3,055,030 TOOL ATTACHING MECHANISM FOR A FLOOR MACHINE

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This invention relates to means for detachably connecting a driven member to a driving member, and has been found particularly useful for attaching brushes to floor treating machines.

Heretofore, brushes have usually been attached to floor treating machines by the use of snaps, hooks, detents and other types of catches. Many of these prior attaching means have been prone to damage, making it difficult or impossible to properly attach the brushes.

The present invention provides a tool or brush attachment which is of rugged construction not subject to damage, and which is extremely simple to use.

In one form, the invention involves a brush or other tool having a cylindrical opening in the top thereof for reception of a cylindrical motor-driven projection on which the brush or tool is to be removable mounted and by which it is to be driven. The opening in the brush or tool is larger than the motor driven projection so that there will be an annular space between walls of the opening and projection when the tool is mounted or assembled on the projection.

A rubber ring is secured on the projection in surrounding relation thereto and has a plurality of axially spaced resilient annular fins extending radially outwardly inward engagement with the wall of the cylindrical opening. The outside diameter of the fins is greater than the diameter of the opening in the brush or tool, with the result that as the projection with its rubber ring and fins is inserted into the tool opening the fins are deflected upwardly and exert a holding force on the tool. This holding force is radial as well as upward, with the result that the tool is centered on the projection.

The rubber fins also function as a shock absorbing means to cushion side motion imparted to the tool or brush by manual lateral movement of the tool or by orbital movement thereof where the driving device is of the orbital type.

When the brush or tool is to be removed, the separating movement of the tool relative to the projection causes reverse deflection of the rubber fins and as the direction of deflection is reversed, the fins undergo compression. Thus, separation of the brush or tool from the projection is resisted by the force necessary to effect such compression of the fins.

It is an object of the invention to facilitate assembly and removal of a tool relative to a tool holder.

Another object of the invention is to resiliently cushion a tool relative to a holder on which it is mounted.

These and other objects are effected by the invention as will be apparent from the following description taken in connection with the accompanying drawings, forming a part of this application, in which:

FIG. 1 is an exploded perspective view of a floor treating machine incorporating the present invention;

FIG. 2 is a transverse sectional view through the lower portion of the machine of FIG. 1; and

FIG. 3 is an enlarged fragmentary sectional view, taken along the line III—III of FIG. 2, looking in the direction indicated by the arrows.

Referring now to the drawings in greater detail, there is shown in FIG. 1 a floor polisher or cleaner 10, of the orbital type, including driving mechanism 11 and a brush 12. The driving mechanism 11 includes a frusto-conical casing 13 which is closed at the top and terminates in an outwardly flared rim 14 at the lower edge thereof. The driving mechanism 11 preferably includes a conventional handle 15 pivotally mounted thereon for manual movement of the polisher or cleaner on a floor.

The casing 13 houses the usual electric motor (not shown) and the shaft thereof is provided with an eccentric connection, as at 16, with a brush-holding projection 17 depending beneath the flared rim 14 of the casing.

The brush 12 includes an annular backing ring 18 provided with bristles 19 extending downwardly therefrom in the usual manner. While in the construction herein illustrated, the brush is of annular formation, it will be apparent that the brush backing ring 18 could be of disc-like form provided with a disc-like formation of depending bristles 19.

The backing ring 18 is provided with an annular opening 21 adapted to receive the projection 17 of the driving mechanism. The diameter of the opening 21 is materially greater than that of the projection 17 with the result that the walls 22 and 23 of the projection and opening, respectively, are radially spaced from each other, as at 24 (FIG. 3).

In accordance with the present invention a rubber ring 26 is mounted on the projection 17 of the driving mechanism and preferably is positioned in an annular groove or recess 27 provided in the outer wall 22 of the projection. The rubber ring 26 is normally of smaller diameter than the recess 27 so that it is stretched when mounted on the projection in the recess 27 with the result that it frictionally engages the bottom of the recess to assist in its retention in said recess. The ring 26 is provided with a plurality of axially spaced radially outwardly extending annular fins 28. The outer diameter of these fins is greater than the inside diameter of the opening 21 in the brush backing ring with the result that when the brush is assembled on the brush holding projection 17, the resilient fins 28 are deflected upwardly as illustrated in FIGS. 2 and 3.

It will be apparent from inspection of FIG. 3 that these deflected fins 28 not only bias the brush ring 18 upwardly into firm seating engagement with a horizontal flange 29 overlying the brush ring, but also center the ring concentrically with respect to the projection 17. Consequently, the resilient fins provide a radial cushion to absorb any shock which might be imparted to the brush by orbital motion of the projection 17 and to cushion the driving mechanism and its projection 17 from shocks which might be imparted to it by bumping of the brush ring against furniture, baseboards or the like in a construction where the brush is not protected by an outwardly flared lip or rim, as herein provided at 14.

Removal or separation of the brush 12 from the projection 17 causes reverse deflection of the fins 28 and as the direction of deflection is reversed, the fins undergo compression. Since removal of the ring involves compression of the fins, it will be apparent that the ring is retained in mounted position by a force equal to that necessary to effect compression of the fins.

While in the arrangement herein illustrated and described, the fin-carrying ring 26 is of resilient rubber, it will be apparent that other materials may be suitable. If an inextensible material is utilized the ring may be cemented or otherwise secured in the groove of recess 27. Obviously, the flexible and compressible fins 28 may be constructed separately from, and attached to, the ring.

While the separated walls 22 and 23 of the projection and brush, respectively, may be absolutely cylindrical and
perpendicular to a flat surface to be treated, it may be found preferable, under some conditions, to slightly incline the plane 17 and disassemble of the brush with respect to the driving mechanism is facilitated. It will be apparent from consideration of Fig. 3 that as the brush is moved downwardly with respect to the projection, the spacing of the walls 22 and 23 increases with consequent decrease in the holding effect of the fins and corresponding increase in the ease of separation. It is believed apparent from the above description that this invention is applicable not only to floor treating machines of the orbital type herein illustrated, but also to all types of floor treating machines and many other devices where a tool or other driven member is to be mounted on a tool holder or other spaced driving member.

Inasmuch as the present invention is concerned primarily with the means for holding a brush or tool on a tool holder or other spaced driving member.

While the invention has been shown in but one form, it will be apparent to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What is claimed is:

1. A carrying member, a carried member, one of said members having a projection and the other of said members having an opening telescopically receiving said projection, said opening being substantially larger than said projection, whereby the overlapping walls of said projection and opening are spaced, and a retaining member disposed in the space between said overlapping walls and secured to one of said walls, said retaining member including a deflectable element frictionally engaging the other of said walls, movement of said other wall relative to said one wall during assembly of the carrying and carried members deflecting said element in the direction of said movement and preventing movement of said one wall, said one wall during separation of the carrying and carried members deflecting said element in the direction of the last-mentioned movement, said element undergoing compression during change from the first-mentioned direction of deflection to the second-mentioned direction of deflection.

2. A driving member, a driven member, one of said members having a projection and the other of said members having an opening telescopically receiving said projection, said opening being substantially larger than said projection, whereby the overlapping walls of said projection and opening are spaced, and a retaining member secured to one of said walls, said retaining member including a deflectable element projecting across the space between the overlapping walls and frictionally engaging the other of said walls, movement of said other wall relative to said one wall during assembly of the carrying and driven members deflecting said element in the direction of said movement, and movement of said other wall relative to said one wall during separation of the driving and driven members deflecting said element in the direction of the last-mentioned movement, said element being of such length that it undergoes compression during change from the first-mentioned direction of deflection to the second-mentioned direction of deflection.

3. A driving member, a tool adapted to be removably connected to and driven by said driving member, said driving member having a cylindrical projection and said tool having a cylindrical opening therein for reception of the driving member projection, said opening being larger than said projection whereby the overlapping walls of said projection and opening are spaced, and an annular retaining member secured to one of said walls and including a plurality of axially spaced fins of rubber-like material projecting generally radially toward the other of said walls, said fins being of such length that they contact and are deflected by said other wall, insertion of the projection into the opening upon assembly of the tool and the driving member deflecting said fins in one direction and withdrawal of the projection from the opening upon separation of the tool and driving member deflecting said fins in the opposite direction, said fins undergoing compression when changing direction of deflection, whereby separation of the tool from the driving member is resisted by the force required to effect such compression of the fins.

4. A driving member, a tool adapted to be removably connected to and driven by said driving member, said driving member having a cylindrical projection and said tool having a cylindrical opening therein for reception of the driving member projection, said opening being larger than said projection whereby the overlapping walls of said projection and opening are spaced, and an annular retaining member secured to one of said walls and including a plurality of axially spaced fins of rubber-like material projecting generally radially toward the other of said walls, said fins being of such length that they contact and are deflected by said other wall, insertion of the projection into the opening upon assembly of the tool and the driving member deflecting said fins in one direction and withdrawal of the projection from the opening upon separation of the tool and driving member deflecting said fins in the opposite direction, said fins undergoing compression when changing direction of deflection, whereby separation of the tool from the driving member is resisted by the force required to effect such compression of the fins.

5. A driving member, a tool adapted to be removably connected to and driven by said driving member, said driving member having a cylindrical projection and said tool having a cylindrical opening therein for reception of the driving member projection, said opening being larger than said projection whereby the overlapping cylindrical walls of said projection and opening are spaced, and an annular retaining member secured to one of said walls and including a plurality of axially spaced fins of rubber-like material projecting generally radially toward the other of said walls, said fins being of such length that they contact and are deflected by said other wall, insertion of the projection into the opening upon assembly of the tool and the driving member deflecting said fins in one direction and withdrawal of the projection from the opening upon separation of the tool and driving member deflecting said fins in the opposite direction, said fins undergoing compression when changing direction of deflection, whereby separation of the tool from the driving member is resisted by the force required to effect such compression of the fins.

6. A driving member, a tool adapted to be removably connected to and driven by said driving member, said driving member having a cylindrical projection and said tool having a cylindrical opening therein for reception of the driving member projection, said opening being larger than said projection whereby the overlapping cylindrical walls of said projection and opening are spaced, and an annular retaining member secured to one of said walls and including a plurality of axially spaced fins of rubber-like material projecting generally radially toward the other of said walls, said fins being of such length that they contact and are deflected by said other wall, insertion of the projection into the opening upon assembly of the tool and the driving member deflecting said fins in one direction and withdrawal of the projection from the opening upon separation of the tool and driving member deflecting said fins in the opposite direction, said fins undergoing compression when changing direction of deflection, whereby separation of the tool from the driving member is resisted by the force required to effect such compression of the fins.
and driving member deflecting said fins in one direction and withdrawal of the projection from the opening upon separation of the tool and driving member deflecting said fins in the opposite direction, said fins undergoing compression when changing direction of deflection, whereby separation of the tool from the driving member is resisted by the force required to effect such compression of the fins, said driving member and said tool having surfaces which abut to limit relative movement of the driving member and the tool upon assembly.

7. A driving member, a tool adapted to be removably connected to and driven by said driving member, said driving member having a cylindrical projection and said tool having a cylindrical opening therein for reception of the driving member projection, said opening being larger than said projection whereby the overlapping cylindrical walls of said projection and opening are spaced, the wall of said cylindrical projection having an annular groove of substantial axial extent therein, and an annular retaining member disposed in said groove and including a plurality of axially spaced annular fins of rubber-like material projecting generally radially toward the wall of the opening, said fins being of such length that they contact and are deflected by the opening wall, insertion of the projection into the opening upon assembly of the tool and driving member deflecting said fins in one direction, and withdrawal of the projection from the opening upon separation of the tool and driving member deflecting said fins in the opposite direction, said fins undergoing compression when changing direction of deflection, whereby separation of the tool from the driving member is resisted by the force required to effect such compression of the fins.

8. In a floor treating machine, a housing, a motor within said housing, a depending projection beneath said motor, means for transmitting rotary motion from the motor to the projection, said projection having a cylindrical outer surface concentric with its axis of rotation, a floor treating brush having a cylindrical opening therein for reception of said cylindrical projection, said opening being larger than said projection whereby the overlapping cylindrical walls of said projection and opening are spaced, the cylindrical surface of said projection having an annular groove therein, and an annular retaining member of rubber-like material disposed in said groove and including a plurality of integral axially-spaced annular fins projecting radially outward toward the cylindrical wall of said opening, said fins being of such length that they contact and are deflected by the opening wall, insertion of the projection into the opening upon assembly of the brush on the machine deflecting said fins upwardly toward the motor and withdrawal of the brush from the projection upon separation of the brush from the machine deflecting said fins downwardly away from the motor, said fins undergoing compression when changing direction of deflection, whereby separation of the brush from the motor is resisted by the force required to effect such compression of the fins.

9. In a floor treating machine, a driving member, a tool adapted to be connected to and driven by said driving member, said driving member having a frusto-conical projection and said tool having a frusto-conical opening therein for reception of the driving member projection, said opening being larger than said projection whereby the overlapping inclined walls of said projection and opening are spaced, and an annular retaining member secured to one of said walls and including a plurality of axially-spaced fins of rubber-like material projecting generally radially toward the other of said walls, said fins being of such length that they contact and are deflected by said other wall, insertion of the projection into the opening upon assembly of the tool and driving member deflecting said fins in one direction and withdrawal of the projection from the opening effecting reverse deflection of the fins, reversal of the direction of deflection causing compression of the fins, whereby separation of the tool from the driving member is resisted by the force required to effect such compression of the fins.