

QUESTION PAPER REFERENCE: FD2

Claims

1. An insert for accessories to be mounted to a machine tool, the insert being adapted to slidingly fit within a slot of a machine tool bed when in an unexpanded state and comprising means for expanding the insert widthways to engage sidewalls of the insert with side faces of the slot in a friction fit to inhibit the insert sliding along the slot.
2. An insert according to claim 1, wherein the insert is sized to fit exactly within a slot of a machine tool bed, when in the unexpanded state.
3. An insert according to claim 1 or claim 2, wherein the insert is sized in order than an upper region of the insert is flush with a surface of the machine tool bed when the insert is fitted in the slot.
4. An insert according to any preceding claim, wherein the means for expanding the insert comprises a tapered screw or a tapered wedge.
5. An insert according to any of claims 1 to 3, wherein the means for expanding the insert comprises one or more spacers.
6. An insert according to any of claims 1 to 3, wherein the means for expanding the insert comprises a plurality of strips of material.
7. An insert according to any preceding claim, wherein the insert comprises at least one hole for receiving the means for expanding the insert.
8. An insert according to claim 7, wherein the hole extends from an upper face of the insert through the insert to a slit in a lower face of the insert, the hole flaring in diameter from the upper face to the slit.
9. An insert according to claim 8, wherein the position of the means for expanding the insert is variable along the length of the hole, to vary the width of the slit and thereby expand the insert widthways.
10. An insert according to claim 8 or claim 9, wherein the upper face is substantially flat.
11. A mount for an accessory for a machine tool, comprising attachment means for attaching an accessory to the mount, and two gripping arms for attaching the mount to an insert fixed in a machine tool bed, wherein a first arm of the two gripping arms is moveable relative to a second arm of the two gripping arms, for changing the distance between the two gripping arms.

12. A mount according to claim 11, where the first arm is moveable relative to the mount and the second arm is fixed to the mount.
13. A mount according to any of claims 11 or 12, wherein the first arm is fixed to the mount at a pivot and is pivotable about the pivot for moving the first arm relative to the second arm.
14. A mount according to any of claims 11 to 13, wherein the first arm is biased by a biasing means in a position relative to the second arm for gripping the insert and the first arm is moveable away from the second arm by applying a force to overcome the biasing means to release the mount from the insert.
15. A mount according to claim 14, wherein the biasing means is a tensioned coil spring.
16. A mount according to claim 14 or claim 15, wherein the distance between the first arm and the second arm, when in a biased position, is less than the length of the insert.
17. Apparatus for attaching an accessory to a machine tool bed comprising an insert and a mount, the insert adapted to slidably fit within a slot of the machine tool bed in an unexpanded state and comprising means for expanding the insert widthways to engage side walls of the insert with side faces of the slot in a friction fit, to inhibit the insert sliding along the slot, and

the mount comprising two gripping arms for attaching the mount to the insert, wherein a first arm of the two gripping arms is moveable relative to a second arm of the two gripping arms for changing the distance between the two gripping arms to grip and release the insert, and wherein the mount comprises means for attaching an accessory to the mount.
18. Apparatus for attaching an accessory to a machine tool bed substantially as described herein, with reference to figures 2 to 6 of the accompanying drawings.
19. A mount according to any of claims 11 to 17 wherein the gripping arms protrude below a base of the mount.

MARKS AWARDED 22.5/60

Introduction & Description

Apparatus for attaching accessories to a machine tool

The present invention relates to apparatus for attaching accessories to a machine tool, and in particular an insert for a machine tool bed and a mount for attaching to an insert.

A typical machine tool is shown in figure 1 and comprises a tool bed 10 having a number of slots 12 for enabling objects to be bolted in place when being cut by the cutting tool 14.

A tool setter 16 is typically mounted to the tool bed to detect the position of the cutting tool in order that the tool can be controlled to accurately cut objects.

It is important for the tool setter to be fixed to the machine tool bed such that it does not move, and its position calibrated so the controller knows its exact position relative to the machine tool.

The tool setter is usually mounted to the machine tool bed by bolts which protrude up through the slots and a mount for the tool setter is attached to the bolts and fixed using nuts.

Several problems arise with this typical method of mounting a tool setter to a machine tool bed. Firstly, if a tool is left in a slot without a mount attached, it will protrude above the machine tool bed which can obstruct movement of the object being cut.

Secondly, a spanner or similar is required to tighten or loosen the nuts and bolts, which can be fiddly and time consuming.

Thirdly, to remove the tool setter from the bed, the nuts must be loosened which results in the bolts sitting loosely in the slots and the fixed position of the mount being lost. This means that when the tool setter is re-attached to the machine bed the bolts will be in a different position and so the tool setter will have to be calibrated each time it is removed and replaced. This is very time consuming and can result in a loss of productivity in cutting objects, and increase the price of the objects.

According to a first aspect of the invention there is provided an insert for accessories to be mounted to a machine tool, the insert being adapted to slidably fit within a slot of a machine tool bed when in an unexpanded state and comprising means for expanding the insert widthways to engage side walls of the insert with side faces of the slot in a friction fit to inhibit the insert sliding along the slot.

This is advantageous because it means that if a mount is attached, removed and reattached to the mount, the insert remains fixed in place within a slot of the machine tool bed, such that the mount is reattached in the same position and it is not necessary to re-calibrate the position of a tool setter in the mount.

Preferably, [claim 2].

The insert may be cuboidal and may be of a size to fit a standard T-shaped slot or U-shaped slot in a machine tool bed. The insert may have a depth such that it is fully contained within the narrow part of a T-slot, or may extend into a wider part of the T-slot.

Preferably, [claim 3]. This is advantageous because if the insert does not protrude above the surface of the machine tool bed, it will not obstruct objects on the bed when an accessory is not mounted to the insert.

Preferably, [claim 4], however the means for expanding may alternatively be a spacer, or a plurality of thin metal strips. The means for expanding may be adapted to increase the width of the insert so it is able to fit and be fixed in a variety of different sized slots and apertures in machine tool beds.

Preferably, [claim 7]. The hole may extend from an upper face of the insert, through the insert, to a slit in a lower face of the insert, the hole flaring in diameter from the upper face to the slit. This provides the benefit that as the tapered screw or tapered wedge is moved upwards towards an upper face of the insert, the wedge or screw pushes outwards against the walls of the hole and slit, thereby increasing the width of the insert. The hole may comprise an internal screw thread for receiving the tapered screw. This is beneficial as it allows the position of the screw to be easily changed using a screw driver, thereby easily expanding the width of the insert. Therefore, preferably [claim 9].

Preferably, [claim 10]. This is beneficial as it minimises metal debris (swarf) generated during a metal cutting process from getting trapped in or around the insert.

According to a second aspect of the invention there is provided [claim 11]. This is advantageous because the moveable gripping arms provided a simple means for attaching the mount to, and removing the mount from, an insert. Since the mount will not typically subject to a large force in use (unlike the objects being cut), it is not necessary for the mount to be bolted to the machine bed and the gripping arms according to the invention will likely be sufficient for attaching the mount to an insert in the machine bed.

Preferably [claim 12]. Alternatively both arms may be moveable.

Preferably [claim 13]. This provides an easy method for a user to attach and remove the mount from the insert, simply by pivoting the first arm.

Preferably, [claim 14]. This is advantageous because it retains the gripping arms in a position for gripping the mount fixedly to the insert.

Preferably, [claim 15]. Preferably, claim [16].

According to a third aspect of the invention there is provided [claim 17]. This is advantageous as it provides a mount that can easily be detached from the bed when not needed and reattached in exactly the same position when it is required again, avoiding the need for re-calibration of the accessory. The insert may comprise any of the features defined above in relation to the first aspect of the invention. The mount may comprise any of the features defined above in relation to the second aspect of the invention.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawing of which:

Figure 2 is a perspective view of an insert;

Figure 3 is a section view of the insert in an unexpanded state;

Figure 4 is a section view of the insert in an expanded state;

Figure 5 is a perspective view of a mount; and

Figure 6 is a perspective view of the mount and the insert.

As shown in figure 1, an insert 100 is substantially cuboidal and sized to fit into a slot of a machine tool bed, for example 1 x 1 x 5 cm.

The insert 100 comprises two holes 102 which extend from an upper face 104 of the insert 100 to a slit 106 which runs along the length of the lower face 108 of the insert 100, as shown in figures 3 and 4. A tapered screw 110 is inserted in each hole 102 via the slit 106. When the insert 100 is inserted into a slot at the desired position, the screws 110 are tightened in the holes 102, moving the screws 110 upwards in the threaded holes 102 towards the upper face 104.

The tapered surfaces 112 of the screws 110 forces the opposing sides of the insert 100 apart, so that the insert 100 expands widthways, with the side walls 114 of the insert 100 moving further apart, as shown in figure 4.

This has the effect of holding the insert in a fixed position in the slot of the machine tool bed.

As shown in figures 2 to 4, the slit 106 is U-shaped. The holes 102 flare out in diameter from the upper face 104 to the slit 106 for accommodating the tapered screws 110.

A mount 200 is shown in figure 5, with a tool setter T mounted thereto.

The mount 200 comprises a cylindrical base 202 having a cavity 204 running from an upper end 206 to a lower end 208. The lower end 208 sits on the bed of the machine tool in use.

The mount 200 comprises a first arm 210 and a second arm 212, positioned on opposite sides of the curved cylindrical wall of the base 202 of the mount. The second arm 212 is fixed to the base 202 and the first arm 210 is pivotable relative to the base 202. The first arm 210 is attached at a pivot to the base 202 such that if the upper end 214 of the first arm 210 is pressed in the direction of arrow A, towards the base 202, the lower end 216 of the first arm 210 moves away from the base 202, in the direction of arrow B.

The first arm 210 is biased in a position lying against the base 202 by a tensioned coil spring 218. The base 207 is appropriately dimensioned so that when the upper part 214 of the first arm 210 is pressed, the separation between the lower part 216 of the first arm and the lower part 220 of the second arm 212 is such that the arms 210, 212 can pass over ends of an insert and when the first arm 210 is in a biased position, the separation between the lower parts 216, 220 of the arms 210, 212 is less than the distance between the two ends of the insert, so the mount 200 grips the insert.

The mount 200 comprises a bolt 222 for attaching a tool setter T to the mount 200. However, other accessories may be attachable to the mount 200, for example temperature sensors, cameras or calibration artefacts.

Figure 6 shows the mount 200 being attached to the insert 100 in use. The insert 100 is fitted in a T-slot S of a machine tool bed. The upper face 104 is substantially flat and lies flush with the machine tool bed. The screws 110 lie below the upper face 104, but may lie flush with the upper face 104, within the holes 102. The first arm 210 and second arm 212 are separated in their biased position by a length slightly smaller than the length of the insert. The arms 210, 212 protrude beyond the lower end 208 of the base 202 and grip on to either end of the insert 100.

MARKS AWARDED 25.5/36

Abstract

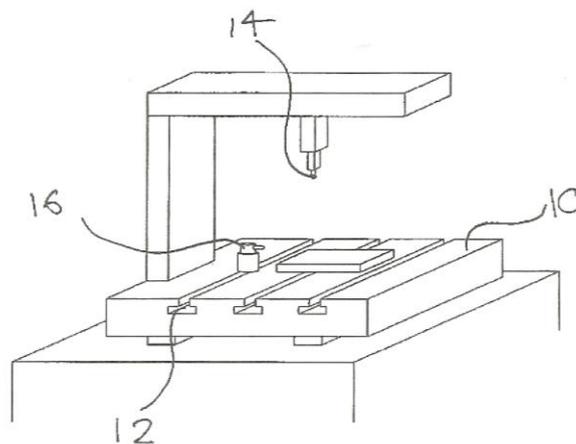
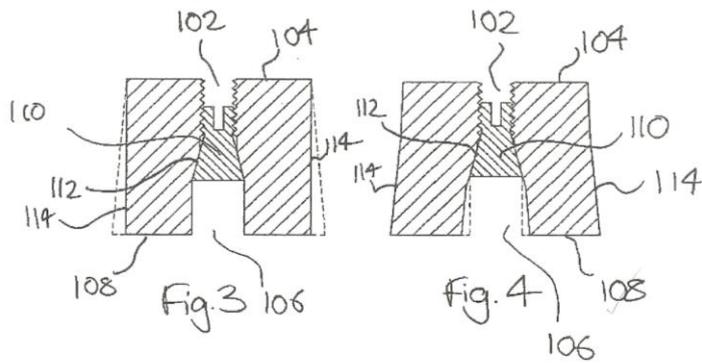
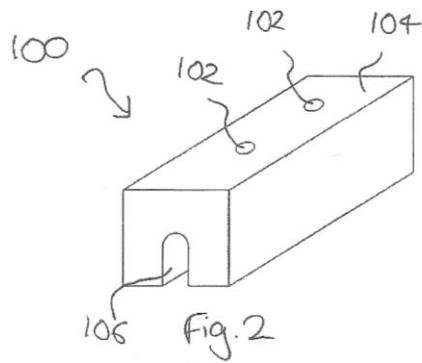


Fig. 1



2/4

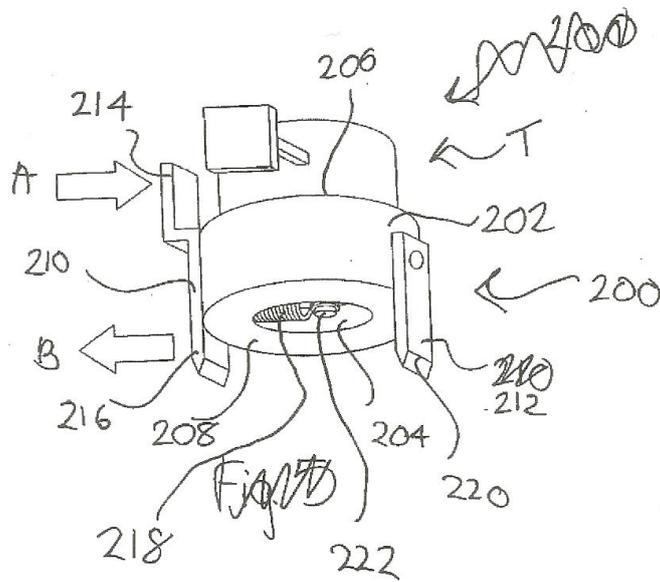


Fig. 5

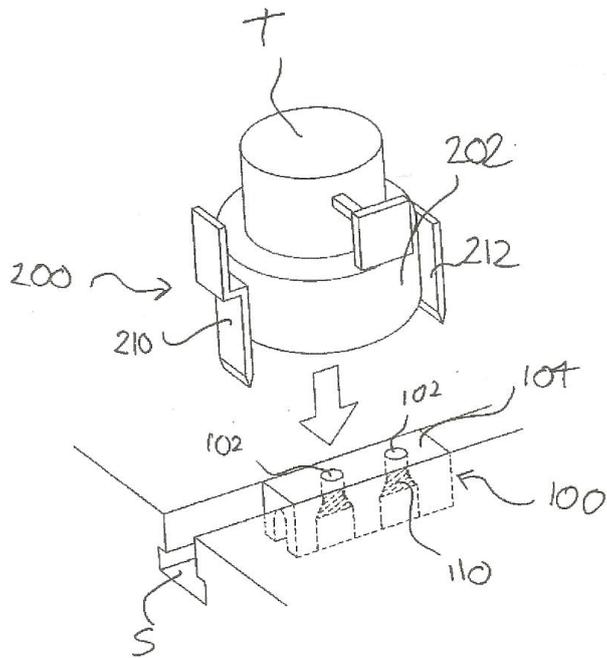


Fig. 6

4/4

Abstract

APPARATUS FOR ATTACHING ACCESSORIES TO A MACHINE TOOL.

An apparatus for attaching an accessory to a machine tool comprises an insert 100 and a mount 200. The insert 100 is adapted to slidingly fit within a slot of a machine tool bed in an expanded state and comprises means 110 for expanding the insert 110 widthways to engage side walls 114 of the insert 100 with side faces of the slot in a friction fit to inhibit the insert 100 sliding along the slot. The mount 200 comprises two gripping arms 210, 212 for attaching the mount to the insert 100. A first arm 210 of the two arms is moveable relative to a second arm 212 of the two arms for changing the distance between the two gripping arms 210, 212 to grip and

release the insert. The mount 200 comprises means 222 for attaching an accessory to the mount 200.

[Figure 6].

MARKS AWARDED 4/4