

Workpiece Receptacle

The invention relates to a workpiece receptacle. The workpiece receptacle is suited in particular for a positionally accurate receipt of workpieces for the processing thereof, such as in particular in presses and punches. The workpiece receptacle of the present invention is particularly suited for an ultrasonic welding device.

Ultrasonic welding devices are used to join plastic parts. For an in particular tight welding of two plastic parts using the ultrasonic welding device, it is necessary that the two parts to be joined by welding are aligned plane-parallel with each other in a highly precise manner. This may be possible using known devices, but it is extremely complex. In particular, each single part has to be aligned individually in the device.

An exact alignment of workpieces is also desired in other processing devices. Specifically, this is also advantageous in pressing and punching.

It is an object of the invention to provide a workpiece receptacle which, in a simple manner, allows for an exact alignment of e.g. parts to be joined by welding, to be punched or to be pressed.

The object is achieved according to the invention with the features of claim 1.

The workpiece receptacle of the present invention is suited for an exact receipt and alignment of workpieces, e.g. for the welding, punching or pressing of parts.

The workpiece receptacle of the present invention will be described hereunder in more detail for the purpose of clarification and in connection with an ultrasonic welding device.

The workpiece receptacle of the present invention comprises a receiving element for receiving the workpiece. It is possible, for example, to arrange one of the two parts to be welded or already both parts to be welded on this receiving element.

The in particular two parts may be fixed using holding and/or clamping devices connected with the receiving element. For the alignment of the at least one part to be welded, the receiving element is received or supported by a base element. The base element itself is preferably stationary. A bearing means is arranged between the base element and the receiving element so as to allow the receiving element to be moved relative to the base element. Thereby, it is possible to align the receiving element and thus the at least one workpiece supported by the receiving element. According to the invention, the receiving element is connected to a bearing cup, where the bearing cup and the receiving element may also be formed as a single piece. In particular, an outer side of the receiving element forms the bearing cup. Correspondingly, the base element is also connected with a bearing cup, where the base element and the bearing cup may again be formed as a single piece and it is particularly preferred that an outer side of the base element forms the bearing cup. According to the invention the two bearing cups have a spherical surface. Thus, it is possible, using the workpiece receptacle of the present invention, to spatially align the at least one workpiece supported by the receiving element, the alignment being made using a single workpiece receptacle. In contrast with conventional workpiece receptacles it is not necessary to perform an alignment by two axes. This would be significantly more complex.

Preferably, the two spherical surfaces of the bearing cups are arranged concentrically with respect to each other. In particular, the two bearing cups or the two spherical surfaces of the bearing cups have the same centre. It is particularly preferred to arrange the at least one workpiece to be welded on the receiving element such that a welding plane extends through the common centre. If, for example, a hollow cylindrical body is welded to a lid, it is preferred that the welding surface, which in this case is in particular annular in shape, forms the welding plane and that the same extends through the common centre of the spherical surface. It is particularly preferred that the workpiece to be welded is arranged such that the centre of the annular welding surface coincides with the common centre of the spherical surfaces. It is now possible to arrange the second workpiece, such as a lid, on the cylindrical body. If, for example, the ultrasonic weld-

ing device is lowered onto the lid, an automatic alignment of the two parts to be joined by welding is effected.

Preferably, balls are arranged between the two bearing cups. Instead of the balls, it is also possible to provide grease or another lubricant. Further, the bearing could be designed as a sliding bearing, where the design as a ball bearing is preferred.

Further, it is preferred that the balls are arranged at a defined mutual distance. Preferably, a bearing cage is provided that in particular maintains the balls at a constant mutual distance. Due to the preferred equidistant arrangement of the balls, a uniform movement of the receiving element is ensured relative to the base element.

Although an automatic alignment of the welding plane may be effected by lowering or pressing the welding device, it is preferred to additionally provide a fixing element for the fixation of the receiving element with respect to the base element. This may be effected by clamping or the like. The fixing element helps to avoid a shifting during the welding process. Likewise, it would be possible, using the fixing element, to effect an intentional inclination of workpiece. The fixing element may e.g. comprise electromagnets which are energized for the purpose of fixation. This has the advantage that no mechanical fixing element has to be provided. If a mechanical fixing element were provided, an unintentional adjustment could occur. In a simple embodiment, the fixing element may, however, comprise a tensioning element which may be tensioned in particular via a lever element.

In a particularly preferred development of the invention an adjustment element is provided. The adjustment element serves to adjust the workpiece such that the welding plane extends through the centre of the two spherical surfaces. Thus, using the adjustment element, it is possible to exactly adjust different workpieces using the same workpiece receptacle. In this regard it is possible that, depending on the workpiece to be welded, a respective workpiece-specific adjustment element is provided. The adjustment element corresponds to a kind

of additional receptacle. The same is arranged on the receiving element and serves to receive the workpiece. As an alternative, it is also possible, however, to provide an adjustment element that e.g. allows for a horizontal displacement of the workpiece.

The invention further relates to a welding apparatus with a welding device and a workpiece receptacle, where the workpiece receptacle is the above-described, in particular advantageously developed workpiece receptacle. Further, a closing device is provided for moving the welding device relative to a workpiece arranged in the workpiece receptacle. In this case, in particular an automatic alignment may occur so that the surfaces to be joined by welding are parallel to each other.

The workpiece receptacle described above, in particular also with reference to preferred developments, is not only suited for ultrasonic welding devices, but also for other devices for processing workpieces. In particular, the workpiece receptacle is suited for pressing or punching devices.

The invention will be explained in more detail hereunder with reference to a preferred embodiment and to the accompanying drawing.

The Figure illustrates a schematic sectional view of a workpiece receptacle suited in particular for a welding apparatus, but also for other devices for the processing of workpieces.

The workpiece receptacle illustrated in the Figure comprises a receiving element 10 for receiving a workpiece. Here, the workpiece may be arranged on the receiving element 10 e.g. in a recess 12 serving in particular for adjustment purposes. It is also possible to provide clamping and/or holding devices e.g. on an upper surface 14 of the receiving element 10. The receiving element 10 is movable with respect to a base element 16. In the embodiment illustrated the base element 16 is supported by a frame element 18 and is stationary. To allow for a movement between the receiving element and the base element, a bearing means 20 is provided. In the embodiment illustrated, the bearing means 20 comprises a plurality of balls 22. The balls 22 are regularly distributed or equidis-

tantly arranged between the receiving element 10 and the base element 16. For this purpose, a bearing cage 24 is provided in the embodiment illustrated. For forming the bearing means, a lower side of the receiving element 12, as illustrated in the Figure, is designed as a bearing cup 26 by shaping the lower side of the receiving element 10 as a spherical surface 28. The part of the base element 16 opposite the bearing cup 26 is designed as a bearing cup 30. A surface 32 directed towards the surface 28 is also designed as a spherical surface. The two spherical surfaces 28, 32 forming the surfaces of the bearing cups are at a constant distance from each other. In particular, the two spherical surfaces 28, 32 have the same centre 34.

For welding two workpieces, the same can be arranged on the upper surface 14 of the receiving element and may, for example, be fixed or held. However, the arrangement of the workpieces is preferably such that the welding plane of the workpieces is in a plane 36 passing through the common centre 34 of the two spherical surfaces 28, 32. Thus, it is possible in particular to lower a welding device from above onto the workpieces to be welded, so that the parts to be welded are thereby in particular aligned automatically or self-actingly in the welding plane 36 in a plane-parallel manner.

Further, it is possible to fix the receiving element 10, and thus also the workpiece arranged on the receiving element 10, with respect to the base element 16. This could be effected e.g. by fixing elements having electromagnets or the like. As shown in the embodiment illustrated it is possible to provide a holding element 38. In the embodiment illustrated the same has an abutment element 40 resting on a lower side 42 of the base element 16. Using a lever 44 connected with a nut 48 arranged on a threaded rod 46, a clamping fixation of the receiving element 10 relative to the base element 16 can be effected.

Claims

1. Workpiece receptacle comprising

a receiving element (10) for receiving the workpiece,

a base element (16) movably receiving the receiving element (10),

a bearing means (20) allowing for a movement between the receiving element (10) and the base element (16),

a bearing cup (26) connected with the receiving element (10), and

a bearing cup (30) connected with the base element (16),

characterized in that

both bearing cups (26, 30) have a spherical surface (28, 32).
2. Workpiece receptacle of claim 1, characterized in that the two spherical surfaces (28, 32) are arranged concentrically with regard to each other and in particular have the same centre (34).
3. Workpiece receptacle of claim 2, characterized in that a processing plane, in particular a welding plane (38) passes through the common centre (34).
4. Workpiece receptacle of one of claims 1 – 3, characterized in that balls (22) are provided between the two bearing cups (26, 30).
5. Workpiece receptacle of claim 4, characterized in that the balls (22) are retained by a bearing cage (24).
6. Workpiece receptacle of claim 4 or 5, characterized in that the balls (22) are arranged equidistantly in particular because of the bearing cage (24),

7. Workpiece receptacle of one of claims 1 – 6, characterized by a fixing element (38) for the fixation of the receiving element (10) with respect to the base element (16).
8. Workpiece receptacle of claim 7, characterized in that the fixing element (38) has a tensioning element (44, 46, 48) for tensioning the receiving element (10) with respect to the base element (16) so as to fix the same.
9. Workpiece receptacle of one on claims 1 – 8, characterized by a holding element for holding the workpiece support on the receiving element (10).
10. Workpiece receptacle of one on claims 2 – 9, characterized by an adjustment element for adjusting the workpiece such that the processing plane, in particular the welding plane (38) passes through the centre (34) of the two spherical surfaces (28, 32).
11. Workpiece receptacle of claim 10, characterized in that the adjustment element allows for a displacement of the workpiece.
12. Welding apparatus comprising

an ultrasonic welding device,

a workpiece receptacle of one of claims 1 – 11, and

a closing device for moving the welding device relative to a workpiece arranged in the workpiece receptacle (10).