Oct. 31, 1950 H. F. BAKEWELL 2,527,871

TOOLHOLDER

Filed June 21, 1946

Fig. 4.

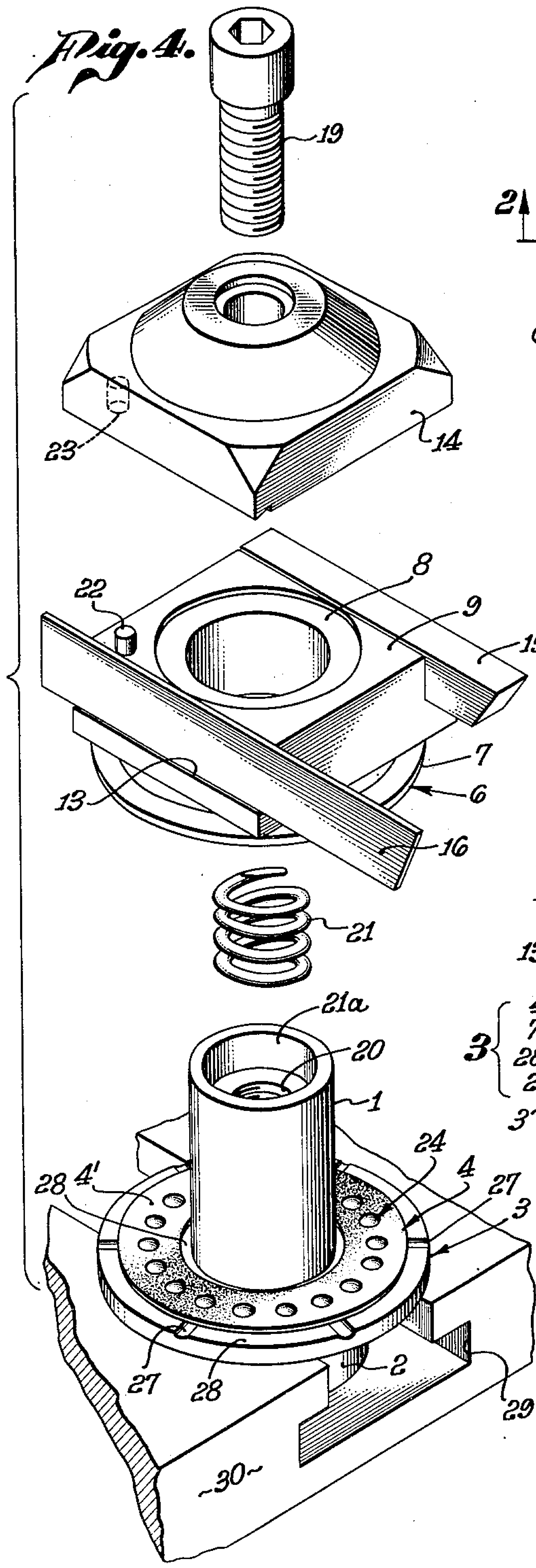


Fig. 1.

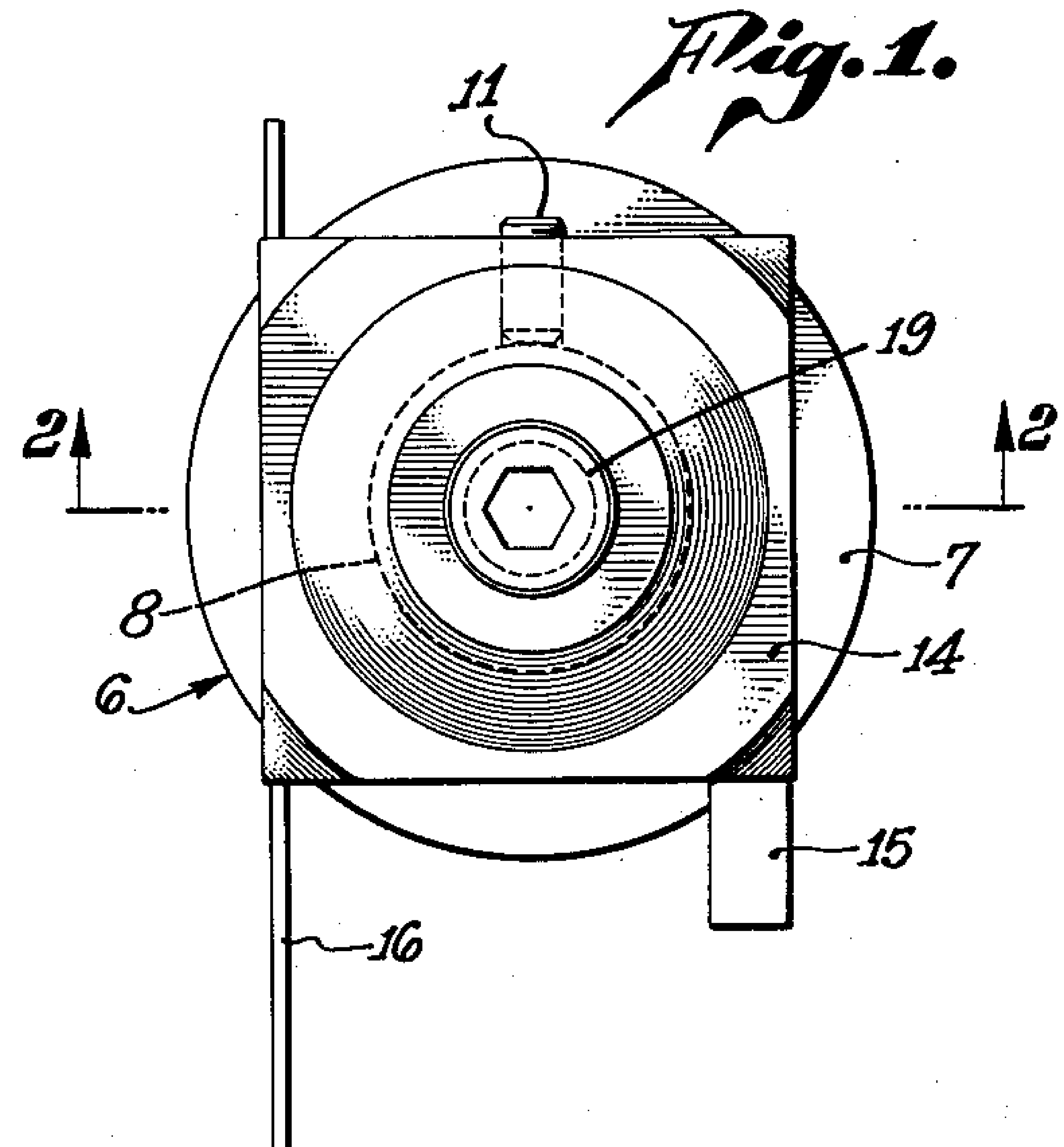


Fig. 2.

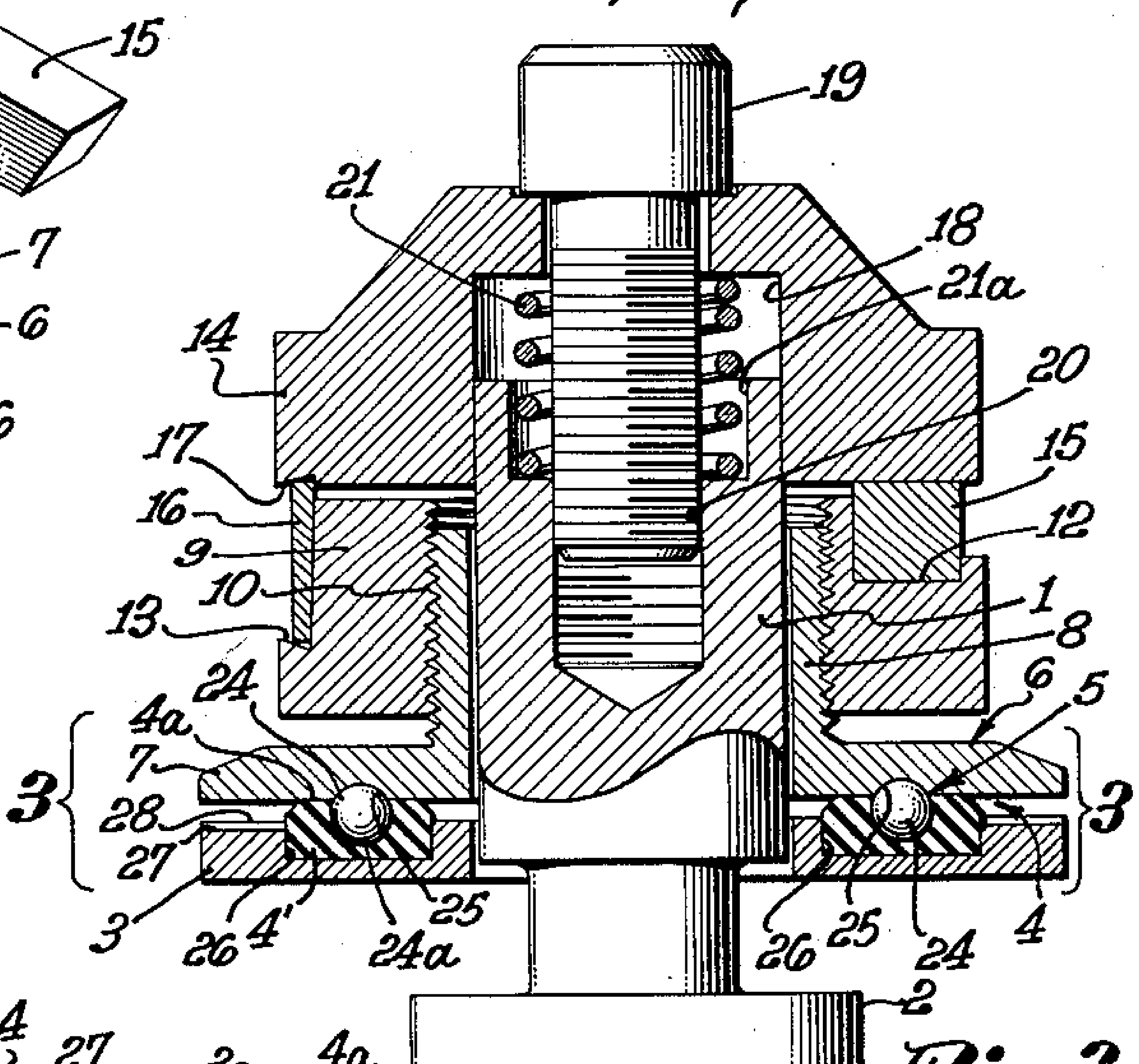
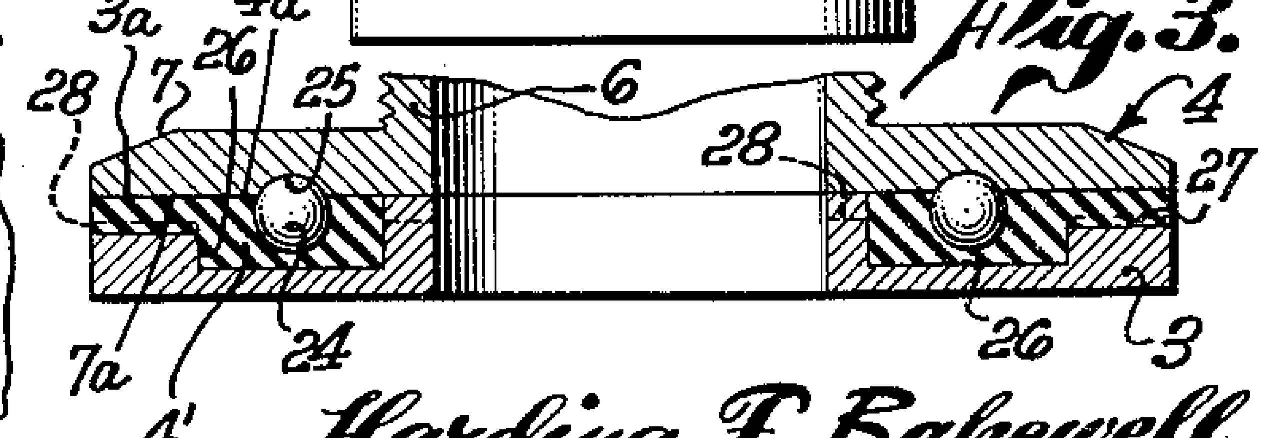


Fig. 3.



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TOOLHOLDER

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4 Claims. (Cl. 29—48)

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This invention relates to tool holders such as are adapted for use on lathes and the like, and pertains more particularly to a tool holder provided with a resilient element adapted to be placed under compressive loading under the stresses imposed upon a tool held in such holder, whereby to cause absorption of vibrations which are normally developed in the tool under use.

One of the important objects of this invention is to provide a tool holder adapted particularly for the holding of tools having cutting edges of the so-called "Carbide" type, wherein the resilient mounting which is provided in the tool holder contributes to a long useful life for the cutting tool, by absorption of detrimental vibrations which in the ordinary case cause a rapid deterioration of the cutting edge of the tool.

A further object of the invention is to provide a resilient tool holder having vibration absorbing characteristics, which provide a highly stable positioning of the cutting tool within the tool holder so that the vibratory movements generated by the action of the cutting tool upon the work are communicated through the tool holder to the resilient vibration absorbing mounting.

The device of this invention may comprise, essentially, a structure adapted for attachment to a convenient supporting member, such as a compound rest, and adapted to receive a cutting tool under compressive engagement, and provided with a resilient member interposed between the tool and the compound rest or other support in a manner such as to receive the compressional forces or stresses which are imposed upon the tool in holding it in position, such resilient coupling member being provided with means engaging the tool support in such manner as to resist torque-induced movement of the tool holder with respect to the rest or other support.

The above and other objects of this invention will be brought out in the ensuing description of a preferred embodiment thereof, or will be apparent from such description. This embodiment is illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of a tool holder according to this invention, showing two alternative types of cutting tools in place upon the tool holder;

Fig. 2 is a transverse sectional view as taken on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary detail on the same section line as Fig. 2 showing that portion of the tool holder of Fig. 2 which is enclosed within the brackets 3—3, illustrating the condition of the adjacent parts of the structure in an intermediate stage in the construction thereof; and

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Fig. 4 is an exploded view of a tool holder according to this invention, showing the various parts in the relationship in which they are assembled for use.

Referring to Figs. 1, 2 and 4 of the drawings, the device of this invention is shown as comprising a shank member 1 provided with an enlarged head 2 at its lower end adapted to be fitted within the T slot 29 in a compound rest 30 (Fig. 4). Surrounding the lower ends of the shank member 1 I provide a base plate or collar 3 carrying a resilient mount or coupling member 4 provided with a torque lock 5 adapted to cooperate with a second collar 6 provided with a base section 7 opposingly directed to the base plate or collar 3 and a guide section 8 surrounding the shank member 1 and slidably mounted thereon. The guide section 8 is provided with a tool support 9, as through a threaded mounting 10, a setscrew 11 being provided to lock the portion 9 upon the guide section 8 (see Fig. 1). The tool support 9 is provided with one or more shoulders adapted to receive a desired cutting tool, and in this particular embodiment I have shown a flat shoulder 12 at one side of the tool support adapted to receive a square cross-section tool 15, and an inclined shoulder 13 at the opposite side adapted to receive a cut-off tool 16, the shoulder 13 being inclined inwardly of the device in order to crowd the thin cross-section cut-off tool inwardly toward the central portion of the tool holder.

A locking collar 14, slidably mounted upon the upper end of the shank member 1, is provided to engage the upper edges of the square cross-section and cut-off tools 15 and 16, either separately or concurrently, a suitable inclined shoulder 17 being provided on the locking collar 14 cooperating with the inclined shoulder 13 on the tool support 9. The locking collar 14 is provided with a central bore 18 in substantially close sliding fit with the upper end of the shank 1, and a locking screw 19 is provided to clamp the collar 14 down upon the tools 15 or 16 to rigidly support said tools on the tool holder. The shank 1 is bored and threaded as at 20 to receive the screw 19, and a bias spring 21 is preferably provided, as by being disposed within a recess 21a in the upper end of the shank 1 in position to bear upwardly against the collar 14, as against upper end of the central bore 18 in said collar 14, to facilitate the separation of the collar 14 from the tools 15 and/or 16 in the removal of these tools from the holder upon loosening of the screw 19.

A keying pin 22 is preferably provided on one of the members 9 or 14, with a coactingly shaped and disposed recess 23 on the opposite member, to facilitate the proper placement of the collar 14 upon the tool support 9 in the operation of clamping down upon the tools.

The resilient mount or coupling 4 and the torque lock 5 may conveniently comprise a ring 4' of rubber, neoprene, plastic, fiber, or other material having vibration-absorbing characteristics, suitably embedded in or attached to one of the opposing base portions of the members 3 and 7, together with a plurality of angularly spaced keying members arranged generally in a plane normal to the extent of the shank 1, i. e., normal to the direction of compressive loading imposed upon the cutting tools when the locking screw 19 is tightened to fasten the device upon the compound rest or other support. The keying members are preferably caused to be partially embedded in the resilient coupling member and being keyed to the opposing base portion of the adjacent collar member. In the construction illustrated in the drawings, the angularly spaced keying members are formed as a plurality of balls 24, having approximately two-thirds of their diameter embedded within the resilient portion of the coupling member which is formed as the ring 4', recessed as at 26 in the base plate or collar 3, the unembedded portions of the balls 24 being disposed in coactingly shaped and arranged recesses 25 in the lower opposing face 7a of the collar portion 7.

Fig. 4 illustrates a stage in the manufacture of the resilient coupling member which is to be used in interposition between the members 3 and 6, and referring thereto, the member 3 is shown as being formed as a flat plate provided with an annular recess 26 within which a body of compounded rubber or the like is disposed. With the construction in a position inverted with respect to Fig. 3, the collar portion 7 of the member 6, already provided with the desired plurality of ball receiving recesses 25, is provided with a plurality of balls 24 corresponding in number to these recesses and is then pressed against the body of rubber or other resilient compound in the recess 26 to force the balls into the rubber compound and from the ring 4' with the balls 24 embedded therein. The two parts 3 and 6 are then forced together until the extreme forward edge portion 3a of the member 3 is brought into contact with the opposing face 7a of the collar portion 7. If the ball recesses 25 in the collar portion 7 are made approximately one-third ball-diameter in depth, this will cause the balls 24 to be embedded for about two-thirds diameter within the body 4', any excess rubber or other resilient compound in the recess 26 being squeezed out through conveniently located sprue holes 27. The depth of the groove or recess 26 will preferably be such as to insure that a layer of resilient material at least about one-third ball-diameter in thickness will underlie the balls 24, as at 24a, Fig. 2. The resilient compound is then brought to the desired condition of resilience by vulcanization or other process suitable to the compound being employed, after which the collar portion 7 may be removed. In order to expose the upper face or edge portion 4a of the resilient member 4' to contact with the lower face 7a of the collar portion 7, in use, the portions of the member 3 inwardly and outwardly of the member 4 are then preferably cut away, as indicated at 28, leaving the member 4' as an upstanding ridge or annulus. The corners of inner and outer rims of this annulus may be cut away as shown in Fig. 2, if desired.

The resilient mounting or coupling member 4 is above-described as being formed of rubber, but it is my contemplation that the material used for this member merely be one which is both resilient (in the sense in which rubber is resilient) and capable of absorbing vibrations imposed upon it, the hardness or vibration-absorption characteristics being established for the specific construction desired. When the device is assembled so as to be supported upon the compound rest 30, as an example of the use of the device as a lathe tool holder, the tightening of the screw 19 upon the locking collar 14 forces the tool 15 or 16, or both of them, against their tool receiving recesses in the tool support member 9, and this compressive effort or stress is communicated through the guide portion 8 of the collar member 6 into the collar portion 7, then through direct contact and through the balls 24 into the resilient coupling member 4', then to the collar member 3 and to the compound rest 30. Vibratory forces imposed upon the cutting edges of the cutting tools 15 or 16 will thus be communicated through to the resilient coupling member 4' and there for the most part absorbed, contributing to the better performance of the cutting tools.

I have shown the tool support member 9 as being threadedly mounted upon a guide portion 8 of the collar 6, but it will be appreciated that these portions may be made integral if desired. The illustrated threaded mounting is provided for convenience in locating the cutting edge of the cutting tool 15 or 16 at the correct height above the compound rest 30 so as to cause the cutting edge to be properly located with the work against which the tool operates, and where this adjustment is not necessary or advisable an integral structure may readily be provided. I preferably form the bore 18 in the locking collar 14 so as to have a relatively close fit to the upper end of the shank member 1, so as to avoid cramping of the collar 14 on the shank in the event that but a single tool 15 or 16 is employed. I preferably also provide a little clearance between the guide portion 8 of the collar member 6 and the outer diameter of the shank 1 to permit a free action of the resilient coupling member 4 in absorbing vibrations. This clearance is somewhat exaggerated in the drawings, for the purpose of clarity, inasmuch as the total amount of movement of the tool support assembly as a result of the resilient action of the coupling member 4 is very minor in amount, and but a very slight clearance is required.

It will be appreciated that many modifications in this structure may be accomplished by those skilled in the art, and I therefore choose not to be limited to the specific details illustrated and described, but rather to the scope of the subjoined claims. For example, while I have illustrated the torque-lock construction as comprising a plurality of spherical balls, the utility of locking elements of alternative shape will be apparent. Similarly, while I have illustrated the vibration absorbing ring member 4' of the resilient coupling member 4 as being secured to the collar 3 solely by the frictional engagement resulting from molding this body within the collar, attachment of the member 4' to the collar 3 or retention thereof within the recess 26, may be accomplished by keying or other means well known in the art.

I claim:

1. In a tool holder adapted for use on lathes

and the like, the combination of a resilient mounting member comprising a plurality of angularly spaced balls and an annularly extending body of resilient material of the character of rubber, said balls being partially embedded in said body of resilient material an amount in excess of one-half the diameter of such balls; a tool support member having a portion adapted to engag one side of said body of resilient material at positions intermediate and surrounding said balls, and having recesses adapted to receive the unembedded portions of said balls; a base member engaging the other side of said body of resilient material; and clamping means engaging said tool support member for moving it toward the base member to compressively engage said resilient body between the tool support member and the backing member.

2. In a tool holder adapted for use on lathes and the like, a resilient mounting member adapted to be subjected to compressive loading under the stresses imposed upon a cutting tool held in such holder, said mounting member comprising an annular member provided with an upwardly directed resilient element having a plurality of angularly spaced keying members arranged generally in a plane normal to the direction of compressive loading, said keying members being partially embedded in said resilient member and having upwardly directed exposed portions; and a second annular member provided with a plurality of downwardly directed recesses adapted to receive said exposed portions, and tool engaging means rigidly connected to the second annular member adapted to hold a cutting tool.

3. In a tool holder adapted for use on lathes and the like, the combination of a base member and a tool support member provided with opposingly directed face portions, one of said members being provided with a resilient element of the character of rubber having embedded therein a plurality of angularly spaced keying members, said keying members being only partially embedded in said resilient member and having exposed portions directed toward the other of said members, and said other member being provided with a plurality of recesses coactingly shaped and disposed with respect to such exposed portions of said keying members; and means for causing said resilient element and said other member to compressively engage one another.

4. In a tool holder adapted for use on lathes and the like, the combination of a base member and a tool support member provided with opposingly directed face portions, one of said members being provided with a resilient element of the character of rubber having embedded therein a plurality of angularly spaced balls of substantially uniform diameter, said balls being partially embedded in said resilient member an amount in excess of one-half diameter and having exposed portions directed toward the other of said members, and said other member being provided with a plurality of recesses coactingly shaped and disposed with respect to such exposed ball portions; and means for causing said resilient element and said other member to compressively engage one another.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,225,327	Walker	Dec. 17, 1940
2,324,603	Strobl	July 20, 1943
2,403,405	Sirola	July 2, 1946
2,433,026	Cassella	Dec. 23, 1947

FOREIGN PATENTS

Number	Country	Date
831,896	France	June 20, 1938