Aug. 1, 1944. C. F. STAPLES 2,354,890

HONING MANDREL

Filed July 3, 1943

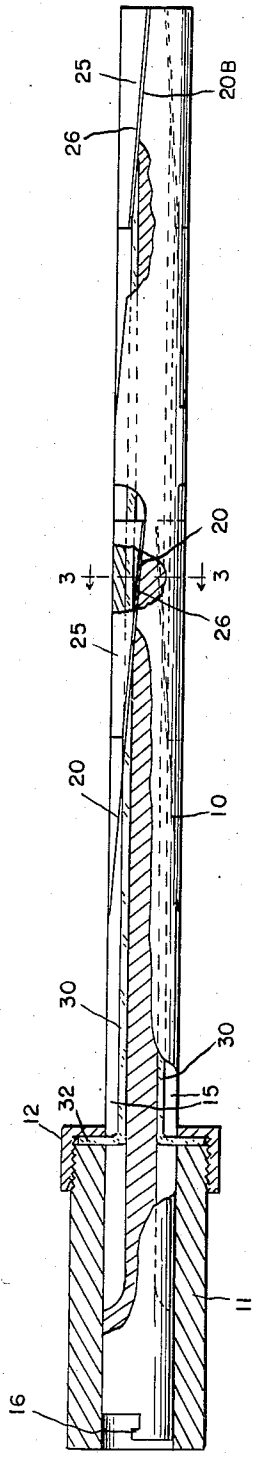


FIG. 1.

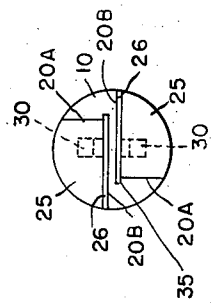


FIG. 4.

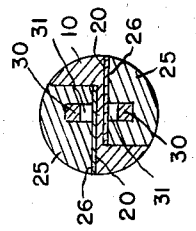


FIG. 3.

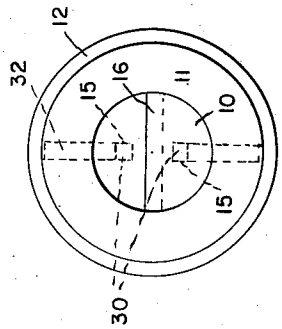


FIG. 2.

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HONING MANDREL

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8 Claims. (Cl. 51—184.3)

The present invention relates to honing devices and specifically to devices for honing and finely finishing the inner surfaces of holes previously bored or otherwise produced.

Among the objects of the invention is a honing device adapted particularly for holes of considerable length and, since such holes are often not exactly straight, adapted to straighten such holes.

Another object is an abrasive stone which is of such form that it will have greatly increased useful life much longer than the forms of stone heretofore used.

Still other objects will readily occur to those skilled in the art upon reference to the following description and the accompanying drawing in which

Figure 1 is a side elevation of the honing mandrel with parts in section.

Figure 2 is an elevation of the left end of Figure 1.

Figure 3 is a section on line 3—3 of Figure 1.

Figure 4 is a view from the right of Figure 1.

As indicated in the drawing, the invention relates to honing mandrels of a type for use with honing machines such as those shown in Sunnen patent, No. 1,913,689, or Gjertsen patent, No. 2,268,479, which patents illustrate machines designed to rotate abrasive-stone carrying mandrels at high speed while work to be honed is moved over them. Such machines are also provided with means for adjusting the stones by the relative movement of the stones and the mandrels.

In the present invention, the mandrel consists of a shaft 10, one end of which is surrounded by a short sleeve 11 provided with threads at its forward end for the reception of a cap 12, through which also the shaft 10 extends. The shaft 10 is provided with two narrow slots 15 extending from near the rear end to the two cam slopes mentioned below and the said rear end is provided with a hook 16 adapted to cooperate with means by which the shaft 10 and sleeve 11 may be moved relatively.

Between sleeve 11 and the forward end of the shaft are a plurality of cam slopes 20 (four being shown) these being produced by milling out diametrically opposite quarters of the shaft, the bottoms of the cuts, parallel to a horizontal diameter, being slanted down to a line a little above said diameter, while the sides, parallel to a vertical diameter are located somewhat beyond said vertical diameter.

In Figure 4 is a view of the forward end of the shaft 10, showing the cuts and showing the location of their side walls 20A and the ends of the sloping cam bottoms 20B. The cam slopes 20 intermediate the ends of the shaft are spaced somewhat from those at the end of the shaft, but in line therewith so that the slots 15 open into the spaces above.

These cam slopes 20 and the corresponding cut away portions are for the reception of abrading stones or hones 25, each of which is cemented to a metal plate 26 and each of which is shaped to conform with the cut away portion of the shaft and have a partially cylindrical surface as shown.

In other words, the stones in cross section appear substantially as a quadrant of a circle but somewhat wider and somewhat shallower than a true quadrant. Further the stones taper in depth to conform with the cam slopes but maintain the same curvature of outer wall.

In order that the stones 25 on their plates 26 may be slid up or down the cam slopes 20, hooked rods 30, of such size as to lie in the slots 15 are welded or otherwise secured to the plates 26, the intermediate stones being grooved underneath as at 31 to permit the rods 30 to extend to the forward stones.

The rear ends of rods 30 are hooked as shown at 32 so that they may lie under or behind the cap 12 and be thus fixed to sleeve 11. By this means, when the shaft 10 and sleeve 11 are relatively moved, the stones are moved up or down the cam slopes 20 and thereby moved out or in with respect to the shaft.

Further, in order to maintain the stones against flying out of their respective quadrants, narrow undercuts 35 are provided at the bottoms of walls 20A and the stones cemented to plates 26 in such fashion as to allow the corresponding edges of the plates to project a short distance into the undercut.

It should be noted that the forward stones should be spaced a relatively considerable distance from the intermediate stones in order that their honing zones be spaced, it being of course, understood that work being honed is moved back and forth longitudinally of the shaft. Because of this fact and because of the relatively short stones, holes having axes not exactly straight may be honed true.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the fore-

going description to indicate the scope of the invention.

I claim:

1. A honing mandrel for honing machines consisting of a sleeve, a shaft slidably mounted therein, said shaft having diametrically opposed quarters thereof cut out to provide notches each having one wall parallel to a radius of the shaft and having its other wall sloping upwardly and longitudinally of the shaft, a pair of stone holders slidable on said sloping surfaces and having abrasive stones mounted thereon, means to prevent movement of said holders outwardly from said sloping surfaces, means to fix the relative position of said sleeve and stone holders, and means by which said sleeve and shaft may be relatively moved.

2. A honing mandrel for honing machines consisting of a sleeve, a shaft slidably mounted therein, said shaft having at its free end diametrically opposed quarters thereof cut out to provide notches each having one wall parallel to a radius of the shaft and having its other wall sloping upwardly and longitudinally of the shaft, a second pair of similar notches in alignment with the first but spaced therefrom longitudinally of the shaft, a stone holder slidable upon each of the sloping surfaces and having an abrasive stone mounted thereon, means to prevent movement of said holders outwardly from said sloping surfaces, means to fix the relative position of said sleeve and stone holders, and means by which said sleeve and shaft may be relatively moved.

3. An abrasive stone for honing devices, said stone in cross section presenting the appearance of substantially a quadrant of a circle, one flat face of which lies outside of a quadrant-defining radius and parallel thereto and the other flat face lies within the quadrant defining radius and parallel thereto.

4. An abrasive stone for honing devices, said stone at one end presenting the appearance of substantially a quadrant of a circle, one flat face of which lies outside of a quadrant-defining radius and parallel thereto, and the other flat face lies within the quadrant defining radius and parallel thereto, the surface defined by the latter flat face sloping outwardly toward the arc of said quadrant.

5. An abrasive stone for honing devices, said stone in cross section presenting the appearance of substantially a quadrant of a circle, one flat face of which lies outside of a quadrant-defining radius and parallel thereto, and the other flat face lies within the quadrant-defining radius and parallel thereto and showing a rectangular notch in the latter flat face.

6. An abrasive stone for honing devices, said stone at one end presenting the appearance of substantially a quadrant of a circle, one flat face of which lies outside of a quadrant-defining radius and parallel thereto, and the other flat face lies within the quadrant defining radius and parallel thereto, the surface defined by the latter flat face sloping outwardly toward the arc of said quadrant, there being a longitudinal notch in said latter flat face having its bottom parallel with the outer curved surface.

7. In a honing mandrel for honing machines in which said abrasive stones in holders are mounted for longitudinal and radial movement in open longitudinal channels in said mandrel and thereby tend to be thrown out of said channels when said mandrel is rotated, means for retaining said stones and holders in said channels, said means comprising a projecting portion on the stone-holder assembly extending at substantially right angles to the direction of said centrifugal force and means carried by one wall of said channel and adapted to coact with said projecting portion to retain said assembly in said channel.

8. In a honing machine, a honing mandrel comprising a shaft supported from one end in said machine, and provided with notches extending longitudinally of said shaft and in longitudinal alignment, said notches each being in the form of substantially a quadrant of the circle of said shaft and having one of its walls sloping outwardly, said shaft being provided also with a slot extending from the supported end through the adjacent notch to the notch adjacent the free end of said shaft, abrasive stones in said notches, said stones being affixed to holders coacting with said sloping walls, means for maintaining said stones and holders against said sloping walls against the action of centrifugal force when said mandrel is rotated and means in said slot for fixing in suitable spaced relation aligned stones and holders and for moving said spaced stones and holders longitudinally relative to said shaft.

CHARLES F. STAPLES.