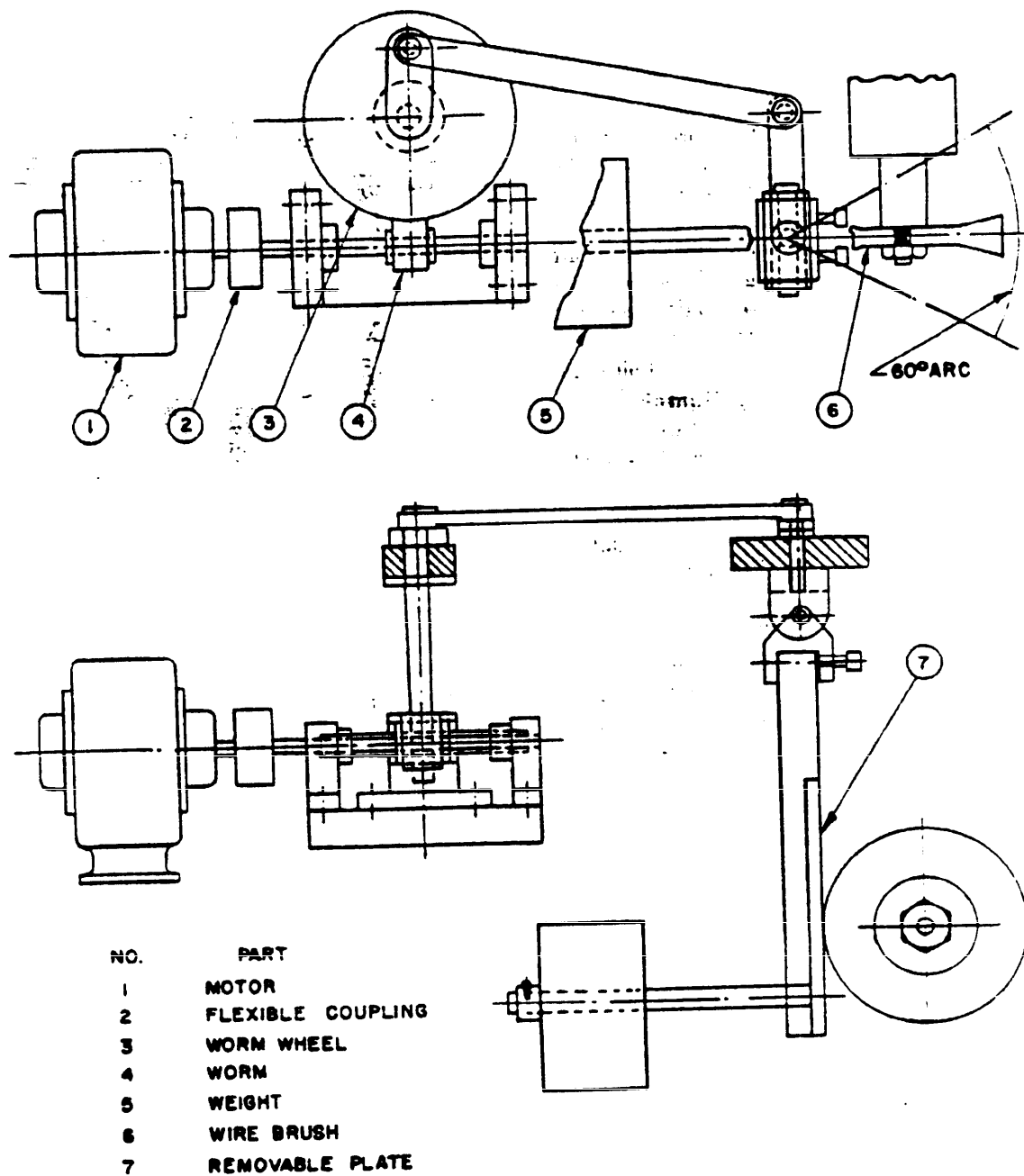


FIGURE 5. Machine for testing wire brushes.

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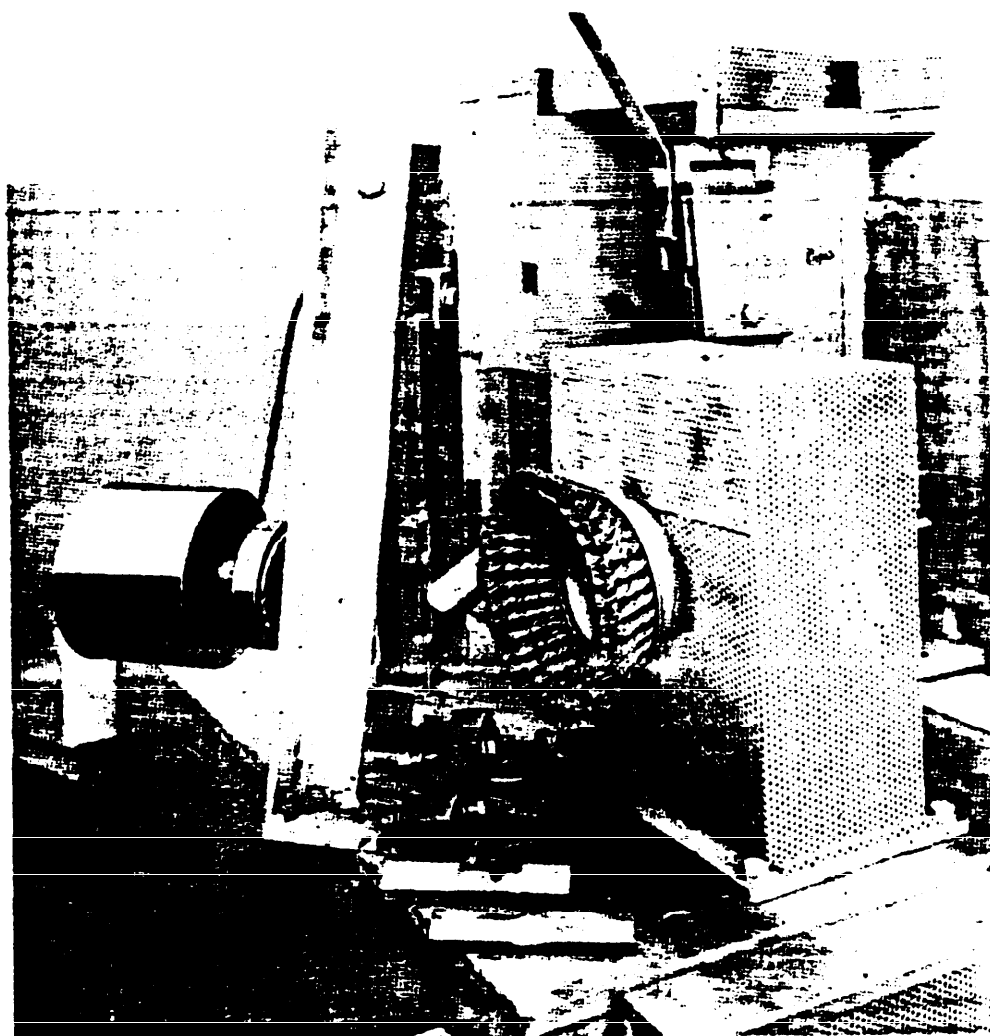


FIGURE 6. Method of testing cup brushes.

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**MILITARY CUSTODIANS:**

**Army—GL**

**Navy—SH**

**Air Force—69**

*Review activities:*

**Army—GL, MO**

**Navy—SH**

**Air Force—69**

*User activity:*

**Navy—MC, YD**

*Preparing activity:*

**Navy—SH**

**CIVIL AGENCY:**

**GSA**

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