

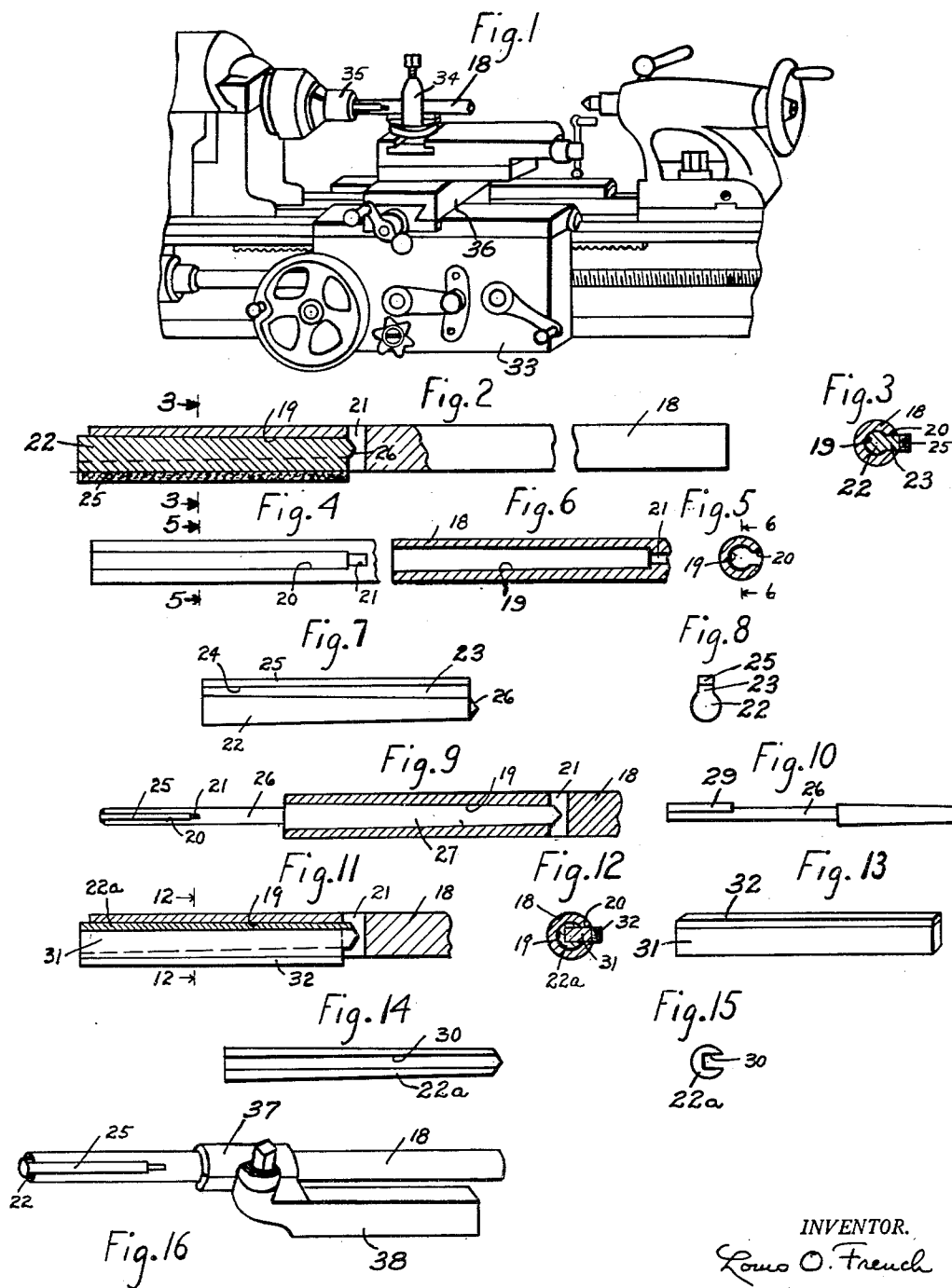
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L. O. FRENCH

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HONING TOOL

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HONING TOOL

Louis O. French, Milwaukee, Wis.

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The invention relates to a honing tool.

Honing equipment for internal bores includes a honing machine, adapters, mandrels, and wedges in addition to the stones and for external cylindrical surface honing relatively expensive stone holders and guides in addition to the stones, which equipment is too expensive for the ordinary home workshop owner or small machine shop to acquire for occasional use thereof. The object of the present invention is to provide a simple and inexpensive honing tool for mounting on the carriage of any standard metal cutting lathe and used in a manner similar to a boring tool for honing internal bores, straight or taper, and in the manner of a lathe cutting tool for honing exterior diameters, either straight or taper, or the end surfaces of work carried by the head stock spindle of the lathe, and especially to provide a tool which will readily hone blind hole bores or external surfaces, one of whose ends terminates at a shoulder, and for truing up concentric bores of varying diameters. Thus the honing tool hereafter described can be used to do several different kinds of finishing operations, each of which are ordinarily done with separate equipment and some of which cannot be done with the usual honing equipment.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a perspective view of a portion of a metal cutting lathe showing a honing tool embodying the invention in operative position thereon;

Fig. 2 is a plan view of the tool, parts being shown in a center section along a horizontal plane and parts being broken away;

Fig. 3 is a detailed vertical sectional view taken along the section line 3—3 of Fig. 2;

Fig. 4 is a side elevation view of the front end of the holder;

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a vertical sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a side elevation view of one of the honing stones;

Fig. 8 is a front end view of the stone shown in Fig. 7;

Fig. 9 is an elevation view of the tool showing certain modifications of the holder, parts being shown in section;

Fig. 10 is a modified form of hone member;

Fig. 11 is a view similar to Fig. 2 showing certain modifications;

Fig. 12 is a detailed vertical sectional view taken on the line 12—12 of Fig. 11;

Fig. 13 is a perspective view of the honing stone shown in Fig. 11;

Fig. 14 is a side elevation view of the auxiliary stone base used in Fig. 11;

Fig. 15 is a front end view of the base shown in Fig. 14;

Fig. 16 shows the honing tool mounted in a holder adapted to be connected to the tool post of a metal cutting lathe.

Referring to Figs. 1 to 8, the honing tool comprises a holder in the form of a metal bar 18 of cylindrical or polygonal cross section which may be of the same or different cross-sectional area throughout its length. The bar 18 has a tapered bore 19, of a standard taper pin bore size, extending inwardly from one end and having its central axis aligned with the longitudinal central axis of

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the bar, a slot 20 extending from said bore to the outer side of said bar, and a transversely extending slot 21 intersecting the back or inner end of the bore 19. The slot 21 may be of the same width or somewhat less than the width of the slot 20 and is aligned therewith.

The honing stone comprises a base and a stone formed of abrasive composition secured to said base. The base is in the form of a standard taper pin 22 adapted to snugly engage in the bore 19 and having a tongue, rib or key 23 extending lengthwise thereof from one side of the pin and of a width to slidably fit in the slot 20, said tongue having an outer surface 24 to which the stone 25 is attached by a suitable bonding adhesive, which surface is parallel to the longitudinal axis of the bar 18. The stone 25 projects from the slotted side of the bar 18 and extends substantially the length of the pin 22 whose large end may project more or less from the front end of the holder. The base is preferably formed as a die casting of zinc casting composition or other suitable metal. The stone member may, after insertion in the holder, be given a light tap on its front end to firmly seat the pin 22 and may be removed by the insertion of a wedge or drift member (not shown) into the slot 21 with its tapered side engaging the end 26 of the pin and be given a tap to release said pin from the bore 19 and force it outwardly therefrom.

For accommodating the different sizes of internal bores to be honed, several holders of different diameters may be provided. For example, a holder of three-eighths of an inch in diameter at the stone receiving end with its stones may be used on holes from one-half to one inch or more in diameter, a holder of five-sixteenths of an inch in diameter at the stone receiving end with its stones may be used on holes from three-eighths to one-half inch and a holder of three-sixteenths of an inch in diameter at the stone receiving end with its stones may be used on holes from one-quarter to three-eighths inch. For holes from three-sixteenths of an inch in diameter to one-eighth an auxiliary holder 26, shown in Fig. 9, having a tapered end 27 to fit the socket 19 of a larger size holder may be used. This holder 26 has a taper pin socket at its outer reduced end to receive a smaller stone of the same kind as that previously described. For holes smaller than an eighth of an inch in diameter, the holder 26 may have the stone 29 directly bonded to its outer end, as shown in Fig. 10.

In the larger sizes of holders, instead of forming the pin 22 as an integral part of the stone base, it may, as shown in Figs. 14 and 15, be formed as a separate steel taper pin 22a with a lengthwise extending slot 30 of a normal width substantially that of the width of the slot 20 and adapted to receive the lower portion of the rectangular die cast base part 31 for the stone, shown in Fig. 13, whose upper portion extends up through the slot 20 in the same way as the tongue 23 of the first form and whose top surface has the abrasive element 32 bonded or secured thereto. For the size of the pin 22a used, the width of the slot 30 is such that when the pin with the stone positioned therein is forced into the tapered bore 19 of the holder, the holder will act to slightly contract the sides of the slot 30 into binding contact with the base part 31 of the stone at one or more points along its length and thus hold the stone in the holder.

The honing tool above described has been designed for mounting in a holder mounted on the carriage 33 of a metal cutting lathe so that the tool will move with the carriage. As shown in Fig. 1, the bar 18 is clamped in the tool post 34 on the upper part of the carriage in the same way that a boring bar or lathe tool is secured in position, and when so clamped, the stone may be used for honing internal bores or for honing external cylindrical surfaces with the stone bearing against the work 35 mounted in the head stock spindle of the lathe or the tool may be disposed at right angles to an end face of the work to finish this face using the cross carriage feed, if desired. Also as previously noted, the hone may be used on work having differential coaxial diameters with one setting of the work by bringing it into contact with these bores through the proper adjustment of the cross slide 36 of the lathe carriage. Instead of clamping the holder directly to the tool post, it may be mounted in a clamping

collar 37 forming a part of a holder 38 which in turn is adapted to be clamped in the tool post holder of the lathe.

As the stone member is mounted at the outer end of the bar holder and is held against lengthwise and rotary movement relative thereto and the abrasive element extends to the outer end of said holder, it is especially adapted for finishing blind hole bores. Furthermore, since the adjustment of the stone position in the bore is not dependent on wedges or similar means but on the adjustment of the cross slide of the lathe, one holder takes care of a very wide range of bores so that the cost of the equipment is considerably reduced over known forms.

I desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except in so far as such limitations are included in the claims.

What I claim as my invention is:

1. A honing tool comprising a metal bar provided with a tapered bore extending lengthwise of and inwardly from one end thereof with its central axis normal to said end and a slot extending radially from said bore to the outer side of said bar, a stone member having a tapered pin portion to firmly fit said bore, a tongue portion to slidably fit said slot, and an abrasive portion extending laterally from and lengthwise of said bar and substantially the length of said pin portion.

2. A honing tool comprising a solid metal round bar provided with a tapered bore extending lengthwise of and inwardly from one end thereof in axial alinement with the longitudinal axis of said bar and a slot extending radially from said bore to the outer side of said bar, an abrasive element having a rectangular honing surface, and means for detachably mounting said element on said bar to dispose said surface laterally of and lengthwise of said bore and beyond its front end including stone base portions engaging said bore and said slot and extending beyond the front end of said bore.

3. The honing tool as defined in claim 1 in which the bar has a slot extending transversely thereof at the back end of said bore for the insertion of a member to release said stone member.

4. In a honing tool, a stone member comprising a base portion in the form of a tapered pin having a radially disposed tongue portion extending substantially the length thereof and tapered to provide a flat supporting surface extending parallel to the axis of said pin and of the width of said tongue, and an abrasive element secured to said surface and of substantially the width of said tongue.

5. A honing tool comprising a solid metal bar provided with a tapered bore extending lengthwise of and inwardly from one end thereof in axial alinement with the longitudinal axis of said bar, and a stone member having an exposed abrasive surface and a base portion substantially coextensive in length with said surface and including a tapered pin in plugging engagement with said tapered bore.

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