Feb. 8, 1966 H. C. PETERSON 3,233,943

BRUSH TRIMMER

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Fig. 1.

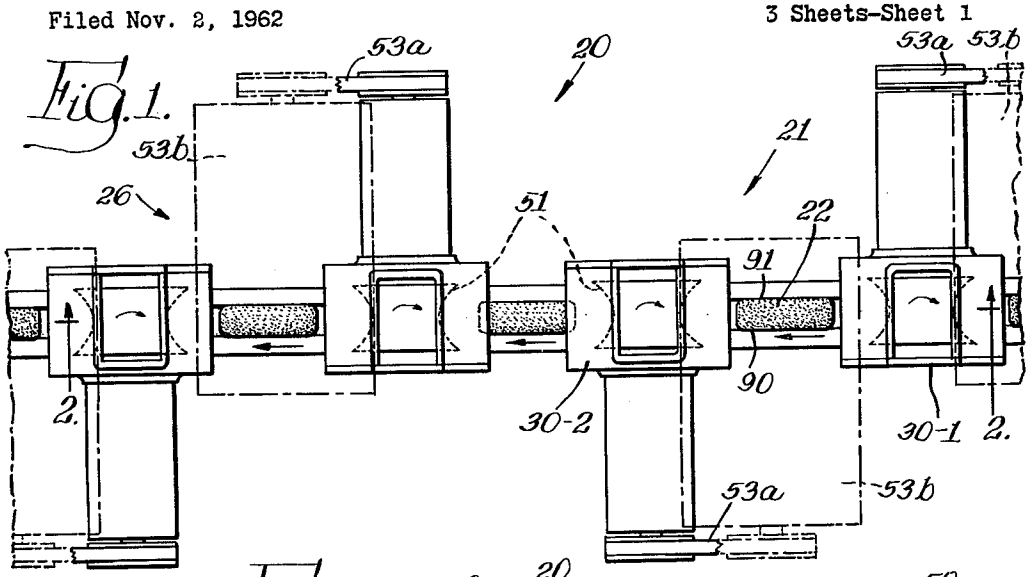


Fig. 2.

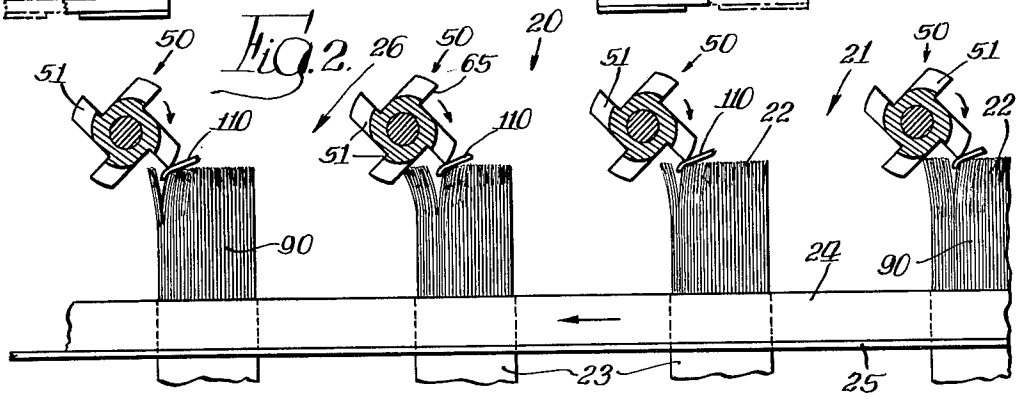
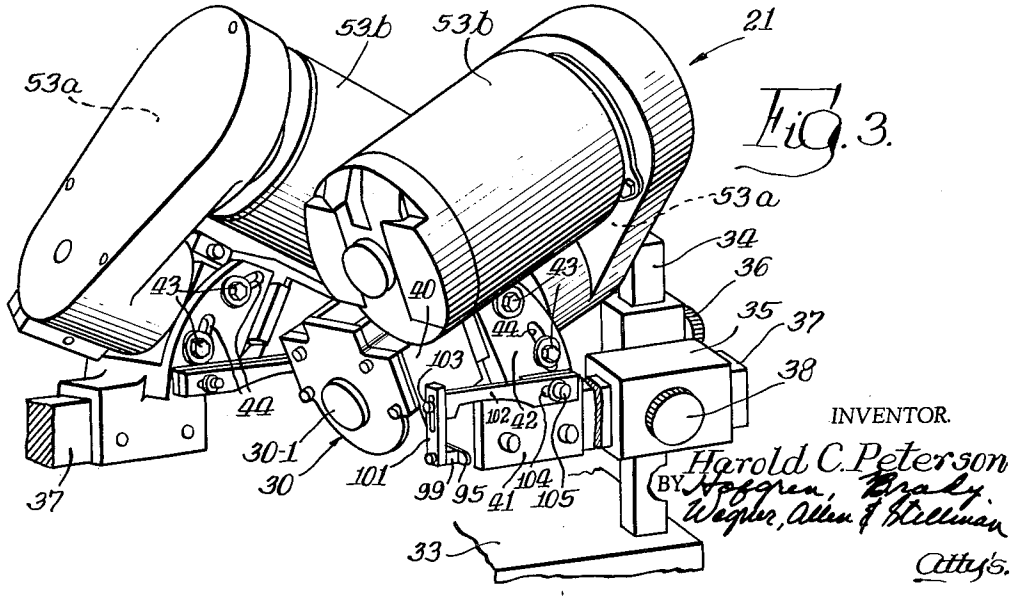


Fig. 3.



INVENTOR.
Harold C. Peterson
BY Hofgren, Brady, Wegner, Allen & Stellman
Atty's.

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Fig. 4.

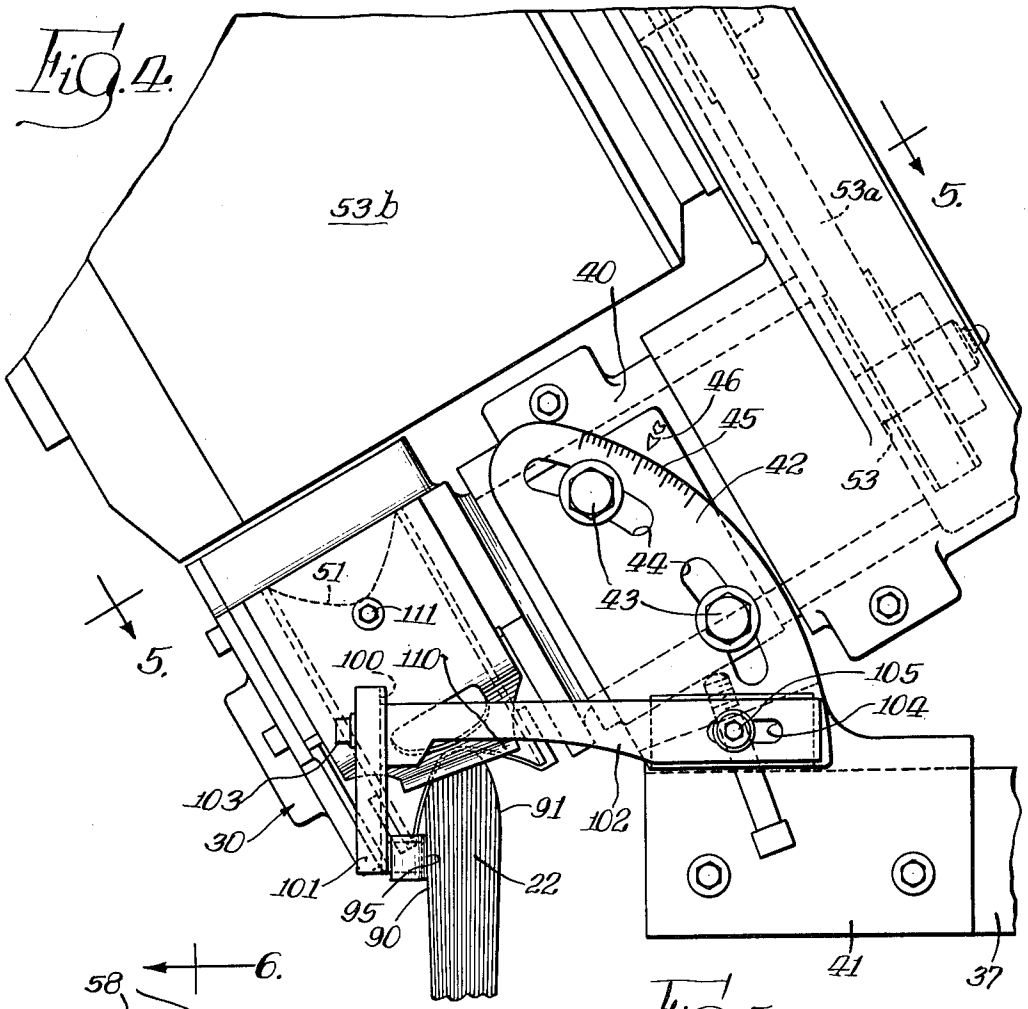
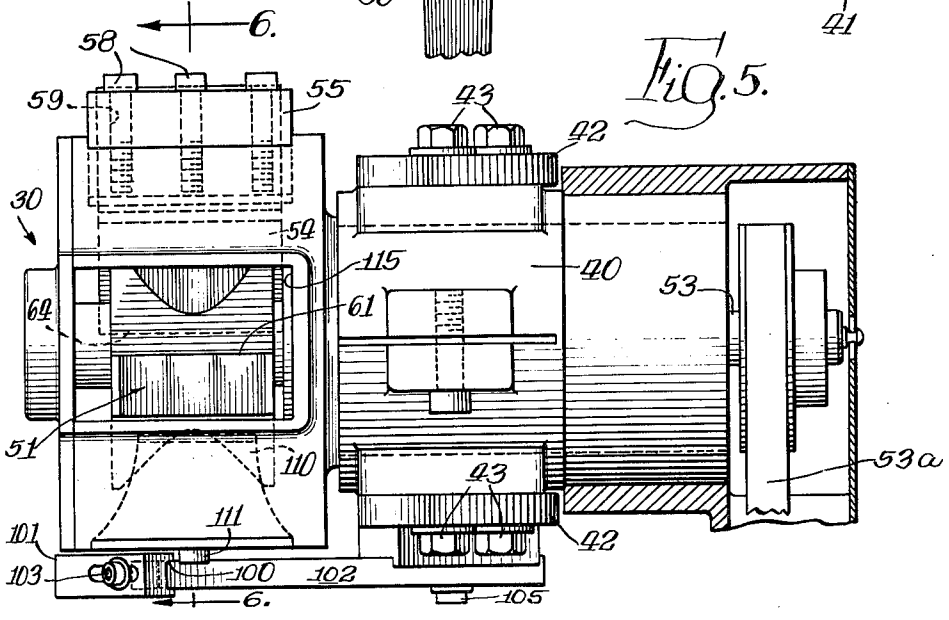


Fig. 5.



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Fig. 6.

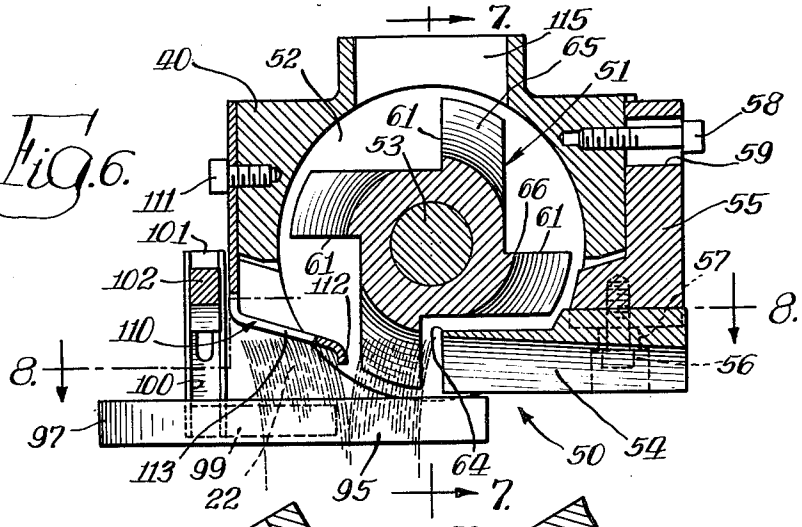


Fig. 7.

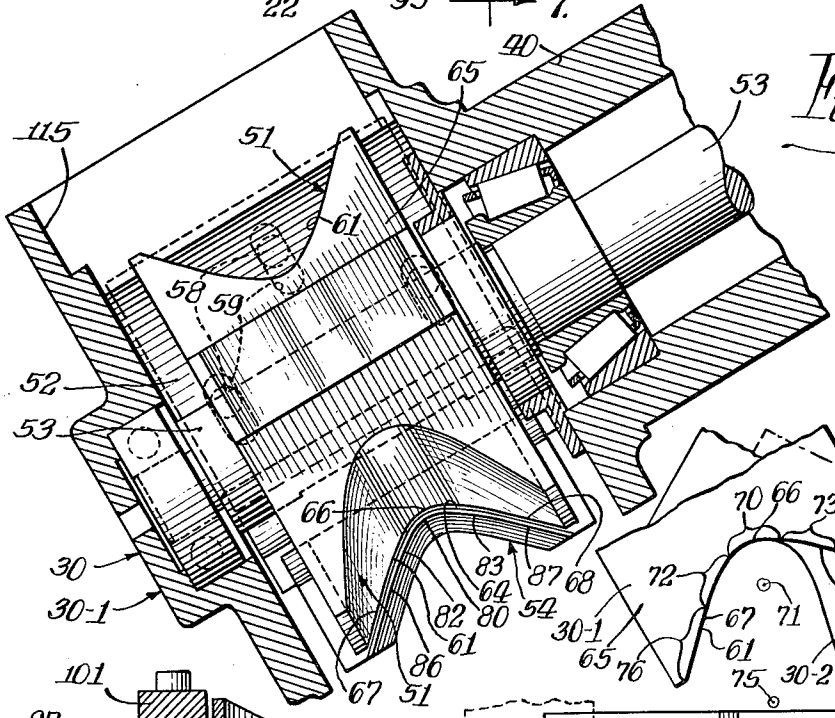
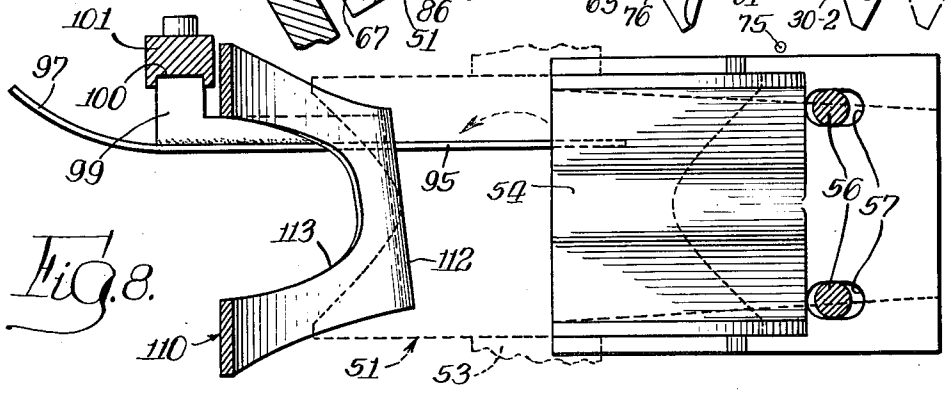


Fig. 9.

Fig. 8.



United States Patent Office 3,233,943 Patented Feb. 8, 1966

3,233,943

BRUSH TRIMMER

Harold C. Peterson, Geneva, Ill., assignor to Carlson Tool & Machine Company, a corporation of Illinois

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11 Claims. (Cl. 300—17)

This invention relates to a machine, and more particularly to a bristle trimming machine.

The primary object of this invention is to provide a new and useful trimmer.

Many brushes have the free ends of their bristles trimmed to provide a desired configuration, for example, paint brush bristles are often shaped to a chisel point. Such shaping has entailed many problems, particularly in shaping brushes having synthetic bristles such as nylon, for example. A major problem has been in retaining adequate sharpness of cutters and in sharpening the cutters. Another problem has been caused by cutter shapes which do not readily permit adjustment to compensate for wear of certain portions of the cutter. Because prior cutters are generally of the precise shape desired in the trimmed bristles, it has been necessary to provide different cutters for each different size brush and for different shapes desired in the trimmed bristles. Another difficulty has been that trimmers were so constructed that a solid mass of bristles was presented to the cutter, often resulting in the cutter biting into or gouging the bristle mass and producing a ragged and unsatisfactory trim.

An important object of this invention is to provide a new and useful brush trimming machine which is durable in operation and versatile in handling various sizes of brushes and providing various configurations of trimmed brush bristles.

Another object is to provide a new and useful cutter assembly, and components thereof.

A further object is provision of a new and useful trimming machine adjustable for handling various size work pieces and providing various trim configurations to the work pieces while utilizing the same basic cutter assembly.

Additional objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a schematic, fragmentary plan view of a preferred embodiment of the brush trimmer of this invention with brushes passing from trimming units, and parts shown in phantom lines for clearer illustration;

FIGURE 2 is a schematic, fragmentary elevational view broken away in part generally along the line 2—2 of FIGURE 1, but showing the brushes engaging cutters of the trimming units;

FIGURE 3 is a perspective view of a pair of trimming units;

FIGURE 4 is an enlarged, fragmentary right-hand end view of the trimming unit shown in FIGURE 3;

FIGURE 5 is a sectional view taken generally along the line 5—5 of FIGURE 4;

FIGURE 6 is a sectional view taken generally along the line 6—6 of FIGURE 5;

FIGURE 7 is an enlarged, fragmentary sectional view taken generally along the line 7—7 of FIGURE 6;

FIGURE 8 is an enlarged, fragmentary sectional view taken generally along the line 8—8 of FIGURE 6; and

FIGURE 9 is a fragmentary diagrammatic elevational view of various associations between cutters of a trimming unit.

While I have shown and shall hereinafter describe one embodiment of the invention, it is to be understood that the invention is capable of many modifications. Changes, therefore, in the construction and arrangement may be

made without departing from the spirit and scope of the invention as defined in the appended claims.

The invention is, in brief, directed to a trimmer illustrated in a preferred embodiment in the form of a brush trimming machine particularly suited for use in providing a chisel point on the free ends of synthetic paint brush bristles, for example, nylon bristles. In the illustrated embodiment a pair of trimming units each includes a pair of trimming heads, one unit for initial rough trimming and the other for a subsequent finish trimming. Each head has a novel cutter assembly such as to remain sharp a longer period of time and to accept various sizes of brushes and provide various trimmed bristle shapes upon adjustment of the heads. While the heads are preferably mounted for any desired sort of adjustment, it should be particularly noted that the heads of each trimming unit may be adjusted laterally of the brush to accommodate various size brushes and angularly to vary the configuration of the trimmed ends of the brush bristles.

Referring to the drawings, FIGURES 1 and 2 schematically illustrate the trimming portion of a trimming machine **20** which includes a first trimming unit **21** for providing an initial relatively rough trim to free ends of a brush bristle bundle **22** suitably mounted in a brush handle **23** operatively positioned in suitable holder means **24** of a conveyor **25**. A second trimming unit **26** receives the roughly trimmed brushes and provides a finished trim to the free ends of the bundle of bristles. The two trimming units are basically the same and the remaining description will be directed to the first trimming unit **21** shown in perspective in FIGURE 3. Means is provided for mounting the heads for vertical and lateral adjustment, and herein a common base **33** carries upright posts **34** each telescopically receiving a fixture **35** which may be clamped in any desired vertically disposed position along the post by means of a clamping screw having a knob **36**. Generally horizontal arms **37** are secured, one to each head and telescopically received in fixture **35** to which it may be releasably clamped in adjusted position by means of a knob **38**.

A body portion **40** of each head is pivotally mounted on a yoke member **41** fixedly secured to the respective arm **37**, and more particularly each body is received between opposed quadrant legs **42** of the yoke and is secured thereto by bolts **43** extending through a pair of arcuate slots **44** in each leg **42**. As shown in FIGURE 3, suitable indexing means such as a scale **45** on one of the quadrant legs **42** and a cooperating index mark **46** on body **40** may be provided for accurately and conveniently adjusting the angular disposition of the respective head.

Each head **30** has a trimmer in the form of a cutting assembly **50**, and with particular reference to FIGURE 6, cutting assembly **50** includes a rotary cutter **51** received in a chamber **52** of body **40** and mounted on an end of a drive shaft **53** for rotation with the shaft. Shaft **53** is driven through a belt drive **53***a* responsive to operation of a motor **53***b*. A stationary cutting blade **54** is mounted on a bracket **55** for movement toward and away from rotor **50** by means of countersunk bolts **56** extending through elongated slots **57** in blade **54** and threadedly received in bracket **55**. Bracket **55** is mounted for movement of blade **54** generally radially of shaft **53** and in the illustrated embodiment, vertically, and herein bracket **55** is mounted on body **40** by means of bolts **58** extending through elongated slots **59** in bracket **55** and threadedly received in body **40**.

Rotor **51** and stationary blade **54** have complementary cutting edge portions **61** and **64**, as may best be seen in FIGURE 6. The rotor cutting edges are on outwardly extending rotor fingers **65**, four such fingers being illus-

trated, and blade cutting edge 64 is on an inner upper portion of the blade, as illustrated. These cutting edge portions have a profile which may best be seen in FIGURE 7, and with particular reference to the rotor profile, as may be seen in FIGURE 9. A shallow concave rotor profile is illustrated including an arcuate apex 66 and outwardly diverging generally straight sides 67 and 68 which are generally normal to each other and tangent to arcuate portion 66. With particular reference to FIGURE 9, each rotor apex 66 is defined by a concave central arcuate portion 70 extending outwardly in opposite directions about thirty degrees from the radial center line of the rotor and described by a relatively short radius extending from a center 71 on the radial center, and arcuate side portions 72 and 73 described by relatively long radii about centers indicated by points 74 and 75, respectively, on opposite sides of the center line, as shown in FIGURE 9. Arcuate side portions 72 and 73 are tangent to arcuate center portion 70, and to sides 67 and 68, respectively, providing a wide and shallow profile. The stationary blade profile is complementary to the rotor profile and has a central arcuate portion 80, side arcuate portions 82 and 83 and straight side portions 86 and 87 corresponding to rotor portions 70, 72, 73, 76 and 77, respectively.

With reference to FIGURE 4, the profiles of applicant's cutting edge portions are such as to trim only one side, as 90, of the free ends of bristles 22, with the companion head of the trimming unit providing the desired trimmed configuration to the opposite side 91 of the bristles. In order to effect alternate trimming of opposite sides of the bristle bundle, first head 30–1 extends to one side of conveyor 25 and is tilted as illustrated in FIGURES 1, 3, 4 and 7, so that its cutting edge portions engage and trim side 90 of bristle bundle 22, and second head 30–2 extends outwardly on the opposite side of conveyor 25 and is inclined in an opposite direction as illustrated in FIGURE 3, so that its cutting edge portions trim side 91 of bristle bundle 22. As previously described, the inclination of heads 30 may be adjusted as desired by loosening bolts 43 and swinging the respective head to any inclination as indicated by the index means 45, 46, and then tightening bolts 43 to retain the desired setting. Thus, the same cutter assembly may be utilized in providing a gradually tapering chisel point or a blunt chisel point. Various widths of brushes, and more particularly bristle bundles, may also be trimmed with the same cutter assembly by moving heads 30–1 and 30–2 toward or away from conveyor 25 by merely loosening knob 38 and making the appropriate adjustment whereupon knob 38 is again tightened to maintain the desired setting. Such lateral movement of the cutter assembly of head 30–2 is illustrated by phantom lines in FIGURE 9.

Each head is provided with guide means for retaining brush bristles properly oriented with respect to the cutter assembly, and herein this means is in the form of a guide member 95 generally horizontal and parallel to the path of movement of conveyor 25. Guide member 95 has an outwardly flared leading portion 97 for guiding bristles into proper alignment with the cutters. Guide member 95 is fixedly secured, in any suitable manner as by soldering, to a guide shoe 99 having an end snugly received in a vertical channel 100 in a mounting bracket 101 adjustably connected at an upper end to a horizontal arm 102 by means of a vertically elongated slot in the bracket receiving a bolt 103 threaded into an end of arm 102, thus providing adjustment in elevation of guide member 95. Arm 102 has a horizontally elongated slot 104 at end opposite bracket 101 and a bolt 105 extends through this slot and is threadedly received in the base of yoke member 41 so that guide member 95 may be adjusted horizontally by loosening the bolt. It should be noted that on each head 30, guide member 95 is adjacent the side of brush bristles which are to be trimmed.

Means is provided for separating the bristles from the mass of bristle bundle 22 as it is engaged by cutter rotor 51 to avoid gouging or otherwise providing an uneven trim to the free ends of the bristles, and herein a flipper member 110 is provided. Flipper 110 has a generally L-shaped plate-like body with one leg firmly secured to body 40 by a bolt 111 and a second leg extending inwardly toward rotor 51 with a depending flange 112 at its inner end for engaging the free ends of bristles in bundle 22 as they are moved by conveyor 25 into the cutter assembly. Thus, as the bristles pass under the lower edge of flange 112 they are individually flipped into the path of rotor cutting fingers 65. In order to provide less resistance to the movement of the bristles and to prevent a collection of bristle particles, flipper 110 has an opening 113 in its inwardly extending leg. To further prevent a build-up of trimmed bristle particles about the cutter assembly, a vent opening 115 may be provided into chamber 52, and this opening may be suitably connected with an exhaust duct if desired.

To summarize the operation of the brush trimming machine, brushes to be trimmed have their handles 23 mounted in holders 24 of conveyor 25 for movement along a path as indicated by the arrows in FIGURES 1 and 2, and positioned so that free ends of bristles of bundle 22 pass serially through cutter assemblies 50 of trimming units 21, there being two such units arranged in tandem. These units may be identical to each other, and the first unit provides a rough trim and the second unit a finished trim. As the bristle bundle 22 moves into the cutting assemblies, it engages guide members 95 and the bristle-free ends engage flippers 110 which cause the bristles to individually flip into the path of cutter rotor 51 and more particularly cutting fingers 65. In the first trimming unit, head 30–1 trims side 90 of bristle bundle 22 and head 30–2 trims side 91, providing a relatively rough trim, and thereafter conveyor 25 moves the brushes into the second trimming unit 21 wherein the cutting process is repeated as previously described to provide a finish trim.

I claim:

1. A trimming machine for chisel pointing free ends of a bundle of bristles in a brush, comprising: a base; a conveyor operatively associated with said base for mounting the brushes and moving the brushes in a path; a first pair of trimming heads for rough chisel point trimming free ends of the bundle of bristles and a second pair of trimming heads for finish chisel point trimming the rough trimmed free ends, each head having a trimmer along said path and including a driven rotary cutter and a cooperating stationary cutter for receiving said free ends and trimming only one side of the bristle bundle, the cutters having cooperating cutting profiles complementary to each other and each with an apex and sides diverging outwardly at about ninety degrees from said apex, and said apex being arcuate and generally tangent to said sides, the trimmers of each head being substantially identical, means for guiding into each trimmer the side of the bristles to be trimmed by the respective trimmer, and a flipper member at a brush receiving end of the head for engaging the bristle-free ends and individually flipping each free end into the rotary cutter; and means mounting the heads on said base for trimming opposite sides of the bristles with the apex and only one side of each cutter cutting the bristle-free ends, and for relative movement laterally of said path for receiving various thicknesses of brushes, and for varying the effective angle of the trimmers with respect to said path to vary the shape of the trimmed free ends.

2. A trimming machine for chisel pointing free ends of a bundle of bristles in a brush, comprising: a base; a conveyor operatively associated with said base for mounting the brushes and moving the brushes in a path; a pair of trimming heads for chisel point trimming free ends of the brush bristles, each head having a trimmer along said path and including a driven rotary cutter with

a shallow concave cutting portion and a stationary cutter with a cooperating complementary cutter portion for receiving said free ends and trimming only one side of the bristle bundle, the trimmers of each head being substantially identical, and a flipper member at a brush receiving end of the head for engaging the bristle free ends and individually flipping each free end into the rotary cutter; and means mounting the heads on said base for trimming opposite sides of the bristles and for relative movement laterally of said path for receiving various thicknesses of brushes, and for varying the effective angle of the trimmers with respect to said path to vary the shape of the trimmed free ends.

3. A trimming machine for trimming bristles in a brush, comprising: means for moving brushes in a path through the machine; a head adjacent the path of brush travel, said head having a cutting blade positioned in the path of brush travel for trimming some of said bristles in a swath generally coextensive with the path of brush travel; and means mounting said head on said machine for movement through an arcuate path toward and away from one side of the path of brush travel to change the position of said blade relative to the brush bristles to adapt said trimming machine for trimming different bristle configurations.

4. The trimming machine of claim 3 wherein said cutting blade is positioned to trim the bristles along one side of the brush.

5. The trimming machine of claim 3 wherein said cutting blade is positioned at an angle relative to the bristles of the brush and wherein said head may be adjusted to change said angle and thereby produce different bristle configurations.

6. The trimming machine of claim 5 wherein said cutting blade has a shallow concave cutting edge for trimming only one side of the bristles of a brush and wherein the means for moving the brushes presents the other side of said brushes to a cutting blade oriented at substantially the same angle to the other side of said brush as the one side to produce a desired bristle configuration on said brushes.

7. The trimming machine of claim 6 wherein said cutting blade trims said bristles along the apex and one leg of the concave cutting edge of the blade.

8. A machine for trimming a bundle of bristles in a brush, comprising: means for moving brushes in a path through the machine, a pair of spaced trimming heads adjacent the path of brush movement, each head having cutting blades for trimming bristle ends on one side of the bristle bundles; means providing for relative adjustment of the cutting blades and bristles to selectively position the bristles for trimming, means mounting the cutting blades for trimming opposite sides of the bristles and for relative movement laterally of each other for receiving various thicknesses of brushes, each of said cutting blades having a profile with an apex and sides diverging outwardly from a wide angle from said apex to the outer ends of said sides, said apex being arcuate and generally tangent to said sides.

9. The machine of claim 8 wherein the mounting means positions each apex and only one side of each trimmer for trimming association with the bristle-free ends.

10. A machine for trimming a bundle of bristles in a brush, comprising: means for moving brushes in a path through the machine, a pair of spaced trimming heads mounted adjacent to and extending across the path of brush movement, each head having a trimming blade normally positioned across the path of brush movement for trimming the free ends and only one side of the bristle bundle; and a mounting arm on the machine to which each head is mounted for movement of the heads and blades through an arcuate path toward and away from the path of brush movement to mount the heads for movement relative to each other and to adjust the angle of each trimming blade relative to the bristle bundles and thereby adapt the trimming machine for trimming different bristle shapes.

11. A machine for trimming a bundle of bristles in a brush, comprising: means for moving brushes in a path through the machine; a pair of spaced trimming heads adjacent the path of brush movement, each head having a trimming blade for trimming the free ends and only one side of the bristle bundle, each trimming blade having a shallow concave cutting edge with the apex and one side of the shallow concave cutting portion presented to said bristles for cutting one side thereof; and means mounting the trimming heads on the machine so that alternate cutting blades are positioned at complementary angles relative to each other to produce the desired bristle configuration, said mounting means mounting said heads for movement relative to each other and toward and away from the path of brush movement to adjust the angle of each trimming blade relative to the bristle bundles to adapt the trimming machine for trimming different bristle shapes.

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FRANK E. BAILEY, *Primary Examiner.*