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BRUSH ROLL CONSTRUCTION

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FIG. 1.

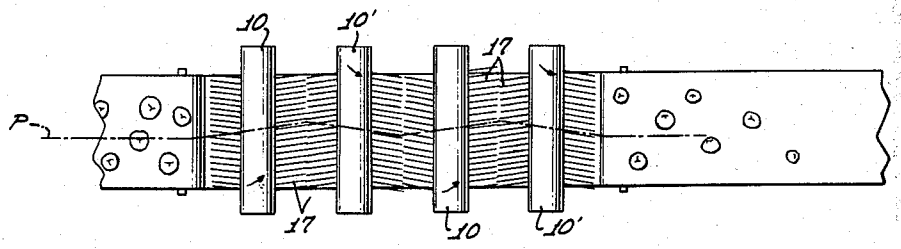


FIG. 2.

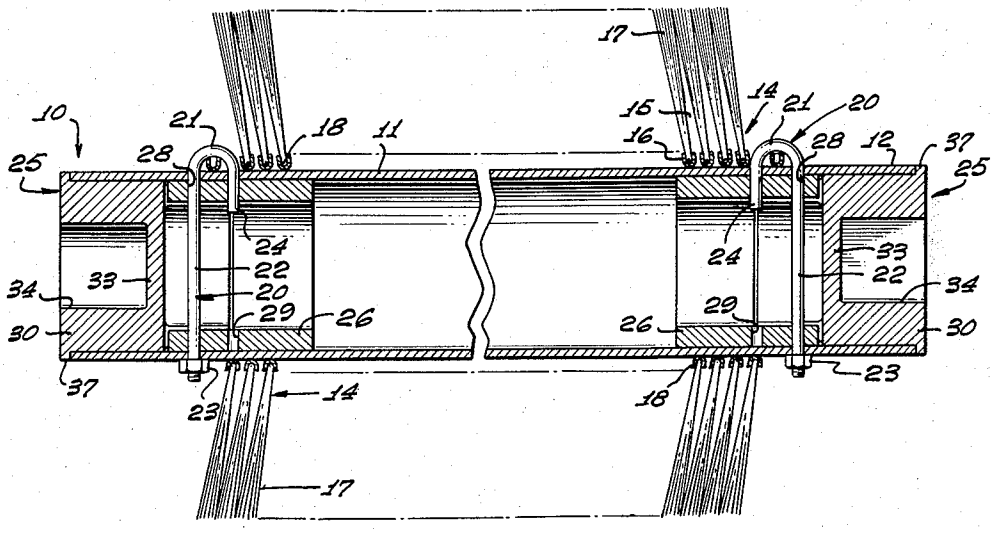
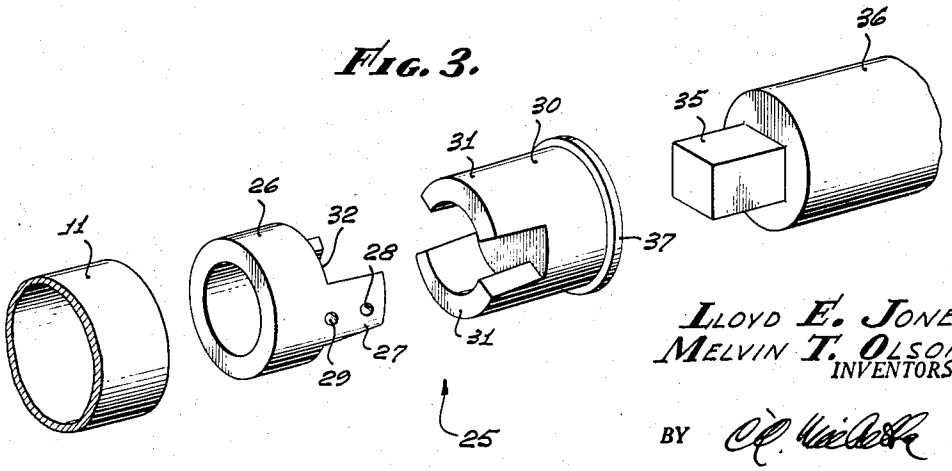


FIG. 3.



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BRUSH ROLL CONSTRUCTION

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8 Claims. (Cl. 15—182)

This invention relates to a brush roll construction for use in a conveyor system for treating globular articles such as tomatoes, fresh fruit, oranges, grapefruit, lemons, vegetables, peppers, and the like. The invention particularly relates to a brush roll which facilitates cleaning of such articles, treating fruit and vegetables with fungicide, applying a protective coating thereto, and for brushing and rubbing external surfaces of such articles.

Prior brush roll constructions, which have been embodied in a conveyor system for such articles to be treated, have been arranged with their axes parallel and have included a plurality of tufted bristles lying generally in zones perpendicular to the axes of the brush rolls. As articles are advanced over such prior brush conveyor systems, other means were employed to turn or rotate each article about its axis so as to bring the entire exterior surface of the article into contact with the brushes. Other prior brush conveyor systems have included pairs of brushes arranged with axes parallel and with grooves cut in their bristles so that an article to be treated would be advanced longitudinally and along the axis of said brushes. The continuous advancement and action imparted to an article being treated in prior proposed brush systems was not satisfactory in that the bristles did not uniformly contact and treat the entire surface area of an article to be treated.

Specific constructions of prior proposed brush rolls have generally included a solid wood or metal core provided with a spirally arranged groove formed in its outer surface or a plurality of interconnected longitudinally spaced circular spider members. A brush strip or a plurality of bristle tufts were positioned and secured in the grooved arrangement while bars carrying bristles were supported by the spider members. Prior proposed bush rolls have been expensive to manufacture and to maintain.

It is, therefore, the primary object of this invention to disclose and provide a novel brush roll arrangement and construction for use in an apparatus for treating globular articles.

Another object of this invention is to disclose and provide a novel construction of a brush roll which is inexpensive, easily manufactured and which may be readily reused and repaired if desired.

A further object of this invention is to disclose and provide a brush roll wherein novel means are provided for mounting said brush roll, said mounting means serving to strengthen the construction of brush roll.

A still further object of this invention is to disclose and provide a brush roll employing a thin section, hollow core member and end mounting means for said core member whereby said end mounting means may be readily replaceable when worn and which serve to reinforce ends of said core member.

The invention contemplates a brush in which the density of bristles may be readily controlled and varied without expensive changes in production procedure.

Generally speaking, the brush roll construction of this invention may be utilized in an apparatus for treating globular articles, such as fruit, wherein a pair of adjacent brush rolls are arranged with their axes parallel and transverse to the desired path of movement of the article being treated. One brush roll is provided with a major portion of its bristles inclined toward one end of said pair and the other brush roll is provided with a major portion of its bristles inclined away from said one end of said pair. The oppositely inclined bristles of adjacent brush rolls imparts a change in the axis about which the article is rotated as it is advanced along its path of travel.

More specifically, the invention contemplates a brush roll comprising a hollow core member of lightweight metal alloy having a smooth, external, cylindrical surface. A continuous brush strip is tightly, spirally wound around said core member on said surface, said strip frictionally grasping said surface. Means are provided for securing ends of said brush strip to the core member and such means may include mounting means for providing a driving connection for the brush roll. The mounting means may include an insert member and a removable, interlocking socket member, said insert member providing sufficient metal section for strengthening ends of the core member for securing the brush strip.

Other objects and advantages of this invention will be readily apparent from the following description of the drawings in which an exemplary embodiment of this invention is shown.

In the drawings:

Fig. 1 is a diagrammatic view of a treating apparatus embodying exemplary pairs of brush rolls of this invention.

Fig. 2 is an enlarged, longitudinal, sectional view of a brush roll embodying this invention.

Fig. 3 is an enlarged perspective view of end mounting means employed with the brush roll shown in Fig. 2.

In Fig. 1, several pairs of brush rolls **10** and **10'** are shown arranged in a conveyor system for an apparatus for treating globular articles such as fresh fruit, vegetables, and the like. One or more pairs of brush rolls may be employed in such a conveyor system, for example, a conveyor system might embody as many as 25–30 pairs of brush rolls.

Each brush roll **10** and **10'** includes substantially the same construction, except that the bristles of one brush roll are arranged in a direction both as to spiral winding and inclination opposite to the bristles of the other brush roll of the pair of rolls. Therefore only one brush roll will be described in detail.

Brush roll **10** may comprise an elongated, hollow, open-ended core member **11** of relatively thin metal section and preferably made of a lightweight metal alloy such as an aluminum alloy. The core member **11** is provided with a smooth, uninterrupted, external, cylindrical surface **12**. The core member **11** may be of any selected length and is of uniform diameter.

A non-rigid brush strip **14** is wound in a tight spiral on the external, cylindrical surface **12** of core member **11**. The strip is spirally wound under tension and tightly frictionally grips the core member **11**. The turns of said spiral winding may be relatively, closely spaced together, as indicated at **15**, for providing a brush roll with dense bristle formation. It should be particularly noted that brush strip **14** is wound in such a manner that a major and substantial portion of the bristles of the brush strip are inclined toward one end of the brush and in the direction of advancement of the spiral winding.

The brush strip **14** may comprise a bendable, flexible, non-rigid base member **16** of U-section and made of any suitable material such as an aluminum alloy. Within

and continuously along the length of the U-section base member **16** is secured a plurality of bristles **17**, said bristles being of selected length and being retained by a wire element **18** positioned within the U-section member and bearing against the folded central portion of bristles **17**. The plurality of bristles **17** held by said U-section base member **16** provide a continuous, longitudinally extending layer of bristles. The side walls of the U-shaped member **16** may be crimped inwardly so as to tightly secure the bristles. The bristles may be of any suitable material having characteristics of long wearing, as for example nylon and other synthetic materials. The specific construction of the brush strip does not form a part of this invention and while this construction of a brush strip is preferable, it is understood that other elongated brush strips having a relatively flexible base member of suitable material may be employed.

The means to secure or anchor brush strip **14** to the thin section, hollow core member **11** may include bolt means **20** disposed at opposite ends of the brush strip, each bolt means **20** having retaining portion **21** of hook configuration. In the example shown, a J-bolt is illustrated in which the J-portion provides hook portion **21**. The shank **22** of the bolt means extends through aligned openings in the core member **11** and threadedly carries a nut **23**. The short leg portion **24** of the bolt means **22** extends through an opening in the core member adjacent to one of the shank openings so that as nut **23** is tightened, the J-portion may be drawn tightly over an end portion of brush strip **14** received therewithin.

Since the core member **11** is of relatively thin metal section, the securement of the end portions of the brush strips by a bolt means tightened in the manner described above may cause, under certain conditions, distortion of the metal of the core member. The present invention, therefore, contemplates an end mounting means **25** for the brush roll which not only serves to reinforce and strengthen the brush strip securing means but which also provides a novel mounting and driving connection for a brush roll.

The end mounting means **25** are substantially similar for each end of the core member. Each end mounting means **25** includes an insert member **26** of hollow, cylindrical form and having a metal section thicker than the metal section of the core member for support and reinforcement thereof. The insert member **26** is provided with an exterior cylindrical face having a diameter such that the insert member is provided a tight driven fit within the open end of the core member.

Each insert member **26** is provided with a pair of diametrically opposite, outwardly facing clutch teeth **27**, each clutch tooth being provided with spaced openings **28** and **29** through one of which the shank **22** of the bolt means may extend and through one of the other openings the short leg of the J may extend. It will thus be readily apparent that teeth **27**, when properly positioned and aligned within the end portion of core member **11**, will reinforce the metal of the core member and will strengthen the securing connection of the brush strip to the core member.

Each end mounting means also comprises a removable socket body member **30** of suitable metal section and having a pair of diametrically opposed, inwardly directed clutch teeth **31** adapted to fit within recesses **32** provided between teeth **27** of the insert member **26** to thereby provide an interlocking clutch-like engagement between the insert member and the socket body member. The socket body member **30** may include a transverse partition wall **33** for strengthening said body member and for defining the bottom of a bore **34** provided with an outwardly facing opening. The bore **34** may be of any suitable configuration and at one end may be cylindrical in form to provide a bearing connection for mounting said end of the brush roll for rotation in a support member. At the other end of the brush roll the socket body member **30**

may be provided with the bore **34** having a polygonal cross-sectional configuration such as a square in order to receive a driving element **35** of corresponding section carried by a driving shaft **36**. Each socket body member may be provided with an outwardly directed, circumferential flange **37** providing a seat for the end face of the core body member **11** and to position the socket body member.

The socket body member **30** is provided a friction fit within the end of the core member, said friction fit being relatively loose so that the socket member may be readily removable out of the open end of the core member **11**. Thus in the event that the bore **34** loses its polygonal cross-section through wear and a suitable non-slip driving connection is no longer afforded, the said socket body member may be readily removed and replaced to provide a proper driving connection for the brush roll.

It should also be noted that driving forces from shaft **36** are transmitted through the interlocking clutch teeth **27** and **31** of the socket body member and insert member **26** and to the core member not only through the tight frictional fit of the insert member with the core member but also through the bolt means which extend through teeth **27** and which secures the brush strip. Thus a positive driving connection is provided for rotating the brush roll.

As mentioned heretofore, brush roll **10'** is constructed identically to brush roll **10** except that the spiral winding of the brush strip may be in the opposite direction, that is, left- and right-hand spiral turns, and that the bristles of the brush strip on roll **10'** are inclined toward the opposite end of the pair of brush rolls. It will thus be readily apparent that when an article to be treated is advanced along a conveyor system embodyng a pluralty of pairs of brush rolls of this invention, the path of the article will be generally that as shown by line P of Fig. 1. As the article is engaged by the bristles of brush roll **10**, the article will be rotated partially in the inclined direction of the bristles **17**. As the article leaves the brush roll **10** and is engaged by brush roll **10'** the bristles of brush roll **10'** which are inclined and spirally wound in the opposite direction will impart a change in direction of rotation to the article passing thereover. Thus as the article progresses along path P, the article is constantly undergoing a modification of the axis about which it rotates. The article will be gently rotated and turned so that the entire external surface of the article will be contacted by the bristles of the brush roll.

It will be readily apparent that the brush roll construction of this invention is very inexpensive because thin section, hollow core members are employed and because the brush strip may be readily wound in a spiral with bristles inclined toward one end without modifying the initial shape and surface on the core member. Thus, the brush roll construction of this invention is so inexpensive, requires very little machining, that, if desired, when the bristles have been worn beyond repair or replacement, the entire brush roll may be discarded. It has been found that bristles of synthetic material outwear the driving connections in socket member **30**. Ready replacement of socket member **30** thus assures using the brush roll of this invention for the full life of the bristles.

It is understood that numerous other changes may be made in the construction of the brush roll and in the arrangement of pairs of brush rolls which come within the spirit of this invention, and all such changes and modifications which come within the scope of the appended claims are embraced thereby.

We claim:

1. In a brush roll construction, the combination of: a hollow, tubular, open-ended core member provided with an uninterrupted, outer, cylindrical surface and having a thin metal section; an elongated, flexible brush strip having a base member carrying bristles, the base member being helical with close convolutions and frictionally en-

gaging the surface of the core member, the bristles in said brush strip being inclined toward one end of said core member; end mounting means for said core member including an insert member positioned within an open end of the core member and provided with axially outwardly directed teeth; a removable driving socket means receivable within said open end of the core member and provided with axially inwardly directed teeth in engagement with the teeth of said insert member; said socket member having a circumferential, annular flange for seating against the end face of said cylindrical, hollow core; and means for securing said brush strip to said core member including a bolt means retaining an end portion of said brush strip and having a shank extending through said core member and through teeth on said insert member.

2. In a brush roll constructon, the combination of: a hollow, tubular, open-ended core member provided with an uninterrupted, outer, cylindrical surface and having a thin metal section; an elongated, flexible brush strip including a bendable base member carrying bristles, said base member being helical with closely spaced convolutions and frictionally engaging the surface of the core member therewithin, the bristles in said brush strip being inclined toward one end of said core member; end mounting means for said core member including an insert member positioned within an open end of the core member and provided with axially outwardly directed teeth; a removable driving socket means receivable within said open end of the core member and provided with axially inwardly directed teeth in engagement with the teeth of said insert member; and means for securing said brush strip to said core member including a bolt means retaining an end portion of said brush strip and having a shank extending through said core member and through teeth on said insert member.

3. In a brush roll construction, the combination of: a hollow, tubular core member provided with an outer, cylindrical surface and having a thin metal section; an elongated brush strip provided with bristles, said brush strip being of helical form with close convolutions in frictional engagement with the core member, the bristles in said brush strip being inclined toward one end of said core member; end mounting means for said core member including an insert member provided with axially outwardly directed teeth; a removable driving socket means receivable within said core member and provided with axially inwardly extending teeth in engagement with the teeth of said insert member; and means for securing said brush strip to said core member including a bolt means retaining an end portion of said brush strip and having a shank extending through said core member and through said insert member.

4. In a brush roll construction, the combination of: a hollow, tubular core member provided with an outer, cylindrical surface and having a thin metal section; an elongated brush strip provided with bristles, said brush strip being helical in form with close convolutions and frictionally engaging said surface on said core member, the bristles in said brush strip being inclined toward one end of said core member; end mounting means for said core member including an insert member provided with axially outwardly directed teeth; a removable driving socket means receivable within said core member and provided with axially inwardly extending teeth in engagement with the teeth of said insert member; and means for securing said brush strip to said core member including a bolt means retaining an end portion of said brush strip.

5. In a brush roll construction, the combination of: an elongated hollow core member of relatively thin section and provided with an outer cylindrical surface; a brush strip having a base member helical in form and frictionally gripping said surface of the core member therewithin; means for securing each end of said brush strip to said core member comprising an insert member fitted within each end of said hollow core member and bolt means extending through said core member and said insert member retaining one end of said brush strip, said insert member being provided with axially directed teeth; and a removable drive socket body member having axially directed teeth interengaged with said teeth on the insert member and adapted to transmit rotation to said brush roll.

6. In a brush construction the combination of: a hollow tubular thin section open-ended core provided with an uninterrupted outer cylindrical surface; an elongated brush strip helical in form and in tight frictional engagement with said cylindrical outer surface and with the majority of bristles in said brush strip inclined in the direction of one end of said core; means for anchoring each end of said brush strip including an insert member driven in each end of said core, said insert member being provided with a pair of diametrically arranged axially outwardly directed teeth, J-bolt means retaining each end portion of said brush strip and each having the short leg of the J and the long leg of the J extending through said core and one of said teeth, the long leg of the J extending through the opposed tooth and core, and a removable driving socket means fitted within each open end of the core and provided with axially extending teeth for interlocking with the teeth on said insert.

7. In a brush roll construction, the combination of: a tubular core member provided with an outer cylindrical surface; an elongated brush strip provided with a continuous layer of bristles, said brush strip being helical in form and frictionally engaging the core member therewithin, the continuous layer of bristles in said brush strip being inclined toward one end of said core member; end mounting means for said core member including an insert member fitted in an end of said core member and provided with axially, outwardly extending teeth; a removable driving socket means receivable within said core member and provided with axially, inwardly extending teeth in engagement with the teeth on said insert member; and means for securing said brush strip to said core member including a bolt means retaining an end portion of said brush strip and engaged with said insert member.

8. In a brush roll construction, the combination of: a tubular core member provided with an outer surface; a brush strip provided with a continuous layer of bristles, said strip being helical in form and receiving the core member therewithin and in tight frictional engagement therewith; end mounting means carried at each end of the core member and including inner and outer mounting members provided with cooperably interengaged teeth; and means for securing each end portion of said brush strip to said core member, said securing means including a bolt means retaining one of said end portions of said brush strip and engaged with said inner mounting member.

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