

ROTARY BRUSH TOOL

Description

The invention relates to a rotary brush tool with a brush assembly and a drive having a housing and output shaft for the brush assembly, the brush assembly having a rotatably drivable brush support and a ring brush with a ring of outwardly projecting bristles.

Such rotary brush tools are typically used to treat metal surfaces in order to clean them of rust or dirt. In fact, the bristles can be used to provide the surface with a certain degree of surface roughness. There are various approaches in the prior art, originating from the applicant, as described in detail in EP 1,834,733 or WO 2012/038537.

The present application is based on the prior art according to EP 4,238,451. The rotary brush tool provided here is provided with a machine housing and a drive unit or drive for the brush assembly housed therein. The drive can basically be a pneumatic drive or an electric motor drive.

If an electric motor drive with a housing and output shaft is used, the rotational movement of the output shaft is transmitted via a more or less complex gear transmission to the rotatably drivable brush support. This results in an overly long structure. In summary, the invention aims to remedy this situation.

The invention is aimed at the technical problem of further developing such a rotary brush tool in such a way that it is quite compact and can be made at reduced overall costs.

To solve these objects, the invention proposes, based on a generic rotary brush tool, that the housing of the drive act as a rotatably driven brush support relative to the fixed output shaft.

According to the invention, a special rotatable brush support is used. This is because its function is taken over by the housing of the drive. The invention is based on the discovery that the drive used for such rotary brush tools is typically an electric motor drive with a housing and an output shaft. In the context of the invention, the output shaft is not used to drive the rotatable brush support, but instead the housing itself functions as the rotatably driven brush support.

To do this, it is only necessary to fix the output shaft of the electric motor drive. This can be done, for example, in a holder. Fixing the output shaft of the electric motor drive rotates the housing. This means that the housing rotates relative to the fixed output shaft or the holder fixed to the output shaft.

As already explained, the drive is usually an electric motor. Such electric motors usually have a cylindrical housing that according to the invention takes over the function of the rotatably drivable brush support. In fact, the ring brush is provided in this context with an annular brush ring with bristles connected to it and projecting outward. The brush ring can be a woven strip made of plastic, in particular polyamide. The bristles are usually U-shaped bristles made of steel and are poked into the brush ring or pushed through it. The bristles thus form the bristle ring. The bristle ring can be provided with or without gaps.

The brush ring in the ring brush is therefore cylindrical or annular, with the inner diameter of the brush ring typically

corresponding to the outer diameter of the housing. This allows the brush ring to be attached to the housing. If the inner diameter of the brush ring exceeds that of the housing at this point, an adapter ring can also be used if necessary. In this case, the brush ring is attached to the housing by the adapter ring.

The thickness of the adapter ring can be adjusted to fit both the brush ring and the housing of the electric motor. In addition, the adapter ring can be made of a heat-conducting material, such as a heat-conducting plastic. Furthermore, it has proven useful in this context to form the adapter ring with axially extending ribs. In this case, the axial ribs hold the annular brush band in place or serve as additional anchoring by engaging the brush ring axially. This creates a space between the axial ribs and the brush ring through which heat can be dissipated.

In addition, the axial ridges allow a certain (and desired) deformation of the brush ring during surface treatment. Such deformations are also observed when a stop is provided that projects into the rotating bristle ring, as described in principle in the prior art according to above-mentioned EP 1 834 733. In this context, it is advantageous to provide a holder to which the output shaft is connected at at least one end. In addition, it is advantageous for the holder in question to be also provided with the stopping formation that is fitted into the rotating bristle ring.

It has also proven particularly advantageous if the holder has a handle that can be pivoted relative to it or if the holder is connected to the handle in question. In this context, it is also possible to proceed in such a way that the holder carries the drive together with the ring brush.

An embodiment in which the drive and the ring brush are coaxial with the axis of rotation of the holder has proven to be particularly advantageous. In this case, a holder with two end plates is usually used. One end plate defines the axis of rotation for the holder, the drive, and the ring brush that are coaxial to the axis of rotation. The other holder end assumes the function of fixing the output shaft of the electric motor. However, the above-mentioned functionalities can also be implemented in other ways.

In this context, the holder can sit via its feet on the surface to be processed and therefore be supported on this surface. For this purpose, the holder may be designed with support feet made of plastic, for example, whereas the holder itself is generally made of metal.

In principle, however, the holder for receiving the brush assembly and for fixing the output shaft can also be connected to a manipulation element that can be moved relative to the surface to be processed. This manipulation element can be any conceivable device that enables mechanical movement relative to the surface to be processed. A potential manipulation element here is a robot or a robot arm. The manipulation element can just as easily be a rotary unit, for example for processing inner surfaces of pipes. Combinations are also conceivable, of course. In addition, the manipulation element can be a linear actuator for movement in one plane similar to a plotter, etc.

All this is achieved against the background that the rotary brush tool according to the invention is simple, robust, and inexpensive. This is because an additional transmission for deflecting the rotational movement of the output shaft to the rotatably drivable

brush support is not necessary. This results in a particularly compact design.

At the same time, weight can be kept low so that the rotational brush tool according to the invention can be moved easily and without any problems with the aid of the manipulation element or even purely manually by an operator. These are the main advantages.

The invention is explained in more detail below with reference to a drawing showing one embodiment and where:

FIGS. 1 and 2 show individual steps in the assembly of the inventive rotary brush tool according to the invention,

FIG. 3A and 3B show the rotary brush tool together with a holder in various processing positions,

FIG. 4 is a front view of the structure of FIGS. 3A and 3B, and

FIG. 5 shows another design variant.

The drawing shows a rotary brush tool. It has a brush assembly 1, 2, 3 and a motor drive 1, 4 having a support housing 1 and an output shaft 4 for the brush assembly 1, 2, 3. The brush assembly 1, 2, 3 in turn has the rotatably drivable brush support 1 and a brush ring 2, 3 having an annular array of outwardly projecting bristles 3. In fact, the ring brush 2, 3 consists of an annular brush ring 2 with bristles 3 connected to it and projecting outward.

The brush ring 2 can advantageously be made of a polyamide fabric. The U-shaped bristles 3 are inserted into the brush ring 2. The bristles 3 thus form the bristle array, which can be either continuous or provided with individual angularly spaced gaps.

According to the invention, the cylindrical housing of the drive 1, 4 rotates the rotatably brush support 1, namely relative to

the fixed output shaft 4. For this purpose, the output shaft 4 is generally fixed at least at one end in a holder 6 of various designs, which will be described in more detail below.

The drive, 4 is an electric motor 1, 4 having the cylindrical support housing 1. As already explained, the ring brush 2, 3 consists of the annular brush ring 2 carrying the outwardly projecting bristles 3 connected to it. A comparison of FIGS. 1 and 2 shows that the annular brush ring 2 is attached to the housing 1 as the rotatable driven brush support 1. This can be seen by comparing FIGS. 1 and 2.

If the inner diameter of the annular brush band 2 exceeds the outer diameter of the cylindrical housing 1 of the electric motor 1, 4, which acts as the brush support 1, an intermediate adapter ring 5 can be provided, as shown in FIG. 1. FIG. 1 shows that the adapter ring 5 according to the illustrated embodiment, is a base ring 5 formed with ribs or ridges 5b. The ribs 5b extend axially of the motor housing 1. The annular brush ring 2 can be attached to the axial ribs 5b so that there are empty spaces between the base ring 5a and the annular brush ring 2 and between the respective axial ribs 5b.

This free spaces allow elastic movements of the annular brush ring 2 during surface treatment and also serve to dissipate any heat generated during treatment of the relevant surface. This includes a possible embodiment that is not shown.

This is because, in FIGS. 1 and 2, the axial ribs or axial ridges 5b are designed such that they engage into the brush ring 2 when it is installed or attached to the adapter ring 5. For this purpose, the bristle ring has recesses in which the axial ridges 5b are fitted in the assembled state, as can be seen by comparing FIGS. 1 and 2. According to the illustrated embodiment, the axial ridges 5b are formed

on an end-mounted circular disc 5c connected on one end to the base ring 5a or extend from this circular disk and project from it. This also couples the ring brush 2, 3 to the housing 1 during its rotation by the adapter ring 5.

In principle, the adapter ring 5 can be dispensed with if the annular brush ring 2 is attached directly to the housing 1. The adapter ring 5 is made of plastic, in particular a thermally conductive plastic. Of course, other materials are also conceivable. In addition, the adapter ring 5 can also be made of solid material, i.e. without the additional axial ridges or axial ribs 5b.

As already described in the introduction, a holder 6 is typically provided that is connected to the output shaft 4 of the drive or electric motor 1, 4 at at least one end. According to the illustrated embodiment, the holder 6 in question is also provided with a stop formation 7 that projects into the rotating bristle ring. The stop formation 7 can be seen in particular in the front view according to FIG. 4 and in connection with the other embodiment according to FIG. 5.

The holder 6 can also be provided with a holder 5, 8 that can pivot relative to it. The pivotability of the holder 8 can best be understood by comparing FIGS. 3A and 3B. In fact, the holder 8 in question can be pivoted relative to an axis or axis of rotation A. Since, the drive 1, 4 and the ring brush 2, 3 are also coaxial with the axis A of rotation of the holder 8 relative to the holder 6, the ring brush 2, 3 pivots with the holder 8 shown in FIGS. 3A and 3B. In fact, the holder 8, together with the ring brush 2, 3 and the drive 1, 4 supporting it, pivot clockwise about the common axis of rotation A during the transition from FIG. 3A to FIG. 3B.

It can be seen that for this purpose the holder 6 is provided with plates 6a and 6b that flank the ring brush 2, 3 and consequently also its drive 1, 4 and the holder 8. For this purpose, the two holder end plates 6a, 6b in the illustrated embodiment are each triangular and coupled to each other by connecting rods. In addition, the holder end plates 6a, 6b are each provided on their undersides with feet 9 for supporting the holder 6 on a surface 0 to be processed, as can be seen from FIGS. 3A and 3B.

The illustrated embodiment shown in FIG. 5 clearly shows that holders 6 can be mounted on a manipulation element 10 that can be moved relative to the surface 0. This manipulation element 10 is one that is inserted into the interior of, for example, a pipeline and rotates there, so that in this way the manipulation elements 10 and the holder 6 that is moved by the manipulation elements, can abrasively process the interior of the pipeline in question on its inner surface 0 with the help of the rotary brush tools attached to it.

Patent claims:

1. A rotary brush tool comprising a drive assembly (1, 2, 3) and a drive (1, 4) having a housing (1) and an output shaft (4) for the drive assembly (1, 2, 3), the drive assembly (1, 2, 3) having a rotatably drivable brush support (1) and a ring brush (2, 3) with a ring of outwardly projecting bristles (3), characterized in that

the housing (1) of the drive (1, 4) is the rotatably driven brush support (1) and the output shaft (4) is nonrotatably fixed.

2. The rotary brush tool according to claim 1, characterized in that the drive (1, 4) is an electric motor (1, 4) and the housing (1) is cylindrical.

3. The rotary brush tool according to claim 1 or 2, characterized in that the ring brush (2, 3) has an annular brush ring (2) with the bristles (3) connected thereto and projecting outwardly.

4. The rotary brush tool according to one of claims 1 to 3, characterized in that the brush ring (2) is attached to the housing (1), optionally with interposition of a adapter ring (5).

5. The rotary brush tool according to one of claims 1 to 4, characterized in that a holder (6) is provided to which the output shaft (4) is connected at at least one end and which preferably is also provided with a stop formation (7) that projects into the rotating bristle ring.

6. The rotary brush tool according to claim 5, characterized in that a handle (8) is pivotable on the holder (6).

7. The rotary brush tool according to claim 6, characterized in that the holder (8) carries the drive (1, 4) together with the ring brush (2, 3).

8. The rotary brush tool according to claim 7, characterized in that the drive (1, 4) and the ring brush (2, 3) are coaxial with an axis (A) of rotation of the holder (8).

9. The rotary brush tool according to one of claims 5 to 8, characterized in that the holder (6) is supported from below on a surface to be processed.

10. The rotary brush tool according to one of claims 5 to 9, characterized in that the holder (6) is connected to a manipulation element (10) that can be moved relative to the surface (A), for example a robot arm or a rotating unit for processing the inside surfaces of pipes, etc.