Feb. 18, 1958 G. A. SAUNDERS 2,823,498

HONING ELEMENT

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Fig. 1

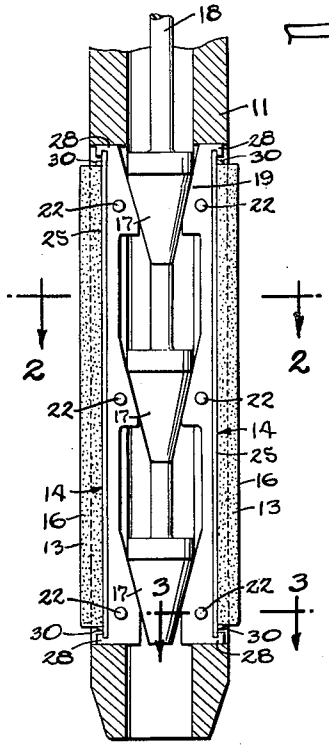


Fig. 2

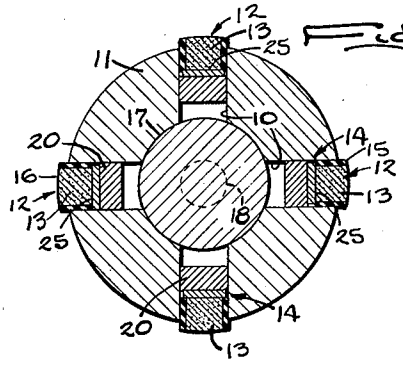


Fig. 3

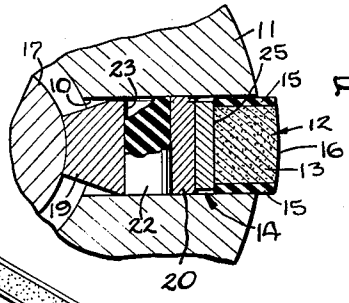
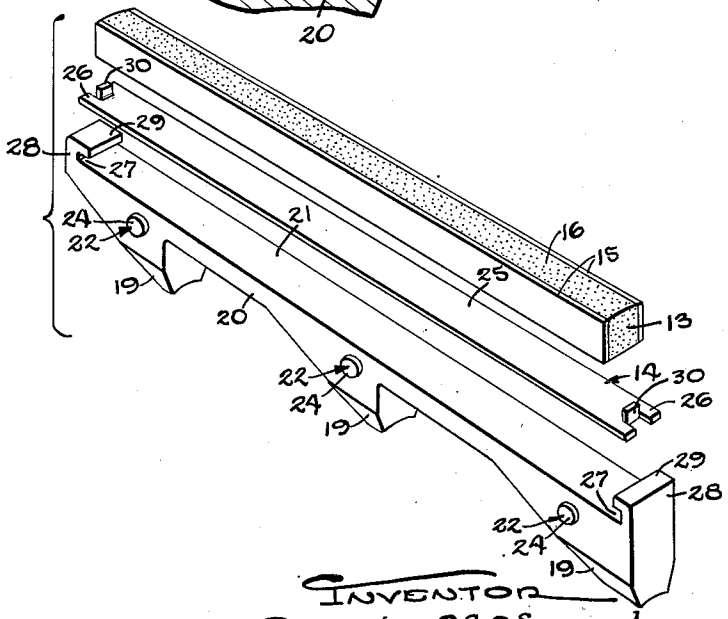


Fig. 4



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Fig. 5

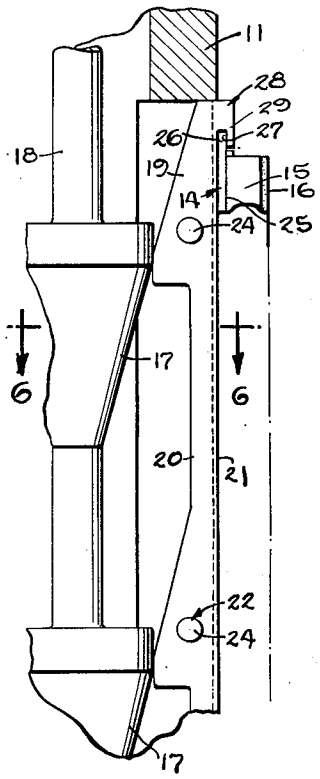


Fig. 6

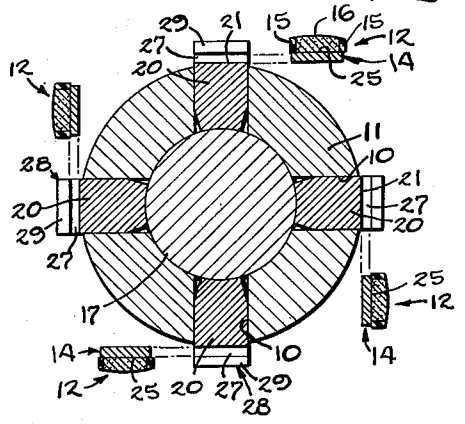


Fig. 7

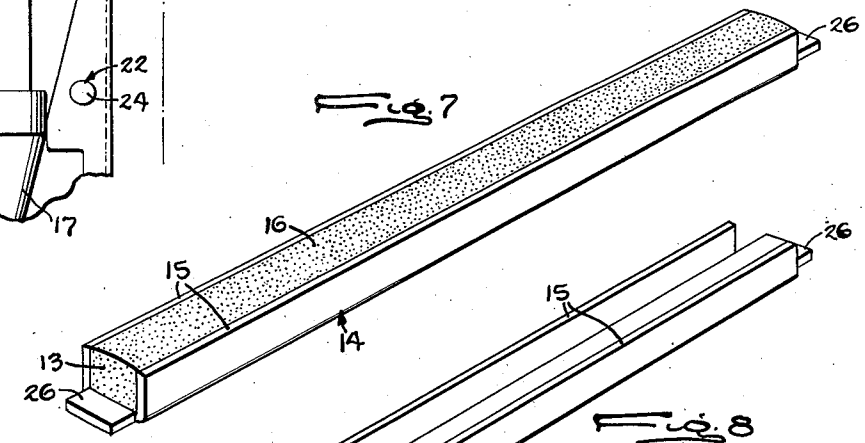


Fig. 8

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2,823,498

HONING ELEMENT

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3 Claims. (Cl. 51—204)

This invention relates to a honing element comprising an abrasive stick and a holder therefor adapted to fit closely in the slot of a rotary body for radial shifting by an expanding cam. The invention has more particular reference to the manner of frictionally holding the honing element in its slot.

The general object is to provide between the honing element and the associated cam follower a novel disengageable connection which permits of low cost manufacture of the element, a wide range of adjustment and long wear of the abrasive stick, ready replacement of the element when worn, and solid backing of the stick during service use.

A more detailed object is to frictionally hold the cam follower plate in the hone body and interlock with the plate the projecting ends of a simple holder secured to the bottom of the stick.

The invention also resides in the novel construction of the interlocking joint which permits sidewise shifting of the honing element relative to the follower plate and into solid abutment with the trailing side wall of the body slot.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a fragmentary longitudinal sectional view of a honing tool having abrasive elements embodying the novel features of the present invention.

Figs. 2 and 3 are fragmentary sections taken respectively along the lines 2—2 and 3—3 of Fig. 1.

Fig. 4 is an exploded perspective view of the improved honing element and its support.

Fig. 5 is a fragmentary view of part of Fig. 1 showing another position of the cam follower by which the honing element is expanded.

Fig. 6 is a section taken along the line 6—6 of Fig. 5.

Fig. 7 is a perspective view of a modified form of the honing element.

Fig. 8 is a perspective view of the modified abrasive stick holder.

Referring first to the form shown in Figs. 1 to 4, the improved honing element is especially adapted for use in a rotary honing tool having elongated parallel sided slots **10** angularly spaced around the tool body **11** and each adapted to receive a composite replaceable honing element **12** comprising an abrasive stick **13** and a holder **14** therefor. The stick is an elongated block of bonded abrasive covered on at least one side and in this instance on both sides with a thin strip **15** of resinous plastic material which is adapted to wear down with the working face **16** in service use. In this instance, the strips **15** extend from the working face all the way down to the bottom of the stone. The combined width of the stone and the strips is only slightly less than the width of the slots **10**.

The honing elements **12** are adapted to be expanded radially by the usual conical cams **17** spaced along a

push rod **18** slidable axially of the body **11**. The cam surfaces bear against complemental surfaces on the narrowed inner edges of projections **19** spaced along the inner edge of elongated follower plates **20** adapted to fit closely within the slots **10** both laterally and longitudinally. Preferably and for a purpose to appear later, the outer flat faces **21** of the plates **20** are disposed slightly beyond the outer periphery of the body **10** when the push rod **18** is in its limit position shown in Fig. 5 of maximum expansion of the follower plates.

In accordance with one aspect of the invention, the different radial positions of the follower plates **20** are maintained frictionally. This may be accomplished for example by plugs **22** of firm resiliently yieldable material such as rubber pressed into transverse holes **23** in the plates **20** and having a free length slightly greater than the width of the plates so that at least one end **24** (see Fig. 4) projects a short distance, for example, $\frac{1}{32}$ of an inch, beyond the side of the plate before insertion thereof in a slot **10**. By pressing the plug ends inwardly, the bar with the plugs thereon may be inserted edgewise between the side walls of the slot, the follower projections **19** thus becoming seated against the cams **17**. With the plug thus compressed and abutting against the slot walls, enough friction will be created to hold the plates securely within the slots under the centrifugal forces encountered in the service use of the tool. The friction devices are disposed well below the outer surface **21** of the plate as permitted by locating the plugs in the projections **19**. In this location, the plug ends remain in engagement with the slot walls in all of the degrees of expansion of the plates.

The invention contemplates the provision of a novel means for connecting the honing element **12** detachably to one of the plates **20** so that the friction on the plates is also utilized to hold the elements in the slots while at the same time permitting lateral shifting of the element relative to its supporting plate into firm abutting contact with the trailing wall of the slot as shown in Fig. 3. This connecting means includes the holder **14** which, in the form shown in Figs. 1 to 4, comprises a relatively thin and flat bar **25** of metal corresponding in width approximately to the stick **13** and its side coverings **15** but longer than the stick so that the ends **26** of the bar extend beyond opposite ends of the stick. These ends, when the bar is lying against the outer surface **21** of the follower plate **20**, project into squared notches **27** formed in lugs **28** upstanding from the ends of the bar and having ends **29** turned inwardly and toward each other so as to overlie the bar ends **26** and hold the honing element against the follower bar. The notches **27** are open at the sides of the bar **25** so that by shifting the honing element laterally with the ends **26** in register with the notches, these ends will interlock with the lugs **28** as the honing element is brought into the plane of the plate **20** as shown in Fig. 3.

The lugs **28** may perform the additional function of holding the honing element against endwise shifting during its reciprocation while engaging the work. For this purpose, the ends **29** of the lugs may project close to the ends of the abrasive stick or, as in this instance, be positioned for engagement with short lugs **30** struck out of the holder ends **26** and upstanding at the ends of the stick in abutment with the latter.

To remove a worn out set of honing elements in a hone constructed as above described, the push rod **18** and the cams thereon are shifted to the limit position shown in Fig. 5 thus fully expanding the follower plates **20** so as to expose their outer edges **21** above the periphery of the body **11**. The worn out honing elements may then be slid sidewise out of the notches **27** and thus separated from the plates as shown in Fig. 6. New honing elements are then inserted and brought into edgewise alinement one

by one with the exposed notches **26** on the plates and shifted sidewise into the latter, the bar ends **26** thus becoming interlocked with the overhanging lugs **28**. With all of the elements thus brought into the planes of the corresponding plates **20**, each element, after retraction of the expanding cams, may be pushed down into the slots **10** until the working faces **16** are spaced only a short distance outwardly beyond the periphery of the body. The tool is then ready for service use, the follower plates **20** being held frictionally in the slots by the plugs **22** and the honing elements being held by virtue of the interlocking of the bar ends **26** and the lugs **28**. At the same time, each element is free to shift sidewise along the top **21** of its plate **20** and thus come solidly against the trailing side wall of the slot under the circumferentially directed friction force applied to the working face **16** of the element when this face first comes into contact with a work surface with the hone rotating. Thus, each honing elements, although received loosely in its slot, is shifted automatically to working position without the necessity of disturbing the accurately guided follower plates.

By making the bar **25** wider than the bottom of the stick **13** as shown in Fig. 3 and extending the side strips **15** clear to the stick bottom, the expanding pressure exerted by the cams is transmitted through the bar directly to the strips rather than through the adhesive securing the strips to the stick. The possibility of the strips being dislodged in service use is thus avoided.

If desired, the nonmetallic coverings **15** at the sides of the stick **13** and the holder **14** including the bar **25** for supporting the latter and for interlocking with the lugs **28** may be formed as one unitary piece and take the form of a channel as shown in Figs. 7 and 8. The lugs **30** of the construction shown in Fig. 4 are omitted and the lug ends **29** are extended for abutment with the ends of the abrasive stick.

I claim as my invention:

1. For use in a hone having a rotary body and an elongated slot therein, the combination of, an elongated member adapted to fit loosely in said slot, a resiliently yieldable member projecting from said member and frictionally engageable under compression with a wall of said slot to hold the member in the slot during rotation of said body, lugs at opposite ends of said member upstanding from the outer face thereof and turned inwardly to form opposed notches open in at least one direction laterally of the member, a stick of bonded abrasive lying along said face and disposed between said lugs, and a holder underlying the bottom of said stick and rigidly secured to the latter, said holder having ends projecting beyond opposite ends of the stick and adapted to enter said notches by bodily edgewise movement of the holder.

2. For use in a hone having a cam follower plate with outstanding lugs near opposite ends defining opposed notches facing toward each other along the outer edge of the plate, a honing element comprising a stick of bonded abrasive adapted to fit between said lugs, a strip of nonmetallic material covering at least one side of said stick and extending to the bottom thereof, and a flat bar extending along and rigidly secured to the bottom of said stick with one edge underlying and engaging the lower edge of said strip, the ends of said bar projecting beyond the ends of said stick and being adapted to enter said notches by bodily edgewise movement of the bar while lying against said plate edge.

3. A homing element as defined by claim 2 including projections rigid with said bar and upstanding from the latter short of the bar ends and adjacent opposite ends of said stick.

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