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WIRE BRUSH

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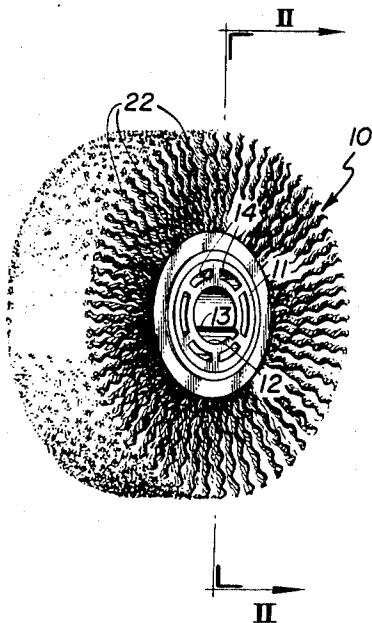


FIG. 1

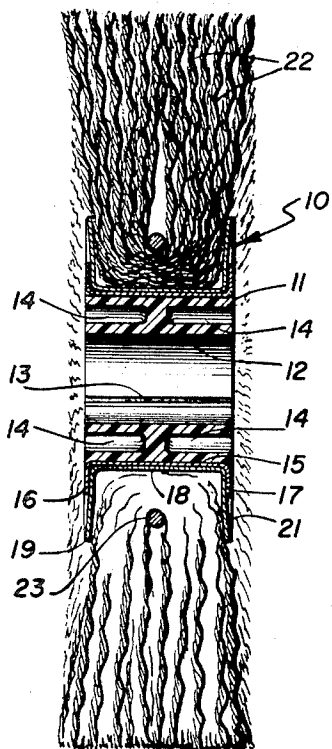


FIG. 2

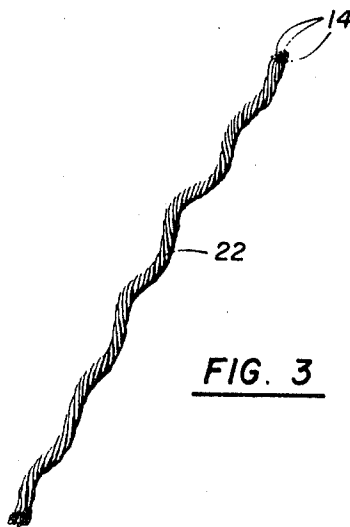


FIG. 3

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WIRE BRUSH

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4 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to a wire brush for industrial brushing, wherein groups of individual wires having good fatigue are cabled together to form strands having a high degree of stiffness.

BACKGROUND OF THE INVENTION

In the art of industrial brush machining or finishing of metals and the like, it is desirable that the individual strands of wire in the brush be quite stiff. This is because the removal of a chip from the workpiece depends to a great extent on the resistance to lateral bending of the individual strand. In order to give such stiffness, the strand of wire must have appreciable thickness or gage. It is well known in the study of strength of materials that, when a column is bent laterally, compressive stresses are set up in the inside of the bend and tensile stresses on the outside. Furthermore, the intensity of the stress is in proportion to the distance from the neutral fibers of the column which are located in the middle. When the alternate bending and snapping back of a strand of wire takes place in an industrial brush, the alternate stressing and un-stressing causes the metal to work-harden, then to develop incipient fatigue cracks, an eventually to break. As this action is taking place in one wire, it is also taking place in the others and, eventually, the brush is rendered useless and must be discarded. The length of life of an industrial brush is a very important matter, not only because of the cost factor, but also because changing brushes makes use of costly human labor and, of course, the machine using the brush is out of operation during the change. These and other difficulties experienced with the prior art devices have been obviated in a novel manner by the present invention.

It is, therefore, an outstanding object of the invention to provide a wire brush having long life.

Another object of this invention is the provision of an industrial wire brush in which each strand has the stiffness of a heavy wire, but the fatigue life of a thin wire.

A further object of the present invention is the provision of a wire brush in which the available cutting edges are increased without loss of stiffness.

It is another object of the instant invention to provide a wire brush having a simple and rugged construction, which can be manufactured from inexpensive, readily-available materials, and which is capable of a long life of useful service with a minimum of maintenance.

Another object of the invention is the provision of a brush where the action of the filaments is regulated and controlled by virtue of a crimped, cabled construction.

A further object of the invention is to provide a brush filled with crimped strands that can be secured firmly against longitudinal movement.

It is another object of the invention to provide a brush where individual strands of wire are crimped to provide damping effect by interengagement of the strands with each other at fixed intervals along their length.

Another object of the invention is to provide a brush wherein strands of wire are crimped to insure uniformity of density at periphery.

A further object of the invention is the provision of a brush wherein strands of wire are crimped to reduce areas of stress concentration, thus eliminating a primary cause of long wire breakage.

It is another object of the invention to provide a brush with strands of wire to preclude compacting into a narrow face (knifing) at its periphery.

A still further object of the invention is the provision of a brush that, because of its novel construction with strands of wire crimped, provides a density at periphery so distributed as to provide equal filament contact with all surfaces and all protuberances on such surfaces that are being brushed.

Another object of the invention is to provide a brush with the stiffness of much larger wire filaments but, because of stranded configuration, gives many more cutting points.

A further object of the invention is the provision of a brush with stiffness of much larger wire filaments but, because of stranded configuration, individual wire filaments are not subjected to excessive stress concentration and, consequently life is improved.

It is a still further object of the invention to provide a brush wherein strands of relatively fine wire are used to attain a density by compacting wires closely together in a manner not possible when conventional wire elements, each individually attached, are used.

It is a further object of the invention to provide a brush wherein the strands of wire are in relationship with each other in such a manner as to permit them to permit them to mutually support each other so that an increased number of wires attainable in the preiphery permits longer life of the brush.

Another object of the invention is the provision of a stranded-wire rotary brush of small diameter that is denser than is possible in brushes of other strand constructions, since in said other constructions the wires are placed as close together as possible at the hub which leaves insufficient density at periphery.

A further object of the invention is the provision of a brush that is so constructed as to permit greater dissipation of heat generated in use due to crimp configuration of strands.

A still further object of the invention is to provide a brush of stranded construction which in use provides an action that is intermediate to the harsh impact action of the construction in knotted or tufted brush and the more uniform softness of construction of crimped wire brushes while, at the same time, having a marked reduction in long wire breakage.

It is another object of the invention to provide a novel brush that has a unique value for brushing resilient materials so that unusually long life can be obtained when brushing such materials as rubber, leather, plastics, etc. which normally cause reduced fatigue life.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

SUMMARY OF THE INVENTION

In general, the invention consists of a wire brush having a base adapted to be mounted for rotation and having a plurality of strands extending from the base, each strand consisting of a plurality of individual wires which have been cabled or braided together.

More specifically, each wire is formed of steel and has a diameter in the order of .006 inch. Each strand has been crimped into a multiplane sine-wave configuration without, however, destroying the cabled relationship of the wires in the strand.

BRIEF DESCRIPTION OF THE DRAWINGS

The character of the invention, however, may be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings, in which:

FIG. 1 is a perspective view of a wire brush embodying the principles of the present invention,

FIG. 2 is a sectional view of the invention taken on the line II—II of FIG. 1, and

FIG. 3 is a perspective view of an individual strand from the brush.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, wherein are best shown the general features of the invention, the wire brush, indicated generally by the reference numeral 10, is shown, for purposes of illustration, as being of the wheel type. It is provided with a central base, such as a hub 11, having a central bore 12 by which it may be mounted on a rotatable shaft or spindle, not shown; a keyway 13 allows the hub to be locked against rotation relative to the shaft. The hub is of generally cylindrical configuration. Mounted on the outer cylindrical surface of the hub is a metal ring 15 having radially extending flanges 16 and 17; the ring is locked to the hub by a force fit. Mounted on the ring between the flanges is an outer retaining member 18 having broad radial flanges 19 and 21.

As is best evident in FIG. 2, between the flanges 19 and 21 are locked a plurality of strands 22, each of which is bent into a hairpin shape with its bight between the flanges. The bundle of U-shaped strands is initially held in place by a wire 23 and then later clamped tightly in place by an axial compression of the flanges 19 and 21 inwardly by a machine press. This pressing action also takes place on the flanges 16 and 17 of the ring 15 to lock the ring and the retaining member tightly together.

FIG. 3 shows the nature of the individual strands 22. Each strand consists of a plurality of small low-carbon steel wire 24 which have been cabled together and then crimped into a multiplane form. In the preferred embodiment, each wire has a diameter of .006 inch. This structure prevents the group of wires in a strand from separating. As each strand is bent during a brushing operation, it resists with the strength or stiffness of a large wire; nevertheless, because of the ability of the individual wires to slide relative to one another, the stress at the outer portions of the strand is no different from that in the center. In other words, the tensile or compressive stress is the same in all the "fibers" of the column.

In addition, the work-hardening of the ends of the individual wires causes them to fracture and expose new,

sharp edges to cut into the metal. The use of the cabled fine wire gives a large number of small cutting edges in a given strand, rather than one large one. The effect of the present invention is to give the advantages in cutting rate of a brush with stiff wires, but with the fatigue life of a brush with finer wires. At the same time, because the fine wires making up a strand are carefully locked together, there is little tendency for the wires to separate and act individually. That is to say, it is important in the practice of the invention that the wires in a given strand be joined together in such a way that they cannot separate, but can still slide relative to one another.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

The invention having been thus described, what is claimed as new and desired to secure by Letter Patent is:

1. A wire brush, comprising

(a) a base adapted to be mounted for rotation, and

(b) a plurality of strands extending from the base, each strand consisting of a plurality of individual wires which are twisted together into said strand and crimped into a multiplanar sinewave configuration.

2. A wire brush as recited in claim 1, wherein each strand is bent into a U shape.

3. A wire brush as recited in claim 1, wherein each strand is locked into an annular groove on the base by a single circumferential wire.

4. A wire brush as recited in claim 1, wherein each wire is formed of steel and has a diameter in the range from .015 inch to .001 inch.

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