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CLAMPING ARRANGEMENTS FOR TOOLS OR WORKPIECES

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Fig. 1

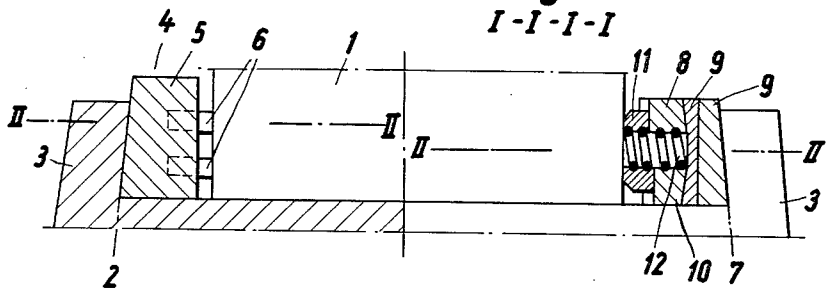


Fig. 5

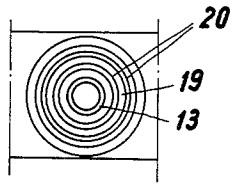


Fig. 2

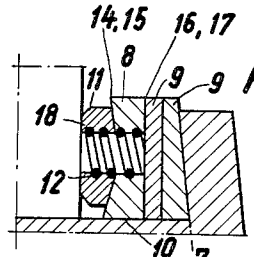


Fig. 3

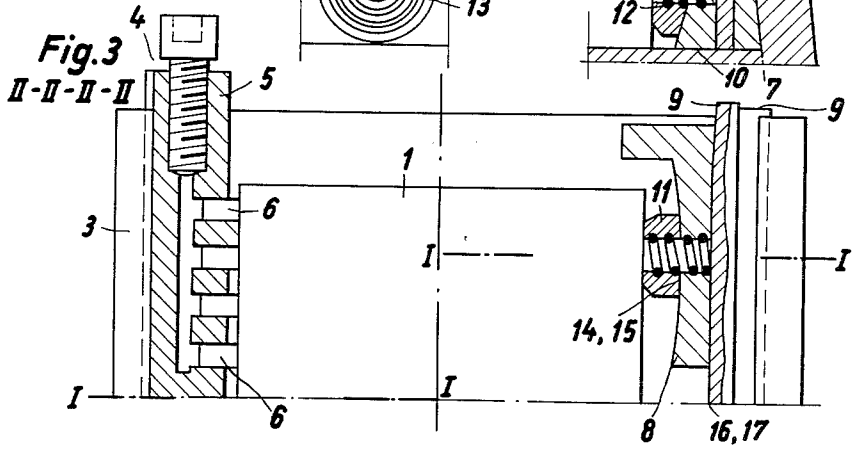
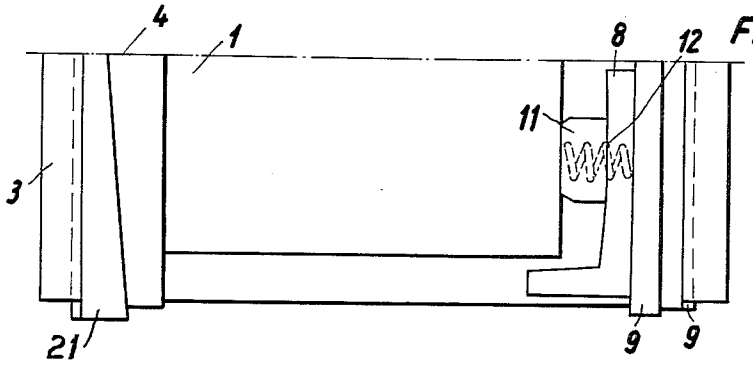


Fig. 4



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CLAMPING ARRANGEMENTS FOR TOOLS OR WORKPIECES

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7 Claims. (Cl. 269—25)

This invention relates to a clamping arrangement having a clamping device on one side and a wedge and plate packing on the other side of an object to be clamped, for example, a tool, workpiece, anvil, or a die, wherein the clamping device, such as a hydraulic clamp which is advantageously used consists of a carrier containing the space for fitting the usual fastening wedges and of cylinders disposed in rows or banks in the said carrier and connected together by passages, and also of a corresponding number of clamping stamps, and a pressure piston producing the working pressure on the clamping stamps and adapted to be operated by a clamp screw. In such arrangements it is known to provide the plate packing with a plurality of cylinder bores connected together by passages and open only on the contact side and also with pistons acting as stamps and acted on by hydraulic pressure. It is also known to dispose between the object to be clamped and the piston acting as stamp, intermediate layers which are mounted in the maner of a ball joint on the said stamp piston and are flat on the clamping or tool side. In this arrangement the distribution of the necessary clamping force over a plurality of clamping or stamp pistons or their intermediate layers is able to produce effective pressing, but the hydraulically acting plate inserts, used instead of the usual plate and wedge packings, are relatively expensive. The depth of installation in the supporting direction is also relatively very great.

In comparison with the hydraulic plate insert with which the clamping is distributed over a number of stamps for its transmission, the usual plate and wedge packing, however, has the disadvantage that the pressing is distributed over a large contact surface corresponding to the length of the plate and wedge packing. It is true that plate packings are known which are shaped as plates making contact only at the edges, but partly because of edge surfaces with great edge length and partly through the action of temperature originating from heated hammer dies, and in addition owing to different oxidation of the long contact edges, these plates cause irregular pressing which must then be balanced by a number of thin packing sheets or shims which give rise to further inaccuracies. In addition to the consequent tendency for the clamping to loosen, in the case of hydraulic clamping, the disadvantage exists that with a relatively small quantity of the enclosed hydraulic medium and with the operating device, acting as pressure piston and likewise relatively thin for reasons of installation, for the hydraulic clamping device, the carrier, which in any case is of dimensions just sufficient for the smaller capacity of normal clamping wedges, would contain only a relatively slight stroke for the piston serving as stamp, so that the possibility of balancing inaccuracies in installation is limited. Hammer mechanism vibrations are also transmitted to the packing side and in consequence of the compressibility of the hydraulic medium are further increased at high pressure, these vibrations having been found by experience to produce loosening the more readily, the less uniform the contact surfaces and the pressing and the more numerous the thin sheet-metal packings or shims.

The present invention aims at obviating the foregoing disadvantages and to this end consists in a clamping arrangement, comprising a table or base plate adapted to support an object to be clamped, a clamping device at one side of said table, and at least one wedge and an intermediate plate at the other side of said table, wherein said intermediate plate is provided with at least one gripping member which stands back in relation to the base of said intermediate plate and is movably connected thereto, said object being adapted to be clamped between said clamping device and said gripping member and wherein the surface of said gripping member contacting said intermediate plate and the corresponding surface of the latter are curved at least cylindrically in the longitudinal direction. Preferably the contacting surfaces are curved circularly in all directions, that is spherically.

Advantageously, the outer surface of the intermediate plate contacting the wedge and the corresponding surface of the latter are curved cylindrically outwards transversely to the longitudinal direction.

An improvement of the adhesiveness of the gripping members is achieved by concentric grooves on their clamping side.

In order that the invention may be more readily understood, reference is made to the accompanying drawings which illustrate diagrammatically and by way of example one embodiment thereof, and in which:

FIGURE 1 is a vertical section on the line I—I of FIG. 3 with cylindrically curved contact sides of the gripping members,

FIGURE 2 is another vertical section with spherical curving of the contact side of the gripping member,

FIGURE 3 is a sectional plan on the line II—II of FIG. 1,

FIGURE 4 is a plan view of a modified arrangement, and

FIGURE 5 shows the clamp side of the gripping member illustrated in FIG. 2.

Between the object 1 to be clamped and the abutment side 2 of the clamp table 3 there is disposed on one side a hydraulic clamping device 4, comprising the clamp body 5 and clamping pistons 6, while between the object 1 and the abutment side 7 on the other side there are disposed the plate intermediate 8 and the adjustment wedge 9, lying on the clamp table 3.

According to the invention the intermediate plate 8 and also a second intermediate plate 8 disposed at the other end of the table have a gripping member 11 standing back in relation to the base 10 of the intermediate plate 8 and movably connected thereto. Each of the gripping members 11 has a threaded bore 13 into which a coil spring 12 is screwed, the inner end of said spring being secured to the gripping member 11. The outer end of the coil spring 12 projects to the extent of the thickness of the body of the intermediate plate 8, the said body having a correspondingly threaded hole 13 into which the coil spring 12 carrying the gripping member 11 can be screwed. The extent of this movement is limited by the contact of the surfaces 14 and 15, facing each other, of the gripping member 11 and the body of the intermediate plate 8 respectively. According to FIGURE 3, the contact surface 14 of the member 11 and the abutment surface 15 of the plate 8 are curved outwardly, that is to say cylindrically in the longitudinal direction. They can, however, in accordance with FIGURES 2 and 3 also be curved spherically outwards. With this latter shaping, the rear outer surface 16 of the body of the plate 8 shown in FIGURE 2 and also the abutment surface 17 of the wedge 9 can be flat, preferably inclined in accordance with the inclination of the table slot. Alternatively, the contact surface 16 and abutment surface 17 are curved cylindrically outwards transversely to the longitudinal direction. The clamp surface 18

of the gripping member 11 shown in elevation in FIGURE 5 is flat and provided with grooves 19 disposed concentrically in spaced relationship to one another.

The raised ring surfaces 20 lying in one plane and of slight thickness are the adhesion and clamping surfaces which by virtue of the construction of the clamping arrangement according to the invention press during clamping into the plane of the clamp sides of the object 1 to be clamped.

In the plan section shown in FIGURE 3 the clamping device is a hydraulic clamp and in the plan in FIGURE 4 a wedge clamp, the wedge being indicated by reference numeral 21.

The body of the plate 8 can also extend over the entire length of the table that is from one to the other end thereof. It can then be provided with one but preferably with a plurality of gripping members 11.

We claim:

1. A clamping arrangement comprising, in combination, a base plate adapted to support an object to be clamped by the clamping arrangement and having along opposite edges thereof abutment portions projecting upwardly from the upper face of the base plate; clamping means abutting with one side thereof against one of said abutment portions and adapted to clampingly engage with gripping portions at the other side thereof the object to be clamped; at least one wedge engaging with one face thereof the other of said abutment portions and having an opposite face facing said object; an intermediate plate extending along said wedge and abutting with one surface thereof said opposite face of said wedge; at least one gripping member having a rear face abutting along the whole area thereof against said intermediate plate at a surface thereof opposite said one surface and a front face adapted to clampingly engage said object so that the same may be securely clamped between said gripping portions of said clamping means and said front face of said gripping member, said gripping member being spaced from said upper face of said base plate; and resilient connecting means connecting said gripping member to said intermediate plate.

2. A clamping arrangement comprising, in combination, a base plate adapted to support an object to be clamped by the clamping arrangement and having along opposite edges thereof abutment portions projecting upwardly from the upper face of the base plate; clamping means abutting with one side thereof against one of said abutment portions and adapted to clampingly engage with gripping portions at the other side thereof the object to be clamped; at least one wedge engaging with one face thereof the other of said abutment portions and having an opposite face facing said object; an intermediate plate extending along said wedge and abutting with one surface thereof said opposite face of said wedge; at least one gripping member having a substantially spherically curved rear face abutting along the whole surface thereof against a correspondingly curved surface portion of said intermediate plate matching said curvature of said rear face and a front face adapted to clampingly engage said object so that the same may be securely clamped between said gripping portions of said clamping means and said front face of said gripping member, said gripping member being spaced from said upper face of said base plate so that said gripping member may universally tilt with respect to said intermediate plate; and resilient connecting means connecting said gripping member to said intermediate plate.

3. A clamping arrangement comprising, in combination, a base plate adapted to support an object to be clamped by the clamping arrangement and having along opposite edges thereof abutment portions projecting upwardly from the upper face of the base plate; clamping means abutting with one side thereof against one of said abutment portions and adapted to clampingly engage with gripping portions at the other side thereof the object to be clamped; at least one wedge engaging with one face thereof the other of said abutment portions and having an opposite face facing said object; an intermediate plate extending along said wedge and abutting with one surface thereof said opposite face of said wedge; at least one gripping member having a substantially spherically curved rear face abutting along the whole surface thereof against a correspondingly curved surface portion of said intermediate plate matching said curvature of said rear face and a front face adapted to clampingly engage said object so that the same may be securely clamped between said gripping portions of said clamping means and said front face of said gripping member, said gripping member being spaced from said upper face of said base plate so that said gripping member may universally tilt with respect to said intermediate plate; and resilient connecting means connecting said gripping member to said intermediate plate, said resilient connecting means comprising a coil spring threadingly engaging into aligned threaded bores respectively formed in said intermediate plate and said gripping member.

4. A clamping arrangement comprising, in combination, a base plate adapted to support an object to be clamped by the clamping arrangement and having along opposite edges thereof abutment portions projecting upwardly from the upper face of the base plate; clamping means abutting with one side thereof against one of said abutment portions and adapted to clampingly engage with gripping portions at the other side thereof the object to be clamped; at least one wedge engaging with one face thereof the other of said abutment portions and having a curved opposite face facing said object; an intermediate plate extending along said wedge and abutting with one surface thereof said opposite face of said wedge, said one surface having a curvature matching that of said opposite face of said wedge; at least one gripping member having a substantially spherically curved rear face abutting along the whole surface thereof against a correspondingly curved surface portion of said intermediate plate matching said curvature of said rear face and a front face adapted to clampingly engage said object so that the same may be securely clamped between said gripping portions of said clamping means and said front face of said gripping member, said gripping member being spaced from said upper face of said base plate so that said gripping member may universally tilt with respect to said intermediate plate; and resilient connecting means connecting said gripping member to said intermediate plate.

5. A clamping arrangement comprising, in combination, a base plate adapted to support an object to be clamped by the clamping arrangement and having along opposite edges thereof abutment portions projecting upwardly from the upper face of the base plate; clamping means abutting with one side thereof against one of said abutment portions and adapted to clampingly engage with gripping portions at the other side thereof the object to be clamped; at least one wedge engaging with one face thereof the other of said abutment portions and having an opposite face facing said object; an intermediate plate extending along said wedge and abutting with one surface thereof said opposite face of said wedge; at least one gripping member having a substantially spherically curved rear face abutting along the whole surface thereof against a correspondingly curved surface portion of said intermediate plate matching said curvature of said rear face and a front face adapted to clampingly engage said object so that the same may be securely clamped between said gripping portions of said clamping means and said front face of said gripping member, said front face of said gripping member being formed with grooves and ridges, said gripping member being spaced from said upper face of said base plate so that said gripping member may universally tilt with respect to said intermediate plate; and resilient connecting means connecting said gripping member to said intermediate plate.

6. A clamping arrangement comprising, in combination, a base plate adapted to support an object to be clamped by the clamping arrangement and having along opposite edges thereof abutment portions projecting upwardly from the upper face of the base plate; clamping means abutting with one side thereof against one of said abutment portions and adapted to clampingly engage with gripping portions at the other side thereof the object to be clamped; at least one wedge engaging with one face thereof the other of said abutment portions and having an opposite face facing said object; an intermediate plate extending along said wedge and abutting with one surface thereof said opposite face of said wedge; at least one button shaped gripping member having a substantially spherically curved rear face abutting along the whole surface thereof against a correspondingly curved surface portion of said intermediate plate matching said curvature of said rear face and a front face adapted to clampingly engage said object so that the same may be securely clamped between said gripping portions of said clamping means and said front face of said gripping member, said front face of said button shaped gripping member being formed with concentric annular grooves and ridges, said gripping member being spaced from said upper face of said base plate so that said gripping member may universally tilt with respect to said intermediate plate; and resilient connecting means connecting said gripping member to said intermediate plate.

7. A clamping arrangement comprising, in combination, a base plate adapted to support an object to be clamped by the clamping arrangement and having along opposite edges thereof abutment portions projecting upwardly from the upper face of the base plate; hydraulic clamping means abutting with one side thereof against one of said abutment portions and adapted to clampingly engage with gripping pistons at the other side thereof the object to be clamped; at least one wedge engaging with one face thereof the other of said abutment portions and having an opposite face facing said object; an intermediate plate extending along said wedge and abutting with one surface thereof said opposite face of said wedge; at least one gripping member having a substantially spherically curved rear face abutting along the whole surface thereof against a correspondingly curved surface portion of said intermediate plate matching said curvature of said rear face and a front face adapted to clampingly engage said object so that the same may be securely clamped between said gripping portions of said clamping means and said front face of said gripping member, said gripping member being spaced from said upper face of said base plate so that said gripping member may universally tilt with respect to said intermediate plate; and resilient connecting means connecting said gripping member to said intermediate plate.

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