

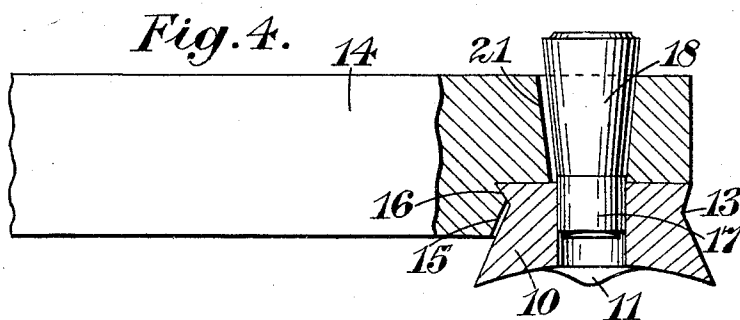
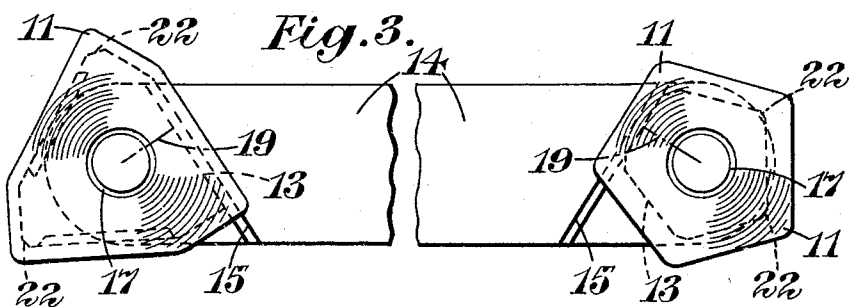
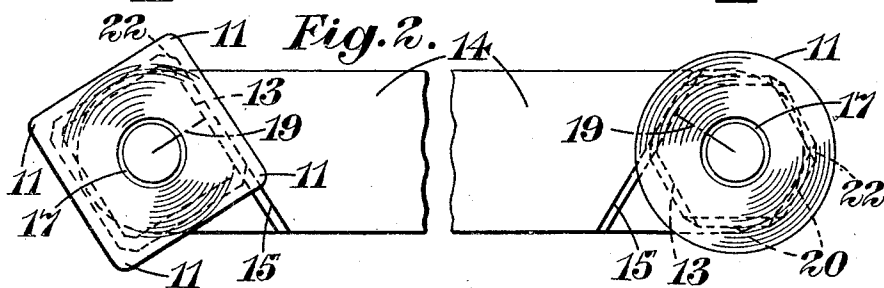
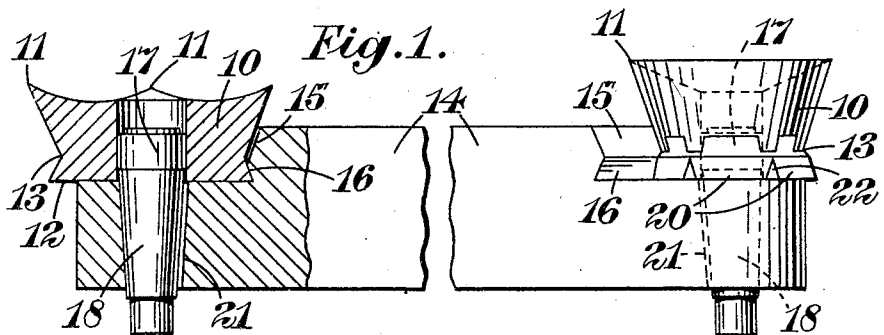
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TURNING AND BORING TOOL

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TURNING AND BORING TOOL

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This invention relates to turning, boring and like tools of the type in which a detachable cutter having taper sides is secured to a holder by a central stud or the like with the cutter side supported by a shoulder or recess wall on the holder, the object of the invention being to provide improved means for securing the cutter to the holder.

As usually made the cutting points or edges of the cutter are formed at the junction of its taper sides with the larger end surface and when worn a new point or part of the edge may be brought into operation by turning the cutter about the central stud or the like. According to the present invention which may be applied also to tools used for shaping, planing and other purposes, the sides of the cutter are formed with a waist, the holder is provided with an undercut shoulder or wall fitting the tool waist, and a wedging pin engages an axial hole in the cutter and a hole in the holder which is slightly nearer than the one in the cutter to the undercut shoulder or wall when the cutter is in contact therewith. The action of the wedging pin tends to draw these holes into register and thus presses the cutter against the supporting shoulder or wall of the holder.

In the accompanying drawings:—

Figure 1 is an elevation of a holder carrying a tool at each end according to the present invention, one end of the holder being shown in central longitudinal section.

Figure 2 is a plan of Figure 1.

Figure 3 is a view similar to Figure 2 showing differently shaped cutters carried by the holder.

Figure 4 is a sectional elevation illustrating a modification.

Like reference numerals indicate like parts throughout the drawings.

In carrying out the present invention as illustrated the cutter 10 is provided with cutting points or edges 11 at one end and with a base 12 at the other end, the sides between the two ends 11 and 12 being tapered inwardly from both ends to form a waist 13. The holder 14 is of bar form and is recessed at one or both ends to provide a shoulder or wall 15 which is undercut at 16 to fit the waist 13 of

the cutter 11 as shown, for example, on the left-hand side of Figure 1. The base 12 of the cutter 10 rests on the recessed end of the holder 14 and its waist 13 or dove-tail like part of the side below that waist is pressed against the undercut portion 16 of the shoulder or wall 15 by wedge action.

In the construction illustrated this wedge action is set up by a pin having a cylindrical portion 17 sliding in a central cylindrical hole through the cutter 10 and a tapered portion 18 engaging a similarly tapered hole in the recessed part of the holder 14. The required wedge action is ensured by the disposition of the central hole in the cutter 10 in relation to the one of the holder 14, the latter hole being slightly nearer than the former to the undercut shoulder or wall 15, 16 when the cutter 10 is placed in contact therewith as shown clearly in Figure 1. The action of the wedging pin 17, 18, tends to draw these holes into register and thus presses the cutter against the supporting shoulder 15, 16. The parts are preferably arranged for this pressure to be exerted against the undercut portion 16 of the shoulder 15, with a clearance, as illustrated, between the remainder of the shoulder and the side of the tool between the waist 13 and cutting edge or points 11. If desired, however, the shoulder or wall 15 may be arranged to be in contact with the tool or both sides of its waist 13.

It will be appreciated that, as the hole in the holder and the part 18 of the pin engaging it are both of a similar tapered formation as illustrated, the sides of both being inclined to the axis at the same angle, at the beginning of the wedging action the relative disposition of the holes in the cutter 10 and in the holder 14 will cause the part 18 of the pin to be in contact with the side of the holder hole which is remote from the undercut shoulder or wall 15, 16 and its cylindrical portion 17 to be in contact with the opposite side of the wall of the hole in the cutter. Thus, by driving in the wedging pin 17, 18 the cutter 10 will be rigidly locked to the holder 14. This construction gives a substantial bearing surface between the pin and both the holder and the cutter, but in modified

constructions the complete operative length of the pin may be tapered, and the holes engaged thereby may both have parallel or both have inclined sides.

Although it is preferred for the pin 17 to be circular in transverse section it may be of any desired shape, the holes in the cutter and holder being shaped accordingly. Thus a flat sided wedge may be used, the side of the hole in the cutter adjacent to the shoulder 15, 16 being normal to its base and the opposite side of the hole in the holder being inclined to correspond with the angle of the wedge or vice versa.

The undercut shoulder 15, 16 is preferably straight and inclined to the length of the holder 14 as shown in Figures 1, 2 and 3 and it will be appreciated that any shape of cutter may be secured to the holder by making each of them with its waist 13 at the same distance from its central hole, this distance being measured on the line 19 (Figures 2 and 3) normal to the waist passing through the centre of the hole. A square cutter is thus shown secured at the left-hand end of the holder in Figures 1 and 2, a triangular form at the corresponding end of the holder in Figure 3 whilst a pentagonal shape is shown at the right-hand end of Figure 3. A circular cutter is shown at the right-hand side of Figures 1 and 2 and in order to enable it to be interchangeable with the other shapes of cutter and to provide increased bearing surface on the undercut shoulder 15, 16, its tapered sides between its base 12 and waist 13 are made flat as shown at 20. In Figures 1 and 2 these flat sides 20 of the cutter engaging the undercut shoulder 15, 16 are shown hexagonal in outline, although they may be of other shape if desired. Similarly in all cases the outline of the parts of the cutter engaging the undercut shoulder 15, 16 may, if desired, differ from the outline of the cutting edge 11 and the shoulder or wall 15 be shaped to correspond with the portion of the outline engaged thereby, the outline of the cutting edge being of any desired shape.

When the cutter 10 is to be used with its cutting edge or points 11 uppermost the wedging pin 17, 18 is preferably inserted through the cutter into the holder as shown in Figure 1, the pin tapering from its cylindrical portion 17 to a smaller diameter. Although the tool so secured may be used with the cutting points or edges facing downwards there may then be some risk of the pin falling out and to avoid this it may be inserted through the hole in the holder into the one in the cutter, as illustrated in Figure 4. In this case the tapered portion 18 of the pin is oppositely arranged, the wedging pin tapering to a smaller diameter towards the cylindrical portion 17. The wedging and locking action is, however,

the same as that previously described with reference to Figure 1.

In both the constructions illustrated in Figure 1 and in Figure 4 the taper 18 of the wedging pin is of the same inclination as that of the hole in the holder engaged thereby, but these tapers are so formed as to provide a clearance 21 between them in the locking position on the side adjacent to the undercut shoulder 15, 16 of the holder. The provision of this clearance 21 ensures the efficient production of the desired wedging action on the cutter, since in the absence of such a clearance the wedging action would be limited when the tapered portion 18 reached the end of its longitudinal travel by arriving at a fitting position in the tapered hole therein. The cylindrical portion 17 of the pin is preferably formed accurately to fit the hole in the cutter 10.

As the cutter is sharpened by grinding its operative end face its axial length is gradually decreased and in order that it may remain efficient when the cutting points or edges 11 are ground to proximity with the waist 13 the angles between the inwardly tapered sides below the waist, immediately under the cutting points 11, are preferably removed by grinding or otherwise as indicated at 22 in order to provide the necessary clearance between the base of the cutter and the work. For a like reason the undercut wall 15, 16 of the holder is preferably limited in height to be less than the axial length of the cutter 10 as illustrated; and the waist 13 is preferably nearer to the base 12 than to the cutting points 13 in the base of a new cutter, being as near to the base as is consistent with an adequate engagement by the undercut portion 16 of the wall 15.

What I claim is:—

1. In a metal cutting tool the combination of a cutter having its sides converging from both ends to form a waist intermediate the ends, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure and a wedging pin engaging an axial hole in the cutter and a hole in the holder which is slightly nearer than the one in the cutter to the undercut shoulder when the cutter is in contact therewith, substantially as and for the purpose specified.

2. In a metal cutting tool the combination of a cutter having its sides converging from both ends to form a waist intermediate the ends, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure and a wedging pin having a cylindrical portion sliding in a cylindrical hole in the cutter and a tapered portion engaging a tapered hole in the holder, substantially as specified.

3. In a metal cutting tool the combination of a cutter having its sides converging from both ends to form a waist intermediate the ends, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure, and a wedging pin having a cylindrical portion sliding in a cylindrical hole in the cutter and a tapered portion engaging a tapered hole in the holder to lock the cutter waist in engagement with the shoulder, the tapers of the wedging pin and of the hole in the holder being formed to provide a clearance between them in the locking position on the side adjacent to the shoulder, substantially as specified.

4. In a metal cutting tool the combination of a cutter having a circular operative edge at one end and flat sides inwardly tapered from a flat base of polygonal outline to form a waist, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure and a wedging pin engaging an axial hole in the cutter and a hole in the holder which is slightly nearer than the one in the cutter to the undercut shoulder when the cutter is in contact therewith, substantially as and for the purpose specified.

5. In a metal cutting tool the combination of a cutter having a flat base of polygonal outline and sides inwardly tapered from the base to form a waist with the corners between the tapered sides removed between the waist and base, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure and a wedging pin engaging an axial hole in the cutter and a hole in the holder which is slightly nearer than the one in the cutter to the undercut shoulder when the cutter is in contact therewith, substantially as and for the purpose specified.

6. In a metal cutting tool the combination of a cutter having an operative edge at one end and its sides tapered inwardly to form a waist nearer to its base than to its operative edge, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure of less height than the axial length of the cutter, and a wedging pin engaging an axial hole in the cutter and a hole in the holder which is slightly nearer than the one in the cutter to the undercut shoulder when the cutter is in contact therewith, substantially as and for the purpose specified.

7. In a metal cutting tool the combination of a cutter having a circular operative edge at one end and flat sides inwardly tapered from a flat base of polygonal outline to form a waist with the corners between the tapered

sides removed between the waist and base, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure and a wedging pin having a cylindrical portion sliding in a cylindrical hole in the cutter and a tapered portion engaging a tapered hole in the holder to lock the cutter waist in engagement with the shoulder, the tapers of the wedging pin and of the hole in the holder being formed to provide a clearance between them in the locking position on the side adjacent to the shoulder, substantially as specified.

8. In a metal cutting tool the combination of a cutter having its sides converging from both ends to form a waist intermediate the ends, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure and a wedging pin having a cylindrical portion sliding in a cylindrical hole in the cutter and a tapered portion engaging a tapered hole in the holder which is slightly nearer than the one in the cutter to the undercut shoulder when the cutter is in contact therewith in a locking position, the tapers of the wedging pin and of the hole in the holder being formed to provide a clearance between them in the locking position on the side adjacent to the shoulder, substantially as specified.

9. In a metal cutting tool the combination of a cutter having an operative edge, a flat base of polygonal outline and sides inwardly tapered from the base to form a waist nearer to its base than to its operative edge with the corners between the tapered sides removed between the waist and base, a holder having an undercut shoulder fitting the cutter waist and disposed to take both the thrust of the tool feed and the tilt of the tool due to cutting pressure of less height than the axial length of the cutter, and a wedging pin having a cylindrical portion sliding in a cylindrical hole in the cutter and a tapered portion engaging a tapered hole in the holder which is slightly nearer than the one in the cutter to the undercut shoulder when the cutter is in contact therewith in a locking position, the tapers of the wedging pin and of the hole in the holder being formed to provide a clearance between them in the locking position on the side adjacent to the shoulder, substantially as specified.

In testimony whereof I hereunto affix my signature.

JOHN ARCHER.