April 24, 1945. M. F. MARINI 2,374,552

COUNTERSINKING TOOL

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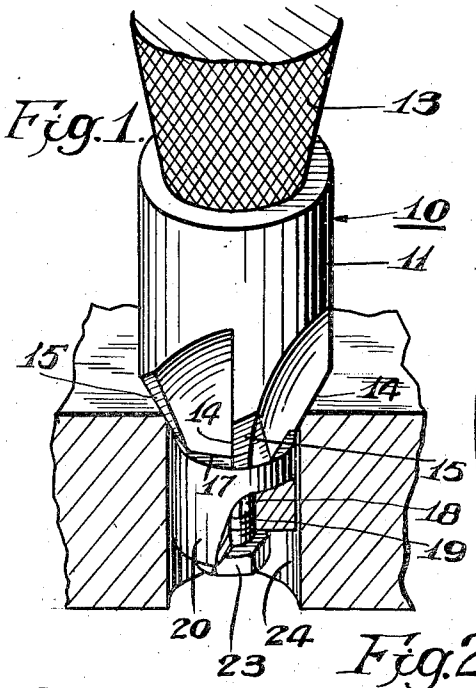


Fig. 1.

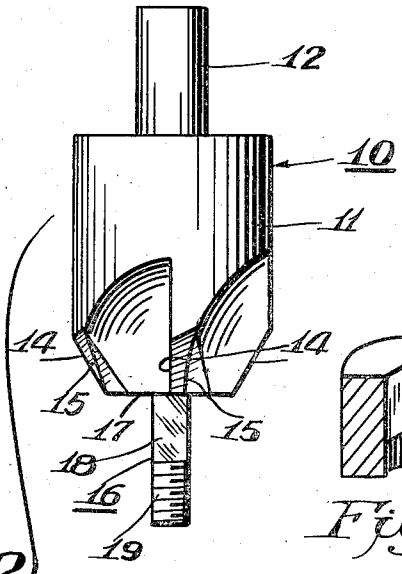


Fig. 2.

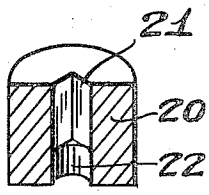


Fig. 4.

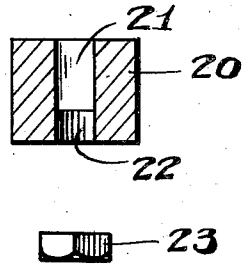
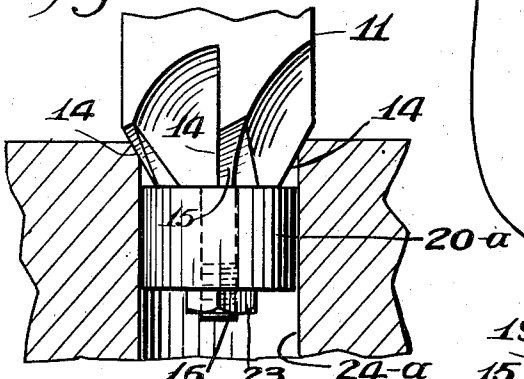


Fig. 5.



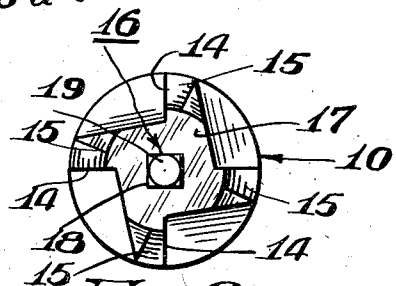


Fig. 3.

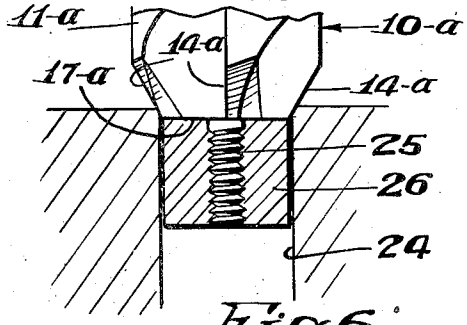


Fig. 6.

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COUNTERSINKING TOOL

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2 Claims. (Cl. 77—73.5)

The present invention relates to countersinking tools or reamers and it relates more particularly to a new and improved countersinking tool or broaching bit.

An object of the present invention is to provide a new and improved countersinking tool or reamer or broacher. Another object of the present invention is to provide a new and improved countersinking tool or reamer or broacher which will be positively guided in the hole being worked.

Other objects and advantages of the present invention will be apparent in the following detailed description, appended claims and accompanying drawing.

Conventional countersinking tools or reamers or broachers heretofore employed have had the disadvantage of being free to shift laterally during the countersinking operation so that the bevel formed very often is not uniform and is off-center relative to the axis of the hole.

Accordingly, the present invention contemplates a new and improved countersinking tool or reamer or broacher which will be positively guided axially of the hole so that the final bevel formed will be accurate and properly centered.

Generally speaking, the present invention comprehends a countersinking tool having inclined cutting-edges of appropriate taper and having a guide detachably connected forward of the cutting-edges; the guide being adapted to fit within the hole with slight clearance so as to prevent wobbling or other lateral movement of the cutting-edges during the countersinking operation. The present invention further contemplates the use of a plurality of different-diametered guides whereby the same broacher can be used for different-sized holes.

For the purpose of illustrating the invention, there are shown in the accompanying drawing forms thereof which are at present preferred, since the same have been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and that the invention is not limited to the precise arrangements and organizations of the instrumentalities as herein shown and described.

Referring to the accompanying drawing in which like reference characters indicate like parts throughout:

Figure 1 represents a perspective view of one embodiment of the present invention as it appears in use; parts being broken away better to reveal the construction thereof.

Figure 2 represents an exploded elevational view of the embodiment of Figure 1.

Figure 3 represents a bottom plan view of the countersinking tool of Figure 2, as it appears when the guide and nut are removed.

Figure 4 represents a view partly in perspective and partly in cross-section of the guide of Figures 1 and 2.

Figure 5 represents a fragmentary view partly in elevation and partly in cross-section showing the countersinking tool of Figure 1 as it appears in use in a larger-diametered hole and with a larger-diametered guide.

Figure 6 represents a fragmentary view partly in elevation and partly in cross-section showing another embodiment of the present invention as it appears in use.

Referring now more particularly to Figures 1 to 4 inclusive, I may provide a counterbore or broacher indicated generally by the reference character 10. The counterbore 10, which may be of hardened tool steel or the like, includes a generally cylindrical body portion 11 having a reduced shank 12 extending upwardly therefrom; the shank 12 being adapted detachably to be gripped by the chuck 13 of a drill-press or the like (not shown).

A plurality (for example four) of tapered cutting-edges 14 are formed at the lower end of the body portion 11; the cutting-edges 14 being relieved as at 15 in conventional manner.

A post 16 extends from the forward or lower face 17 of the body portion 11 generally along the axis of said counterbore 10. The post 16 (which has a relatively small transverse dimension) has a square (or other non-circular) stem portion 18 which is nearest the body portion 11 and an externally screw-threaded stem portion 19 formed at the outer end of the square portion 18; the sides of the square portion 18 being formed as generally tangential extensions of the screw-threaded portion 19 as shown particularly in Figure 3.

A generally cylindrical guide 20 is adapted to be removably mounted upon the post 16 of the counterbore 10. The guide 20 is axially apertured; the aperture having a square cross-section as at 21 (adapted to fit snugly about the square portion 18 of the post 16) and having a circular cross-section at its lower or outer end as at 22 (adapted to fit about the screw-threaded portion 19 of said post 16 with a slight clearance).

The guide 20 has an axial dimension somewhat less than the length of the post 16 so that, when the guide is fitted upon the post, enough of the screw-threaded portion 19 of said post 16 will protrude to permit a nut 23 to be screw-threadedly mounted thereon to lock the guide 20 in position as shown in Figure 1. In the embodiment of Figures 1 to 5, the guide 20 has a diameter generally the same as the baximum diameter of the lower face 17 of the counterbore 10; this diameter being very slightly less than the diameter of the opening to be countersunk.

Thus, when the countersinking tool of the present invention is inserted within the hole or opening 24 to be reamed or broached or countersunk as shown in Figure 1, the guide 20 thereof will fit snugly within said opening 24 with relatively slight clearance. Thus, the forward or working end of the countersinking tool will be kept from wobbling or other undesirable lateral movement or shifting during the countersinking operation and will be maintained in position generally axially of the opening so that the bevel formed thereby will be accurate and uniform throughout.

It is apparent that the counterbore 10 of Figure 1 can be used to countersink a plurality of different-diametered openings due to the upward and outward flare of the cutting-edges 14. That is, with relatively smaller-diametered openings (i. e. openings only slightly larger in diameter than the lower face 17), the bevel will be formed by the lower smaller portions of the cutting edges 14 while with relatively larger-diametered openings (i. e. openings slightly smaller in diameter than the maximum diameter of the body portion 11), the bevel will be formed by the larger uppermost portions of the cutting edges 14.

Thus, where the countersinking tool is to be used in the relatively smaller-diametered opening 24 as stated hereinabove, the guide employed will be like that shown in Figures 1, 2, and 4; that is, a guide having generally the same diameter as the lower face 17 as stated hereinabove.

When, on the other hand, the countersinking tool is intended to be used in a larger-diametered opening 24—*a* as shown in Figure 5, a larger-diametered guide 20—*a* is employed; the guide 20—*a* having a diameter greater than that of the face 17 and slightly less than that of the opening 24—*a* so that, again, the countersinking tool is maintained in proper axial alignment with the opening during the forming of the bevel by the upper portions of the cutting-edges 14.

In Figure 6 I have shown another embodiment of the present invention. The embodiment of Figure 6 includes a counterbore 10—*a* having a body portion 11—*a*, cutting edges 14—*a* and a lower face 17—*a* similar to those described in connection with the embodiment of Figure 2 but having an axial post 25 extending downwardly from the face 17—*a*. The post 25 is externally screw-threaded generally through its length with a right-hand thread.

Upon the post 25 there is adapted to be detachably mounted a guide 26 which is provided with an axial internally screw-threaded opening adapted to receive said post 25. It is apparent that right-hand rotation of the countersinking tool during the counterboring operation will tend to tighten the guide 26 upon the post 25.

While the guide 26 of Figure 6 has a diameter generally the same as that of the lower face 17—*a*, so that the countersinking tool is adapted for use with the smaller-diametered opening 24 as shown in Figure 6, it is apparent that the guide 26 could be made with a larger diameter to permit the countersinking tool to be used in the larger-diametered opening 24—*a*.

The novel countersinking tool of the present invention is adapted quickly and easily to form bevels or chamfers in openings as described hereinabove and also to remove burrs on the inner edge of holes such as might be formed, for instance, in cutting pipes or the like.

The size and shape of the cutting-edges can be varied considerably. Thus, for example, the cutting-edges may be made with a 60° taper as shown in the drawing or, instead, may be made with a 45° taper or a 65° taper or any other desired taper. The number of cutting-edges and the shape thereof may also be varied through wide limits depending upon the type of operation to be done and the nature of the material to be worked.

The countersinking tool of the present invention, when used with a proper-diametered guide, is positively centered in the opening and insures an even chamfer or bevel and even removal of burrs regardless of whether it is manipulated by a drillpress or a brace-and-bit or any other suitable tool.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiments be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having thus described the invention, what I claim as new and desire to protect by Letters Patent is:

1. A countersinking tool or the like comprising a generally cylindrical body portion, reduced shank extending axially rearward from said body portion and adapted to be gripped by a chuck or the like for rotation of said tool, a plurality of circumferentially-spaced tapered cutting-edges formed at the forward end of said body portion, said cutting-edges being adapted to form a bevel at the end of a hole or the like when said tool is axially rotated, a reduced post extending axially from the forward end of said body portion, said post having a non-circular portion, a generally cylindrical axially-apertured centering-guide adapted non-rotatably to fit over said non-circular portion, and means for fastening said centering-guide upon said post, said centering-guide being adapted to enter said hole ahead of said cutting-edges and having a diameter slightly less than that of the hole, whereby it will center said tool generally axially of said hole during the cutting operation and will tend to prevent lateral shifting of said cutting-edges.

2. A countersinking tool or the like comprising a generally cylindrical body portion, a reduced shank extending axially rearward from said body portion and adapted to be gripped by a chuck or the like for rotation of said tool, a plurality of circumferentially-spaced tapered cutting-edges formed at the forward end of said body portion, said cutting-edges being adapted to form a bevel at the end of a hole or the like when said tool is axially rotated, a reduced post extending axially from the forward end of said body portion, said post having a generally polygonal cross-section adjacent said body portion and being screw-threaded at its outer end, a generally cylindrical axially-apertured centering-guide adapted non-rotatably to fit over the polygonal portion of said post, and a nut adapted screw-threadedly to engage with the end of said post and to lock said centering-guide thereon, said centering-guide being adapted to enter said hole ahead of said cutting-edges and having a diameter slightly less than that of the hole, whereby it will center said tool generally axially of said hole during a cutting operation and will tend to prevent lateral shifting of said cutting-edges.

MARIO F. MARINI.