Dec. 15, 1964 P. F. DE VALLIERE 3,161,084

MACHINE TOOL TURRET

Filed Aug. 22, 1962 2 Sheets-Sheet 1

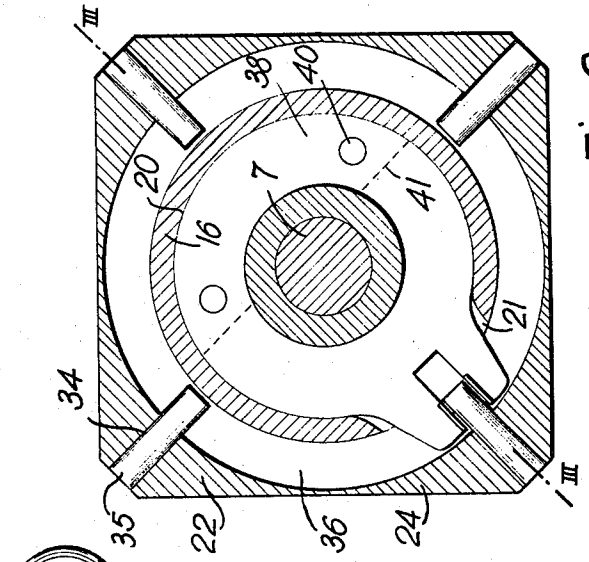


Fig. 2

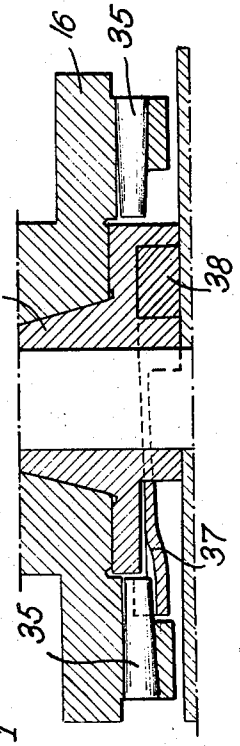


Fig. 3

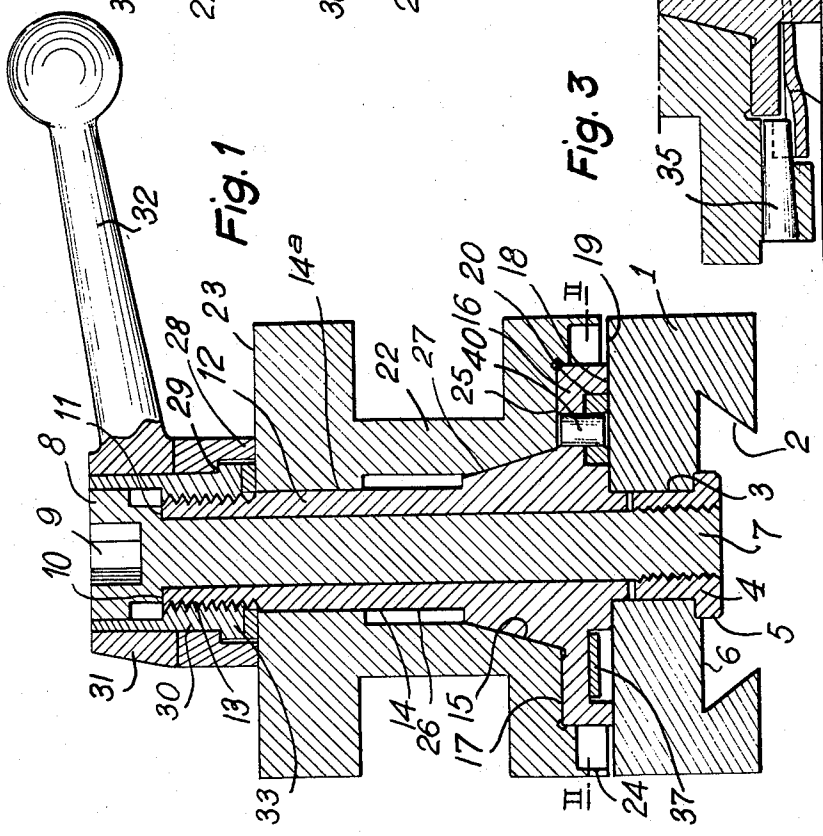


Fig. 1

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Fig. 4

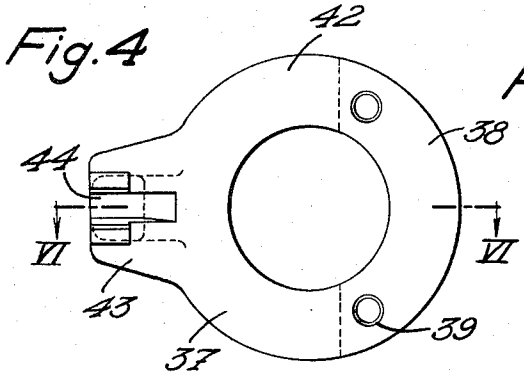


Fig. 5

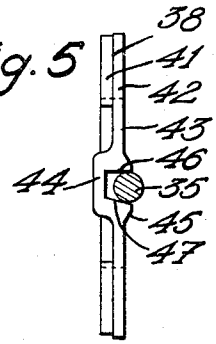


Fig. 6

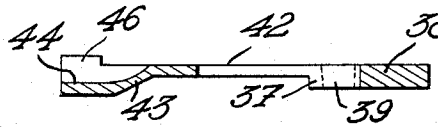


Fig. 7

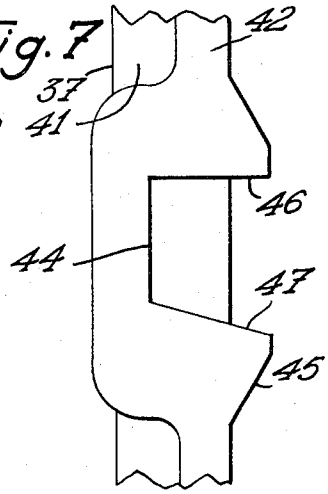


Fig. 8

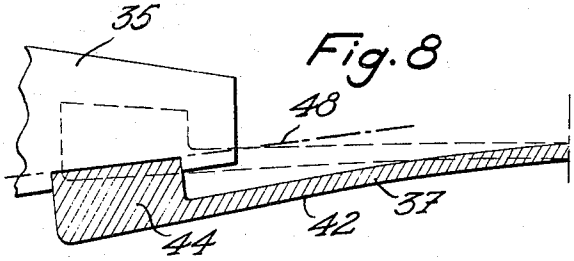


Fig. 9

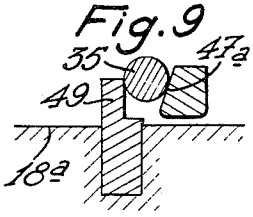


Fig. 10

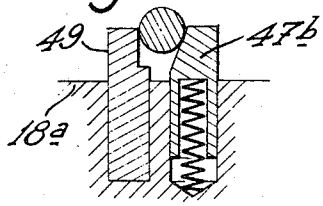
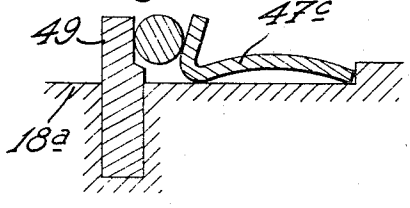


Fig. 11



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3,161,084

MACHINE TOOL TURRET

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6 Claims. (Cl. 74—817)

This invention relates to turrets for the support of tools.

Such turrets are intended to allow for the successive operation of a variety of tools and it is vital that the position of these tools be set with a high degree of accuracy.

A variety of methods of construction have been resorted to heretofore for turrets of this type intended for use with tools or the like.

It is an object of the invention to provide a tool turret which affords highly accurate positioning, great fixity in all positions, simple and rapid operation, and which can be built at relatively low cost.

It is a further object of the invention to provide a tool turret having a body pivotally mounted on a shaft and which can be clamped thereon by a wedging effect obtained by the co-operation of at least one tapered seat with another matching seat, said wedging effect being restrained by abutment against a planar surface and resilient locking means being provided between the turret base-body and the support for indexing the various positions of said turret base-body relative to said support, said turret being particularly adapted for use with machine tools of relatively small size.

The turret base-body is associated with a wedging and release control.

It is a still further object of the invention to provide resilient locking means acting by co-operation between taper pins disposed radially within the turret base-body and at least one retractable member for receiving said pins.

In one specific embodiment, said retractable member consists of a resilient component which can be displaced away from the path of the taper pins but is endowed with extreme rigidity in a direction parallel with the plane of said path.

Such a member is provided with a projection having preferably inclined flanks and access profiles whereby said turret can be easily and sensorily positioned when operated.

Such a resilient member is preferably provided in the form of a flat annular spring fitted to the turret support, in conjunction with a radial arm on the end of which is embodied a projection co-operating with said pins.

The description which follows with reference to the accompanying drawings, which are filed by way of example only and not of limitation, will give a clear understanding of how the invention can be carried into practice and will reveal further advantageous particularities thereof which naturally fall within the scope of the invention.

In the drawings filed herewith:

FIGURE 1 is a sectional view of a turret according to the invention;

FIGURE 2 is a section taken through the lines II—II of FIGURE 1;

FIGURE 3 is a sectional view of the turret, taken through the lines III—III of FIGURE 2;

FIGURE 4 is a plan view of the resilient member;

FIGURE 5 is a side-elevation view corresponding to FIGURE 4;

FIGURE 6 is a sectional view through the lines VI—VI of FIGURE 4;

FIGURE 7 is a larger-scale detail of the notch adapted to receive the pins;

FIGURE 8 is a schematic illustration of the manner of co-operation of the resilient member with a pin; and

FIGURES 9 to 11 are schematic illustrations of alternative embodiments of resilient members.

The turret as illustrated is mounted on a base 1 the lower face of which embodies a dovetail-shaped slideway 2 for securing to a machine-tool carriage for example. The base is provided with a central bore 3 adapted to receive the cylindrical portion 4 of a nut having an outer retaining flange 5 beneath the face 6 of slideway 2. Said nut receives the threaded portion of a stud 7 which comprises a head 8 having a cylindrical outer surface and the external flank of which is provided with a convenient recess 9 adapted to co-operate with an operating key. The lower face 10 of head 8 bears against the upper face 11 of a core 12. The upper part of this core is provided with a threaded portion 13 which surmounts a cylindrical portion 14, which portion in turn surmounts a tapered seat 15 terminating in a thrust flank 16 which offers a planar face 17 at right angles to the axis common to cylindrical portion 14 and tapered seat 15. The thrust seat 16 is applied, through its lower face 18 which is parallel with face 17, against the upper face 19 of base-body 1 by tightening stud 7 into the securing nut referred to precedingly.

The lower face 18 of thrust flank 16 embodies an annular groove 20 which opens out widely through an open sector 21.

The core 12 is utilized as a pivot for a turret body 22 which is provided in its upper part with a planar face 23 and in its lower part, in containment within a skirt 24, with a planar face 25 adapted to thrust against face 17. Internally, said turret comprises a bore 14*a* which is slidingly and pivotally supported on the cylindrical bearing 14 and, beyond an open section 26, a tapering seat 27 is provided on the turret adapted to co-operate with seat 15 to form a restricted wedging effect by the thrust exerted by face 25 against face 17.

The upper part of turret base-body 22 is provided with a fitted ring 28 with flange 29, which flanged ring retains an operating nut 30 which is screwed onto the threaded portion 13 provided over the head of core 12 and comprises a skirt which surrounds the head 8 of stud 7, said nut being rigid with a ring 31 to which is secured an operating lever 32. Said nut 30 is provided with a flange 33 positioned beneath flange 29. Ring 31 is adapted to bear upon ring 28.

Externally, the turret base-body 22 is prism-shaped and has a square base in the example illustrated. The prism formed by the lower part of said turret base-body is provided with cylindrical channels with a view to constituting the thrust face 25 and the skirt 24, the circles forming the bases of these channels being thus contained within the corresponding outer polygon. The corners of the lower part of base-body 22 are each provided with a radial aperture 34 into which are driven taper

pins 35 which thus protrude into the opening surrounded by skirt 24, the tapering portions of said pins being thereby positioned close to the outer cylindrical portion of thrust flank 16. Since the metal thickness in the lower part of base-body 22 is at a maximum about the apertures 34, the guiding and retaining surfaces associated with said pins 35 are very rigid, thereby ensuring constant and accurate location of the pins.

The internal opening 20 within the securing flank 16 receives a flat annular spring 37, as is more clearly illustrated on FIGURES 4 to 7. Said spring comprises a thick heel 38 provided with holes 39 into which engage securing dowel pins 40, which pins extend through corresponding holes in flanks 16. Beyond the chamfer edge 41 which bounds the heel 38 approximately diametrically, said spring comprises a recessed portion 42 terminating in an arm 43 which extends through the open sector 21 which is located diametrically opposite the thick heel 38. Said arm 43 is provided with an axial notch 44 the edges of which are raised above the face of the reduced portion and of the arm 43 and which is provided with engagement profiles 45. One of the flanks 46 of said notch is preferably axial while the opposite flank 47 is inclined relative thereto and converges towards it and towards the bottom of the notch.

Operation of the turret constructed as hereinbefore described is as follows:

As nut 30 is unscrewed, flange 33 displaces flange 29 and raises the turret base-body 22 relative to the core 12, thereby unwedging seat 15 and seat 27. At the same time, the particular pin 35 which was engaged in notch 44 is raised clear thereof, thus allowing for pivoting of the turret.

Assuming nut 30 not to have been unscrewed so far so that pin 35 is still partially accommodated in notch 44, the pivotol motion of the turret will cause arm 43 of spring 37 to bend when the pin 35 which is still partly engaged in notch 44 tends to emerge therefrom. Similarly, when a subsequent pin 35 returns to the vicinity of notch 44, it clears the heads of the notch flanks by riding up the profile 45, the reverting of spring 37 into its inoperative position producing a sensorily perceptible latching effect which warns the operator that a stop position has been reached. To ensure clamping in this position, the operator merely has to screw in nut 30 once more in order to jam the turret base-body 22 against the tapered face 27 on the corresponding seat 15, said wedging effect being limited by the mutual thrust between faces 25 and 17.

Should it be desired to vary the stop positions, it will suffice to loosen stud 7 to permit rotation of core 12, following which stud 7 can be tightened up again to clamp said core.

It will of course be understood that in cases where such adjustment is not required, core 12 can be rigid with support 1.

Spring 37 is preferably obtained by forming or microfusion processes. Instead of being secured by means of dowel pins, it could alternatively be brazed in the corresponding lodging on the core.

Said spring 37, which is resilient axially and very rigid transversely, undergoes a rocking motion along the lengths of pins 35 in operation, and this motion results in self-cleaning of the various bearing surfaces, thereby assisting accuracy of positioning, all extraneous matter finding its way out without difficulty through the peripheral aperture of notch 44, due to the slanting lower face thereof.

The various parts are so arranged by design that, in the operative position, the lines of contact between the generating lines of the operative pin 35 and the flanks 46 and 47 of notch 44 lie substantially in the median plane of spring 37, as shown by the broken line axis 33 of FIGURE 8, whereon solid lines illustrate the spring and the pin in the operative positions and dotted lines

the spring in the relaxed position. This avoids undesirable twisting of the spring.

Furthermore, in the operative position, the contact points between the notch flanks and the taper pin surface lie substantially along two generating lines of the pin taper.

This makes for very high precision and very great resistance to wear. Positioning can be assisted sensorily as stated precedingly provided that nut 30 is not unscrewed too far, and such a sensory perception can be suppressed if the nut is unscrewed sufficiently.

While it is an advantage to provide notch 44 with a truly radial restraining face such as the face 46 and an opposite inclined face, it is manifest that both faces could be equally or unequally inclined relative to a radial plane without too great a loss of precision. Such a disposition would dispense with the need for a preferential direction of rotation of the turret base-body.

FIGURES 9 to 11 illustrate an alternative embodiment wherein the resilient means for setting the turret position could comprise a single locking plane only, the other being secured into the turret support. Thus, as shown in FIGURE 9, the turret support 18*a* could comprise upstanding fingers 49 above which the pins 35 could be raised, the arm of the resilient member rigid with said support being provided with only one thrust face 47*a*.

As illustrated in FIGURE 10, the resilient member could consist of a spring catch 47*b* mounted on the support 18*a*.

Another alternative embodiment is illustrated in FIGURE 11, wherein the abutment 49 acting as an anvil cooperates with a cambered spring 47*c* thrusting against the support 18*a* and itself acting as the required inclined thrust face.

It is to be clearly understood that, without departing from the spirit and scope of the invention, many modifications may be made to the specific embodiments hereinbefore described without departing from the scope and spirit of the invention as defined in the following claims.

What I claim is:

1. A machine tool-turret comprising a base, a core supported by said base, a turret body rotatably and slidably mounted on said core for movement with respect to an axis passing through said core, said core and turret body having respective conical matable surfaces and planar matable surfaces arranged such that upon relative sliding movement of the body on the core in opposite directions the matable surfaces are respectively engaged and disengaged, the planar matable surfaces being arranged substantially perpendicular to the directions of sliding movement of the turret body to limit the degree of engagement between the conical matable surfaces of the core and said body, said turret body including a portion having an external polygonal contour, a cylindrical recess being provided in the latter portion in coaxial relation, taper pins supported in said portion of said turret body at the corners thereof and projecting internally into the cylindrical recess, and means projecting within said recess and supported in fixed position therein for engaging respective of said taper pins upon rotation of the turret body for angular positioning of the turret body between particular positions, the latter means comprising a substantially fixedly supported member including a resilient portion which engages the taper pins.

2. A machine tool-turret as claimed in claim 1 wherein said means projecting within said recess is secured to said core.

3. A machine tool-turret as claimed in claim 1 wherein said means projecting within said recess is secured to said base.

4. A machine tool-turret as claimed in claim 1 wherein said means projecting within said recess is constituted by said member which is a flat annular spring member including a radial arm at a free extremity of which there

is provided a notch which operatively engages said taper pins one at a time, said radial arm being resilient in a direction parallel to the directions of sliding movement of the body but rigid in its own plane.

5. A machine tool-turret as claimed in claim 4 wherein said radial arm has an axial face and an inclined face bounding and defining said notch, said arm further having inclined ramp surfaces radiating from said notch to facilitate introduction of the taper pins into the notch.

6. A machine tool-turret as claimed in claim 1 wherein said fixedly supported member is a fixed stop rigid with said base and having an axial face and the resilient portion is an elastic member supported adjacent said stop in said recess such that said fixed stop and elastic member cooperatively and resiliently engage the taper pins.

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