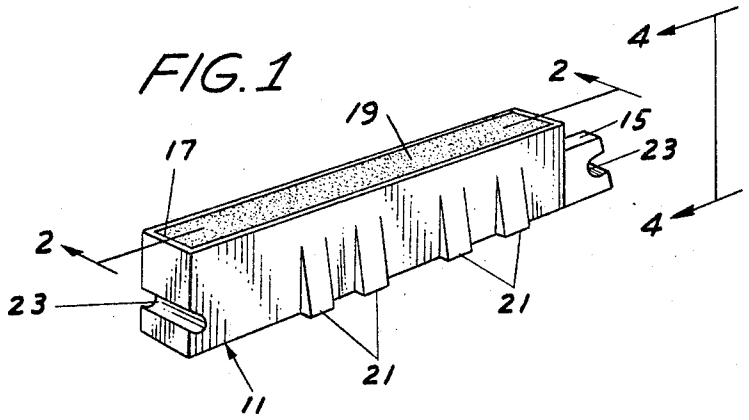
Aug. 9, 1966 D. D. DUESENBERG 3,264,789

HONING STONE HOLDER

Filed Oct. 17, 1963

FIG. 1



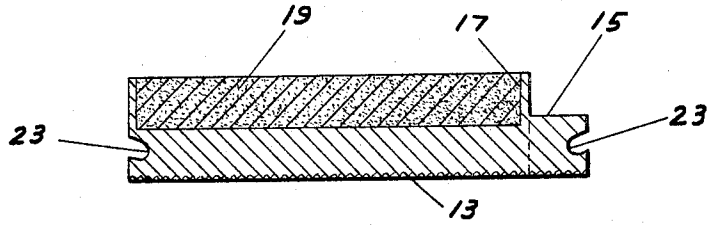


FIG. 2

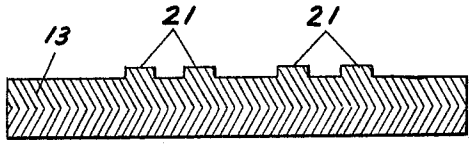


FIG. 3

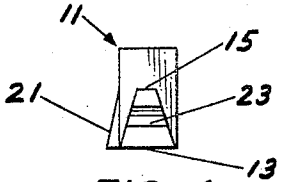


FIG. 4

INVENTOR
DENNY D. DUESENBERG
BY John R. Faulkner
Olin B. Johnson
ATTORNEYS

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HONING STONE HOLDER

Denny D. Duesenberg, Grosse Ile, Mich., assignor to Ford Motor Company, Dearborn, Mich., a corporation of Delaware

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This invention relates to novel holders for honing stones or abrading elements employed for the honing of the interior surfaces of previously formed holes or apertures. In particular, this invention relates to honing stone holders for use with a honing arbor or mandrel in the machining of cylindrical surfaces, such as cylinder castings and the like.

A wide variety of rotary honing devices are known to the art which retain a plurality of abrading elements circumferentially disposed in relation to a central shaft, arbor or mandrel with positioning means interposed therebetween to move the abrading elements radially outward to forcefully engage the workpiece upon which the same are rotated for honing and to return such elements when desired to an inoperative position. Typical examples of such devices are those disclosed in U.S. Patents 1,850,847, 2,265,377, 2,419,136 and 2,799,127. This invention is concerned with the immediate and expendable holders which retain the abrading elements and which in turn are detachably engaged by the arbor and/or its appurtenances.

The honing stones commercially available commonly have dimensional variances of as much as 0.005 inch. If the face of a stone is brought into contact with the workpiece without provision for such dimensional variances, a portion of the face must be worn down to admit of full face contact with the workpiece. Honing under these conditions can impart an uneven taper to the bore.

One object of this invention is to provide a honing stone holder that is self-adjustable under normal honing pressures so as to immediately provide essentially full face contact of the abrading element with the workpiece.

A second object of this invention is to provide a honing stone holder of improved design that will signal through wear the need for stone replacement when the height of the abrading element has decreased to a predetermined minimum.

These, together with other objects, will become apparent from a consideration of the accompanying drawings and from the following detailed description. In the drawings:

FIGURE 1 is a perspective view of an expendable stone holder designed in accordance with this invention with an abrading element in place therein;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1 illustrating the relative positions of the lower surface of the abrading element and the upper surface of the signal ledge;

FIGURE 3 is a bottom view of the holder shown in the previous figures illustrating one embodiment of the pressure sensitive knurled surface through which compensation is effected to offset dimensional variances in the abrading element; and

FIGURE 4 is an end view of the holder taken along line 4—4 associated with FIGURE 1.

Referring now to the drawings there is shown an integrally formed stone holder or shoe **11** which is substantially rectangular in configuration. Holder **11** has a knurled base **13** and a projecting lug, platform, or ledge **15**, the functions of which are hereinafter described in greater detail. Holder **11** is provided with a rectangular channel or cavity **17** in which is seated an abrading element or stone **19**. In a more positive sense, the stone **19** may be viewed as located within a thin walled incasement supported by the body of the holder. The stone **19** is

held within the cavity **17** by a suitable adhesive or by other means suitable to hold such element securely in position. Holder **11** in this embodiment is equipped with engaging means including a plurality of lugs **21** and end slots or grooves **23** whereby the holder is detachably secured to a honing arbor and/or its appurtenances. It will be understood by those skilled in the art that such engaging means as well as the shape and size of the holder can be modified within the scope of this invention to meet the individual requirements of the honing device for which its use is intended.

The holder **11** is formed of a suitable soft metal or alloy, e.g., aluminum. In honing the walls of the incasement surrounding the sides of the stone **19** are abraded away with the stone and hence must be of a material that will not cut or otherwise mar the surface of the workpiece. The bottoms of the walls of the incasement are contiguous with the body member and the tops define an aperture through which the stone is inserted. In this embodiment the holder is of unitary construction and is formed, i.e., cast, machined, etc., such that the bottom surface of the cavity is located a short distance below the upper surface of the projecting ledge or platform **15**. The ledge **15** is laterally disposed with relation to the incasement for the stone and may be viewed as an extension of the central body member. Thus, the bottom of the stone **19** is seated this predetermined distance below the level of the upper surface of such ledge. As the stone is worn down to a level even with the upper surface of ledge **15**, abrasion of such surface is initiated. The resulting change of appearance in the upper surface of the ledge thus provides a visual sign that the expenditure of the given stone is nearing completion. Since each holder of the set employed in the holding device can be of the same design, warning is available to the operator of the near exhaustion of the first stone of the set to be expended. The undesirabliity of continued honing after one or more of the stones is exhausted is self-evident.

Referring now particularly to FIGURE 3, there is shown one embodiment of the knurled base **13** of the holder **11**. In this embodiment the entire base of the holder is serrated in a substantially V-shaped pattern. The type, pattern and size of the knurl can be varied in accordance with the pressure surface afforded by the honing device whereby the holder with its incased stone is forced against the workpiece. The seating is essentially permanent in that the serrated base is irrecoverably compressible, i.e., does not return to original form when pressure is released.

To seat the stone in accordance with this invention the face of the stone is brought into contact with the workpiece or an equivalent surface with the base of the holder securely held in normal honing alignment. Pressure at least as great as normal honing pressure is evenly applied to the base of the holder causing the knurled base of the holder to be flattened in proportion to the magnitude of the forces of compression at each point on the base. Hence, the depression of the knurl at any point is directly proportional to the height of stone in line with such point, height being measured along a line segment extending from the center of the arbor to the workpiece surface. Similar dimensional variances in the holder are likewise compensated for with this seating.

Thus, one preferred embodiment of the holder may be viewed as having a central body member resting upon a knurled base and having a side opposite and parallel to the base which supports both the walls for incasing the stone and laterally disposed therefrom the wear signal protrusion which is positioned slightly above the lower surface of the stone. In such embodiment the walls which provide lateral support for the stone encompass a major por-

tion or area of the side opposite the base while the wear signal area is significantly smaller.

The seating of the stone can be effected either statically or in normal honing rotation. The pressure sensitive, self-adjusting base thereby causes the full force of the stone to cut immediately without waiting for the stone to wear into full length contact.

Having thus described the invention with particularity, it is obvious that modifications can be made in the same without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. An expendable holder for an abrading element of a honing device comprising an integrally formed structure including a body member having an irrecoverably compressible, knurled base and a side opposite said base supporting an incasement adapted to receive an abrading element, said incasement defining an aperture opposite said base through which said abrading element can be inserted into said incasement.

2. An expendable holder for an abrading element of a honing device comprising an integrally formed metal structure including a body member having an irrecoverably compressible, knurled base and a side opposite said base having a cavity opening opposite said base and adapted to receive and substantially incase the bottom of an abrading element, said base being adapted to compensate for variances in the height of the several portions of said element by equalizing through compression forces exerted upon said base through said element when pressure is applied evenly to said base and said body member is forced against the bottom of said element.

3. An expendable holder for an abrading element of a rotary honing device comprising an integrally formed metal structure including a body member having an irrecoverably compressible serrated base and a side opposite said base adapted to receive and retain an abrading element, said base providing means for equalizing at a plurality of points the combined height of said holder and said element by adjusting said holder for variances in the height of said element through compression of the corresponding portions of said base to a degree directly proportional to forces applied to said base through said element.

4. An expendable holder for an abrading element of a honing device comprising an integrally formed metal structure including a body member having an irrecoverably compressible serrated base and a side opposite and parallel to said base, said side opposite supporting a thin walled incasement adapted to receive an abrading element, said base being constructed and arranged to be compressed in proportion to pressures exerted upon said base along lines perpendicular to said base and said side opposite thereby providing means for equalizing the combined height of said holder and said element at a plurality of separated points intermediate the boundaries thereof to compensate for variance in height of said element.

5. A holder for an abrading element of a rotary honing device comprising a structure including a body member having a base and a side opposite said base, said side having a first and major area and a second and minor area, said major area supporting an incasement having walls constructed and arranged to receive an abrading element therebetween, said walls having bottoms contiguous with said side and tops defining an aperture through which an abrading element can be passed into said incasement, the portion of said minor area farthest removed from said base being situated a greater distance from said base than said wall bottoms and a lesser distance than said wall tops, said portion being constructed and arranged to be abraded by contact with a workpiece when said holder is in operative alignment with said honing device and said abrading element has been worn to the level of said portion.

6. A holder for an abrading element of a rotary honing device comprising an integrally formed, unitary metal structure including a body member having an irrecoverably compressible, knurled base and a side opposite said base, said side opposite supporting an incasement and a platform, said incasement having walls constructed and arranged to receive an abrading element therebetween, at least one of said walls having a bottom contiguous with said side opposite and a top defining one side of an aperture through which an abrading element can be passed to contact and rest upon said side opposite, said platform being laterally disposed in relation to said incasement and spaced apart from said knurled base a greater distance than said wall bottom and a lesser distance than said wall top.

7. An expendable holder for an abrading element of a rotary honing device comprising an integrally formed, substantially rectangular structure including a central body member having a pressure sensitive serrated base and a side opposite said serrated base, an incasement adapted to receive an abrading element supported by said body member and encompassing a major portion of said side, a minor portion of said side supporting a lug constructed and arranged to be abraded by contact with a workpiece when said abrading element has been worn to a predetermined level.

8. A holder for an abrading element of a rotary honing device comprising an integrally formed structure including a body portion having an irrecoverably compressible, knurled base and an opposite side spaced apart therefrom, said opposite side having a first surface and a second surface, said second surface supporting one end of incasement walls the opposite ends of which define an aperture adapted to admit an abrading element between said walls to seat upon said first surface, said second surface being spaced apart from said knurled side a distance greater than said first surface and a lesser distance than said opposite ends of said incasement walls, said knurled base being adapted to equalize through compression forces exerted upon said base through said abrading element.

9. A component of a honing device comprising in combination a holder for an abrading element and an abrading element seated therein, said holder having a base and a side opposite said base, said side opposite having a major surface area adapted to support said abrading element and a minor surface area adapted to serve as a wear indicator, said major surface area substantially encompassed by incasement walls extending therefrom and adapted to receive and retain therebetween said abrading element with said abrading element seated upon said major surface area, said minor surface area being constructed and arranged to be abraded by a workpiece after an abrading element seated upon said major surface area is worn to a predetermined level, said minor surface area being spaced apart from said base a distance greater than the shortest distance between said base and said abrading element and a lesser distance than a major portion of said abrading element.

10. A component of a honing device comprising in combination a holder for an abrading element and an abrading element seated therein, said holder having an irrecoverably compressible base and a side opposite said base, said side opposite having a major surface area adapted to support said abrading element and a minor surface area adapted to serve as a wear indicator, said major surface area substantilly encompassed by incasement walls extending therefrom and adapted to receive and retain therebetween said abrading element with said abrading element seated upon said major surface area, said minor surface area being constructed and arranged to be abraded by a workpiece after an abrading element seated upon said major surface area is worn to a predetermined level, said minor surface area being spaced apart from said base a distance greater than the shortest

distance between said base and said abrading element and a lesser distance than a major portion of said abrading element.

11. A holder for an abrading element comprising a structure having an irrecoverably compressible base, a central body member supported by said base that is compression resistant relative to said base, and incasement means supported by said body member, said base being positioned on a first side of said body member, said body member having a first surface on a second side thereof opposite said base for receiving an abrading element, said incasement means substantially encompassing said first surface, defining an aperture opposite said base portion through which an abrading element can be admitted to said first surface, and being adapted to provide lateral support for an abrading element when said element is positioned against said first surface.

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ROBERT C. RIORDON, *Primary Examiner.*

LESTER M. SWINGLE, *Examiner.*

L. S. SELMAN, *Assistant Examiner.*