March 29, 1949. S. DONIGER 2,465,433

TOOL

Filed Dec. 27, 1946

Fig. 1.

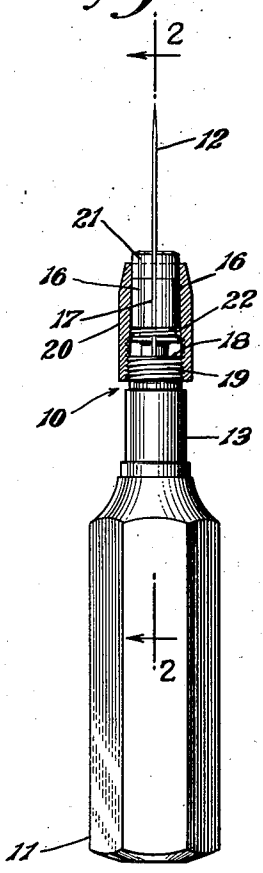


Fig. 2.

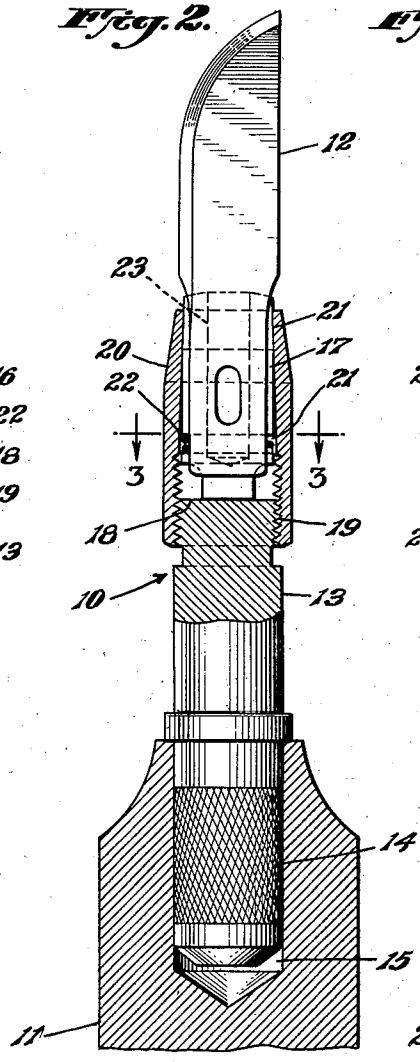


Fig. 4.

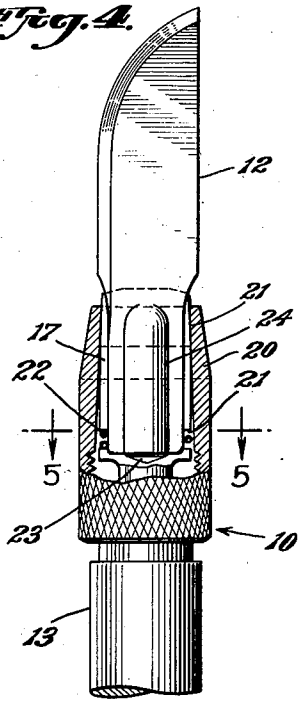


Fig. 5.

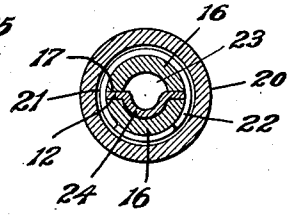


Fig. 3.

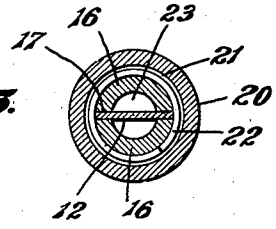
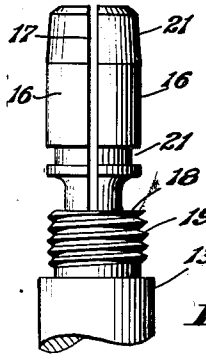


Fig. 6.



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TOOL

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3 Claims. (Cl. 279—42)

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This invention relates to tools and particularly to tools wherein a removable and replaceable blade or other instrument is carried in operative position by a holder mounting it on a handle.

Removable and replaceable blades or other instruments such as screw drivers, drills, files, chisels and so forth have been heretofore introduced upon the market. In general, however, the holder for operatively mounting such blades or other instruments to the handle have failed to furnish adequate support and retention under some of the uses to which the blade or instrument is applied. The inadequacy of the prior art holders is not only pronounced but involves danger to the user in conjunction with keen knife blades. That and other uses involve a lateral pressure on the handle holder and tool, as well as twisting moment applied simultaneously with the pressure. Under stresses of this character, blades in prior art holders are found to tilt or wobble, with resultant loosening effect, and also by virtue of the twisting force applied, tend to unscrew the collet collar constituting part of the holder. A tool in which the blade becomes loose is dangerous in that it may slip unexpectedly while considerable pressure is being applied and stab in almost any direction.

According to the present invention, a tool is provided improving upon the prior art tools of the character indicated, and overcoming the shortcomings thereof.

In particular, an object of the present invention is to provide a holder of the collet type which holds the blade or instrument securely against wobble.

Another specific object of the invention is to provide a secure grip for the blade such that twisting moment applied to the blade does not tend to release the grip-applying means for the collet.

Other objects of the invention will appear to those versed in the art to which it appertains as the description proceeds, both by direct recitation thereof and by implication from the context.

Referring to the accompanying drawings in which like numerals of reference indicate similar parts throughout the several views;

Figure 1 is a sectional elevation of a tool in accordance with the present invention showing a knife blade therein, looking toward the edge thereof;

Figure 2 is a sectional view on somewhat increased scale over that of Figure 1, and taken on line 2—2 thereof, showing the blade in side elevation;

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Figure 3 is a cross-sectional view on line 3—3 of Figure 2;

Figure 4 is a sectional view similar to Figure 2 and showing a tool with differently constructed blade therein;

Figure 5 is a cross sectional view on line 5—5 of Figure 4; and

Figure 6 is an elevation of the collet jaw end of the holder.

In the specific embodiment of the invention illustrated in said drawings, reference numeral 10 designates a holder in general one end whereof is provided with a handle 11 and the other end whereof is arranged and constructed to removably receive and retain a blade 12 or other instrument. The holder includes as the body portion thereof a metallic shank 13 with a knurled peripheral end portion 14 adapted to be pressed into a socket 15 provided for the purpose in the end of handle 11 which is likewise preferably of metal. The handle and holder shank are accordingly rigidly and permanently secured together by this or other suitable means.

The forward end portion of the holder shank, that is, the end remote from the handle, provides collet jaws 16, 16 formed as an integral part of said shank by making a longitudinal saw-slit 17 rearwardly from the forward end as far toward the handle as a peripheral shoulder 18, here shown approximately a third of the way from the jaw end to the handle end of said shank. Said shoulder 18 faces toward the jaw end of the shank, and rearward thereof the shank periphery is provided with external screw threads 19 of very fine pitch, of the order of thirty-two or more threads per inch.

Holder 10 also includes a collet collar 20 the rearward end of which is internally threaded to mesh with the threads 19 of the shank. The collar 20 at its forward end provides an internal taper longitudinally thereof in the form of a frusto-conical surface the apex for which is on the forwardly extended axis of the collar at a considerable distance from the end of the collar with the angle of taper with respect to the axis approximately two degrees. The end margins of the collet jaws are similarly tapered as at 21, and of appropriate diameter to be engaged by the tapered surface of the collar. Consequently a very considerable rotation of the collar is required for a very small deflection of the jaws under the squeezing moment applied by the collar.

Particular attention is called to the fact that the collet jaws are integral with the shank which in turn is held rigidly by the handle. Twisting

moment applied in use to the blade inserted in the saw slit between the jaws is resisted or counteracted directly by the jaws without transmitting any effective unscrewing moment to the collar. Furthermore by virtue of the small angle of taper between the jaws and collar, and fine pitch of the threads employed not only enables the user to tighten the jaws against the blade or other instrument with a large multiplication of the applied force, but also diminishes to nil the unscrewing moment applied from the blade to the collar in the use of the tool. The grip is beneficially obtained with the collar screwing in a direction tending to pull the blade into the holder.

Resulting from the tapering of the inside end portion of collar **20**, the outer end of the coaxial hole through the collar is smaller in diameter than the threaded end and middle part of the hole. Consequently a blade or other instrument the stem of which is just right in crosswise dimension to engage diametrically opposite parts of the hole wall at the outer end of the hole, will not be in contact with the wall at any part of the interior of the collar. Such a situation tends to permit wobble of the blade or other instrument. An important feature of the present invention is to provide means preventing such wobble by holding the stem at its inner end as well as at its part where projecting through the small-diameter end of the tapered hole. Exemplary of this feature, the collet jaws are provided with a groove **21** circumferentially with respect to the shank, the diameter of the base of the groove being slightly less than the cross-dimension of the blade stem. Said groove is also located back from the smaller outer end of the collet jaws a distance almost equal to the length of the blade or instrument stem. Within said groove is loosely carried a ring or overlapping convolutions of a spiral spring **22** the inner diameter of which is substantially equal to or very slightly less than the cross-dimension of the blade stem. Upon inserting the stem in the saw slit between the collet jaws, it comes to said ring or spring and by virtue of beveled corner is readily forced into the ring or spring which accordingly grips the stem and keeps it centered with respect to the axis of the shank and collar and prevents the objectionable wobble.

It will be understood that the jaws are separated because of the saw slit, with their inner faces parallel, but the metal is sufficiently flexible and resilient to permit the jaws to flex into gripping engagement with the blade stem when tightening by rotation of the collar is effected. Release of the squeezing pressure of the collar permits the jaws to return to normal parallel condition and affords the necessary looseness or release of the blade. The ring or spring functions at such time to prevent the blade from dropping out, but the user may readily pull the blade free from said ring or spring for removal of the blade and replacement by the same or another instrument at will.

If so desired, the slit between the jaws may be supplemented by a coaxial bore **23** of adequate depth thereby enabling the jaws to receive either a flat stem, such as shown in Figures 2 and 3, or a stem with a longitudinal rib or reenforcing bulge **24** as shown in Figures 4 and 5. Furthermore while the instrument selected for illustration herein is a knife blade, the invention is not restricted thereto as it is equally applicable to receive, hold and grip any one of a variety of instruments, such as screw drivers, drills, files, chisels and so forth.

I claim:

1. A tool comprising a holder having collet jaws for gripping the stem of an instrument, a collar around said jaws, said collar having an interior taper next the outer ends of the jaws in engagement with said jaws for squeezing the same toward each other for gripping the instrument stem, means within the collar having an opening therethrough for receiving the instrument stem and substantially fitting said stem at opposite edges thereof, said holder having means mounting and retaining said stem receiving means to the holder.

2. A tool comprising a holder having a shank with collet jaws at an end part thereof for gripping the stem of an instrument, a collar around said jaws, said collar having an interior taper next the outer ends of the jaws in engagement with said jaws for squeezing the same toward each other for gripping the instrument stem, a resilient ring means on said shank having an inner diameter substantially the diameter of the smaller end of the said interior taper of the collar and remote therefrom whereby the said ring and said smaller interior taper of the collar constitute supporting engagement of the instrument stem at separated positions on the stem.

3. A tool in accordance with claim 2 wherein said shank provides a groove for retention of said resilient ring means assembled on said shank.

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REFERENCES CITED

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

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