

Brushing device for the working of workpieces

The invention relates to a brushing device for the working of workpieces, containing a
5 bundle of fibre rods, which are arranged parallel to one another, and a protective sleeve,
which encloses the fibre rods and is axially adjustable relative to the fibre rods.

Brushing devices of this kind are used, in particular, on machine tools in order to grind,
polish or clean the surfaces of workpieces and to deburr or round off the edges of
10 workpieces. The fibre rods, which can consist, for instance, of a ceramic material, are
subjected to wear and tear during the said working operations. The extent by which the
free ends of the fibre rods protrude beyond the protective sleeve must therefore be
periodically readjusted. In known brushing devices, a holder carrying the fibre rods has a
locking screw, which juts through a longitudinal slot in the protective sleeve. For the
15 readjustment of the said extent, the locking screw is loosened, the protective sleeve
axially displaced by an amount, and the locking screws then tightened again. This
requires for each readjustment operation manual interventions, which are associated
with a stoppage of the machine.

20 Document WO2015/178273A1 describes a brushing device with mechanical
readjustment of the relative position of the protective sleeve and of the fibre rods. This is
enabled by a nut-spindle combination, which is connected to the fibre rods and the
protective sleeve. For the readjustment, the nut and the spindle must be rotated relative
to one another, which is achieved by a relatively complex design of the brushing device,
25 which design, moreover, makes the use of a standard tool holding fixture for the brushing
device practically impossible.

Starting from this prior art, the object of the invention is to eliminate the drawbacks of the
known prior art and to propose a brushing device which is of simple construction and
30 easy to operate and makes do without parts which are rotatable relative to one another.

This object is achieved according to the invention by the features defined in the
characterizing part of Patent Claim 1.

35 The clamping mechanism allows the non-positive connection to be removed and the
adjustment to be conducted in simple manner.

Particular embodiments of the invention are outlined in the dependent patent claims.

An illustrative embodiment of the invention is explained below with reference to the appended drawings, in which

Figure 1 shows a longitudinal section through a brushing device according to the invention, and

Figure 2 shows a perspective view of the brushing device according to Figure 1 on a scale which is reduced in relation to Figure 1.

10 The brushing device comprises a bundle of fibre rods 1, which is anchored in a holder 9. The fibre rods 1 are here enclosed by a protective sleeve 2, wherein their free ends protrude by an amount from the protective sleeve 2. The holder 9 is connected to a shaft 12, which for its part is surrounded by a guide tube 4. At the end opposite the fibre rods, the brushing device is connected to a standard tool holding fixture 10 of the HSK (hollow
15 shank taper) type. For the transmission of the torque from the tool holding fixture 10 to the holder 9 containing the fibre rods 1, pins 14 are present, which, when an axial load is applied to the fibre rods 1, allow these to yield counter to the force of springs 13. At that end which is facing away from the exposed ends of the fibre rods 1, the protective sleeve 2 is connected to a housing 8, in which is accommodated a clamping cone 3 which is
20 axially adjustable counter to the force of springs 11 and connects the protective sleeve 2 non-positively to the guide tube 4. The clamping cone 3 is here advantageously divided into, for instance, four segments, which are arranged around the guide tube 4.

For the working of a surface of a workpiece, for instance a turbine blade, the brushing
25 device is clamped in a tool axis of a machine tool and rotated about its longitudinal axis 15. Upon the contact with the workpiece, the fibre rods 1 are subject to wear, which from time to time is compensated by increasing up to a desired amount the extent by which the fibre rods 1 protrude beyond the protective sleeve. For this purpose, the tool axis with the brushing device is moved relative to a fixed counter bearing 7 and advanced in the
30 direction of the longitudinal axis until pressure bolts 5 present on the brushing device come to bear against a locating surface 6 of the counter bearing. The clamping cone 3 in contact with the pressure bolts 5 is thus prevented from continuing to follow the axial movement of the tool axis. Upon the further advancement of the tool axis, the housing 8, together with the protective sleeve 2, follows this movement still by a small amount,
35 wherein the housing 8 shifts relative to the clamping cone 3, thereby reduces the clamping force thereof and thus loosens the non-positive connection between the guide tube 4 and the housing 8 with the protective sleeve 2 arranged thereon. The combination of tool holding fixture 10, guide tube 4, shaft 12, holder 9 and fibre rods 1 can now further follow the axial movement of the tool axis, whereby the distance between the free ends
40 of the fibre rods 1 and the free end of the protective sleeve 2 increases.

When the tool axis is moved back, the pressure bolts 5 are relieved of load and the springs 11 press the clamping cone 3 into its clamping position, in which it prevents an axial displacement of the guide tube 4 in the protective sleeve 4.

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The amount by which the free ends of the fibre rods 1 protrude beyond the free end of the protective sleeve 2 can be determined in a simple manner by a measuring device, for instance a laser measuring device, present on the machine tool. As soon as this amount falls below a predefined value, the described readjustment is initiated.

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Reference symbol list

- 1 fibre rods
- 2 protective sleeve
- 3 clamping cone
- 4 guide tube
- 5 pressure bolts
- 6 locating surface
- 7 counter bearing
- 8 housing
- 9 holder
- 10 tool holding fixture
- 11 clamping spring
- 12 shaft
- 13 spring
- 14 pin
- 15 longitudinal axis

Patent claims

1. Brushing device for the working of workpieces, containing a bundle of fibre rods (1), which are preferably arranged parallel to one another, and a protective sleeve (2), which encloses the fibre rods and is axially adjustable relative to the fibre rods (1), characterized in that the brushing device has a clamping mechanism (3, 5, 11), which detachably connects to one another, in a non-positively locking manner, a first component (4) connected to the fibre rods (1) and a second component (8) connected to the protective sleeve (2).
2. Brushing device according to Claim 1, characterized in that the clamping mechanism (3, 5, 11) contains a clamping cone (3).
3. Brushing device according to Claim 2, characterized by at least one spring (11), which forces the clamping cone (3) into a position in which it connects the first component (4) and the second component (8) to one another in a non-positively locking manner.
4. Brushing device according to one of Claims 2 to 3, characterized by at least one pressure bolt (5), which is in contact with the clamping cone (3).
5. Brushing device according to Claim 4, characterized in that the at least one pressure bolt (5) is oriented parallel to the fibre rods (1).
6. Brushing device according to one of the preceding claims, characterized in that the first component (4) is a guide tube, which is connected to a tool holding fixture (10) and surrounds a shaft (12) bearing the fibre rods (1).
7. Brushing device according to one of the preceding claims, characterized in that the second component (8) is a housing (8) accommodating the clamping mechanism (3, 5, 11).
8. Brushing device according to one of the preceding claims, characterized in that the bundle of fibre rods (1) is arranged so as to be axially pliable counter to the force of at least one further spring (13).