

Aug. 4, 1959

D. O. BECKNER ET AL
PROCESS FOR FILE MAKING

2,897,692

Filed June 9, 1955

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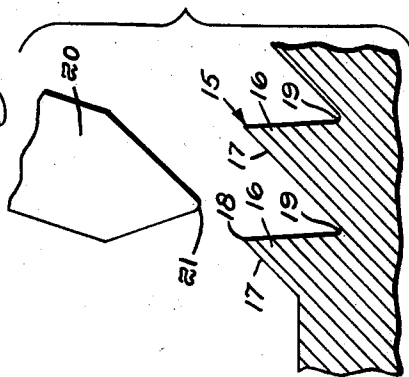
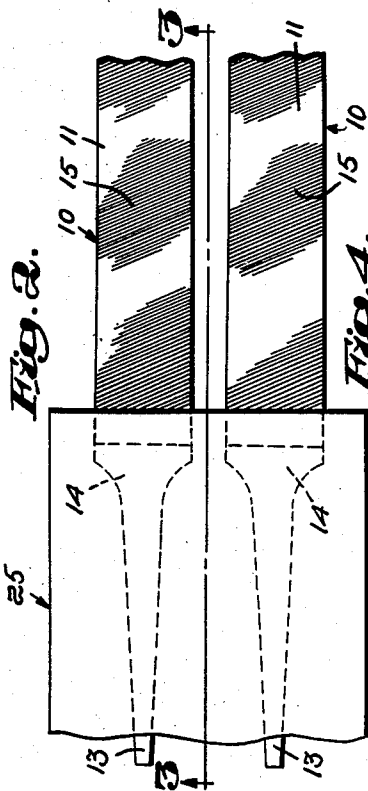
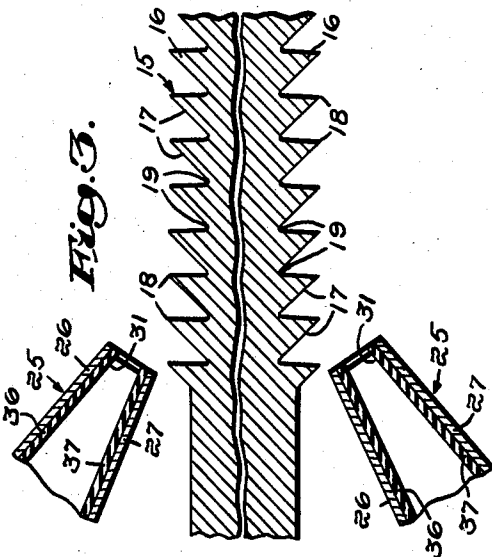
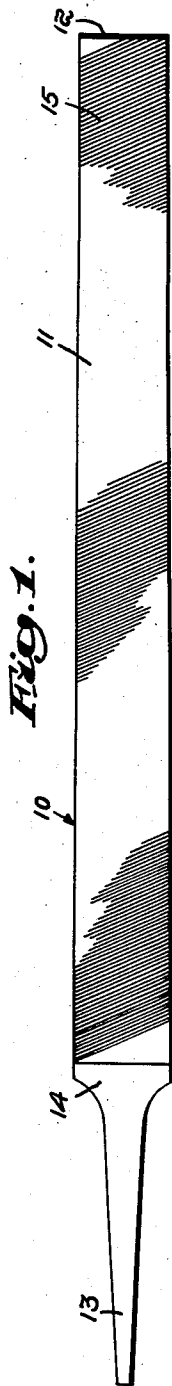
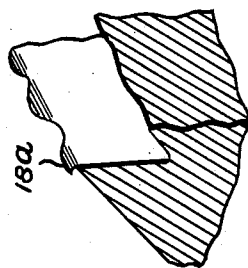
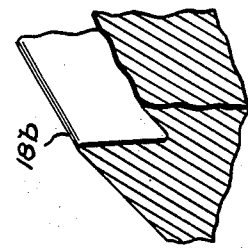
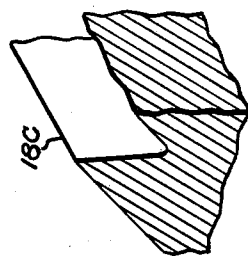


Fig. 2.

Fig. 6.

Fig. 5.



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Fig. 8.

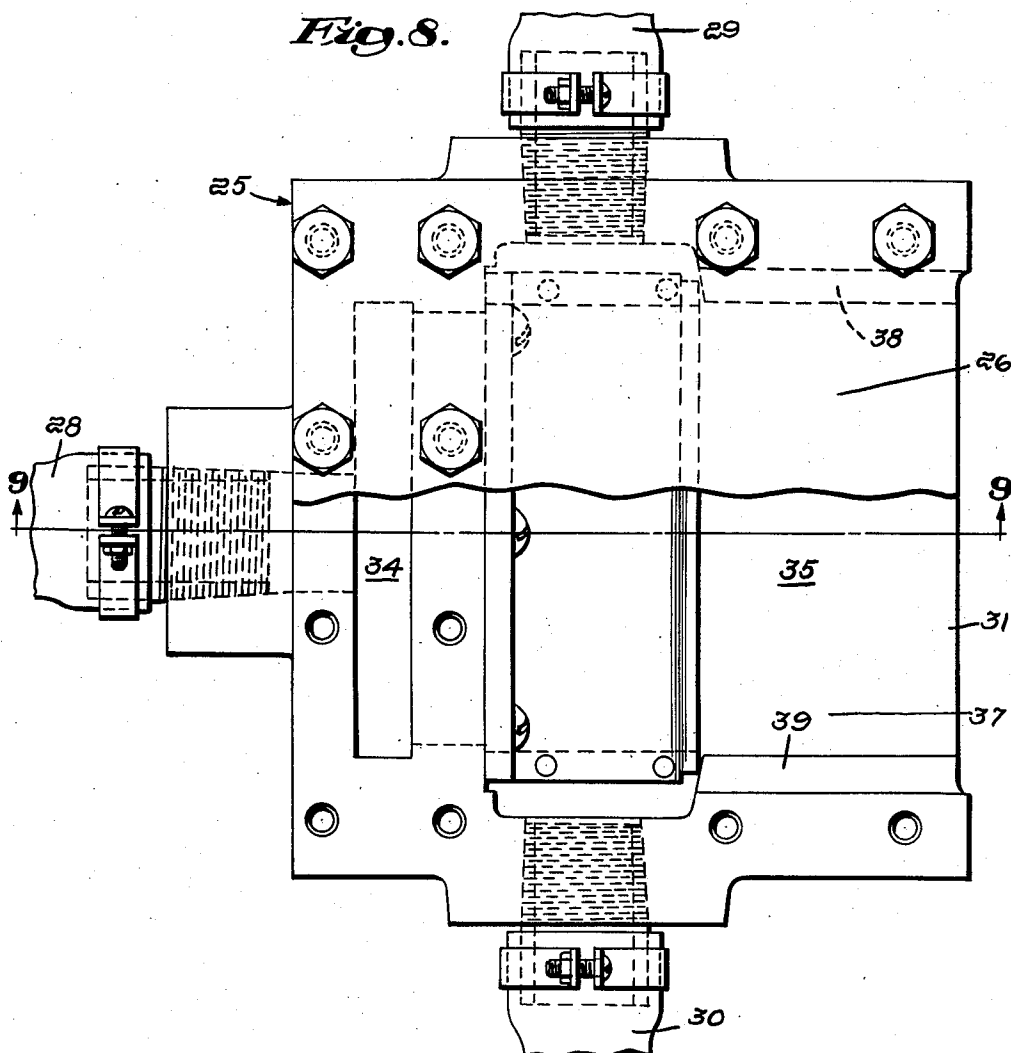
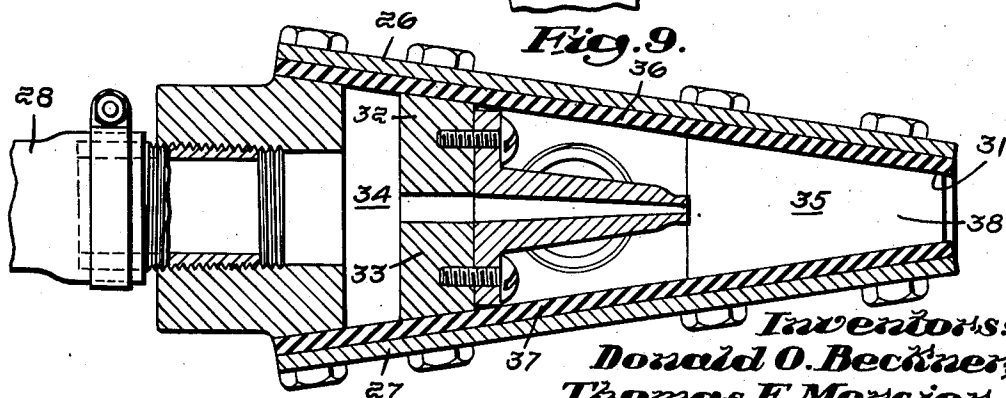


Fig. 9.



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PROCESS FOR FILE MAKING

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Application June 9, 1955, Serial No. 514,246

1 Claim. (Cl. 76—24)

This application relates generally to files and more particularly to a file of improved design, and to a method and apparatus for making the same. The invention aims to provide a file characterized by teeth having exceptional sharpness, and distinguished also by superior uniformity and hardness of construction and manufacture. The invention aims further to provide a new and improved file treating or sand blast device or gun. The still further invention object is the provision of an improved file treating and finishing method which may be employed with the invention apparatus and whereby a file blank is uniquely and advantageously treated to produce teeth of the outstanding sharpness, toughness, and edge holding ability contemplated by the invention.

The invention will be better understood from a consideration of the following specification taken in conjunction with the accompanying drawing in which:

Fig. 1 is a top plan of a file;

Fig. 2 illustrates the treating of files in accordance with the invention method;

Fig. 3 is a section along the line 3—3 of Fig. 2;

Fig. 4 illustrates the forming of file teeth;

Fig. 5 shows an unfinished file tooth;

Fig. 6 shows a file tooth finished in accordance with the prior practice;

Fig. 7 shows a file tooth as finished in accordance with this invention;

Fig. 8 is a top view, partly broken away, of the invention file treating apparatus; and

Fig. 9 is a section along the line 9—9 of Fig. 8.

This invention is concerned with improvements in construction and manufacture of files, or metal tools, usually steel, employed for abrading, reducing, or smoothing metal, wood or the like. Files will be understood to be of rectangular, triangular, round or irregular section, of either tapering or uniform width and thickness, and provided with either single or double cut, transverse or oblique ridges or teeth, all as immaterial to the invention.

The flat, single cut, blunt mill file selected for illustration herein, and indicated generally at 10, Fig. 1, is seen to comprise more particularly a rigid metal bar 11 terminating at one end in a flattened point 12 and at the other in a pointed, handle receiving tang 13. The working face of the file, intermediate the point 12 and heel 14, is serrated and more particularly punched or chiseled or upset to form parallel rows of teeth 15 substantially over its length and width.

In the manufacture of files the blank 10 is subjected to repeated blows of a chisel 20, Fig. 4, as may be actuated by a hammer, not shown, to produce the teeth 15. The file teeth are seen more particularly to comprise relatively steep front or cutting faces 16 and inclined back faces 17. The said faces 16, 17 merge outwardly at a working or cutting edge or point 18. The area voided by the metal flowed to form the elevated point 18 is identified as the recess or gullet 19. It will be understood that the degree of coarseness, or spacing per inch of the teeth, and

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also the height of the teeth or depth of the gullets may vary as desired or appropriate for the particular sharpening, finishing, smoothing, or other use contemplated or selected for the individual file. It may be noted further that the inclination of the teeth faces 16, 17 may also be adjusted to produce a selected rake and degree of acuteness of the point 18.

Generally, however, and whatever the particularly design and specification of the file, maximum endurance and rate of cutting are desired for the teeth. But these objects have not been fully realized in the prior file making practice. Those skilled in the art will appreciate that the chisel tool 20 employed for the indenting or upsetting of the teeth 15 has a point 21 which is slightly rounded, as with an emery cloth, for greater strength. While this blunting of the chisel 20 advantageously yields a rounded gullet 19, such as less readily choked with filings, it will be understood to result also in a metal flow, in the cutting, which produces at the cutting edge or point 18 a thin frangible cap or burr 18a, Fig. 5. Depending on the chisel back angle, the edge cap 18a may have a positive or negative rake, or it may have a reversing or wavy line configuration, as shown.

In the conventional practice, this edge cap or burr is removed by a muck spray or sand blast, at pressures ranging generally from 130 to 150 pounds, and from a round nozzle directed vertically at the teeth, or so as to cause the abrasive fluid to impinge on the points and both front and back faces of the teeth. It will be readily appreciated that the described straight on application of the sand blast serves to blunt, round and dull the edge or crest of the tooth, as indicated at 18b, Fig. 6. Further, the use of a tubular nozzle results in uneven treatment leaving undesired high spots, and more generally an uneven or unequal edge. The result is an unsatisfactory tool whose operation is characterized by uneven wearing of the teeth and by less efficient filing.

Our present invention provides a file tooth of sharper, firmer, and more uniform construction than any heretofore known. Further, and to this end, the undesired burrs or edges produced in the cutting of the file blank are removed and the file teeth are finished by novel method and means, as now to be described.

In accordance with the invention, there is provided an improved spray or sand blast device or gun whereby the muck or abrasive fluid is formed and expelled in a linear or fanned pattern, spray or blast. Referring now more particularly to Figs. 7 and 8, our improved sand blast means is shown to comprise a generally flat rectangular casing 25 having the opposed duplicate blast forming plates 26, 27 joined at three sides except for a rear opening for the pressure air or steam hose 28 and side openings for muck hoses 29, 30, and converging toward a narrow, rectangular front opening 31. The height of the opening may be, say 1/4 in., as appropriate to the desired thin, sheet-like character of the sand blast. The lengthwise proportioning of the casing 25 and more particularly of the opening 31 is conveniently that, say 3 3/8 ins., which somewhat exceeds the width of the largest files which may be presented, Fig. 2, by conventional file blank handling and serving apparatus. The casing is interiorly divided by the closely spaced parallel, opposed accelerating or jet forming plates or leaves 32, 33 into a rearward pressure chamber 34 and a forward, overlying, fluid mixing and blast forming chamber 35.

Further in accordance with the invention the chamber 35 is lined or faced with a soft rubber or other non-metallic rubber-like material, as herein by mounting rubber facings 36, 37 on the plates 26, 27 and installing rubber bushings 38, 39 on the chamber side walls. The use of a soft non-metallic material has been found to produce a

chamber lining much more durable and resistant to abrasive fluid wear than the hard metal of the casing 25.

In the file treating and finishing method of the invention steam or air at a pressure which, while it may be as low as 130 pounds, is preferably in the range of 150 to 170 pounds, is supplied through hose 28 to pressure chamber 34, and then forced through the jet forming plates 32, 33 to the mixing chamber 35. The jet stream will be understood to set up a vacuum serving to draw or suck the muck out of hoses 29, 30 and into chamber 35, from which it is expelled at high velocity and pressure, and in the desired straight sheet pattern, as defined by the described wide, thin nozzle opening 31. We prefer to employ for the muck or abrasive fluid a 120 mesh screen silica sand, soap and water mixture such as conventionally heated, as by steam, and held in suspension, as by agitating air, in a hopper.

Referring now more particularly to Figs. 2 and 3, it will be seen that a pair of the guns 25 may be mounted above and below the files 10, and for simultaneous treating of their opposite or upper and lower faces. In accordance with the invention, the guns 25 are mounted for inclination, varying with the type of file, at 20 to 45 degrees, and herein at about 30 degrees to the plane containing the teeth 15, i.e. the main longitudinal plane of the file body, see Fig. 3, or so as to direct their blast or spray at and substantially normal to the back faces 17. The sand blast thus impinges upon the full width of and at least the upper portion of the tooth back face 17, extending to the point 18, but leaving intact and unremoved the front face 16.

The described construction, arrangement and application of the sand blast means has been found to produce a superior file tooth, and more particularly a more uniform, sharp, and firm cutting point, as represented at 18c, Fig. 7. The use of the straight thin spray pattern, at the higher pressures, and, still more importantly, so as to impinge upon the tooth back face only will be seen to produce a unique honing or lapping action which uniformly smooths and finishes the tooth, removing the high spots, and more particularly the edge cap 18a, Fig. 5, but without blunting of the tooth crest, as heretofore. In other words, the prior abraiding across both faces of the tooth and thus reducing of the point structure is avoided under the invention method whereby only the desired smoothing, treating, and finishing of the tooth to a firm, straight, sharp edge or point is had.

From the foregoing it will be appreciated that our

present invention provides a file characterized by a very much sharper, firmer, and straighter tooth than heretofore and by a superior cutting edge found to remove more metal with less effort, to wear better, and to stay sharp longer. The invention has been shown to provide also new and improved file treating and finishing method and apparatus whereby files of the desired construction, and characterized by faster, greater filing, as evidenced by longer spiral curl chips and reduced chip breakage, are produced.

Our invention is not limited to the particular embodiments thereof illustrated and described herein, and we set forth its scope in our following claim.

We claim:

- 15 In the manufacture of files wherein in the forming of the teeth there is left at the edge portions defined by the juncture of the front and back faces a chisel-upset capping edge burr, the step of honing the outer portions of the burr-capped teeth by a wide straight linear thin sheet-like high-pressure sand blast of the order of 150-170 lbs. p.s.i. directed normally at and laterally across only the upper portion of the teeth back faces so as to impinge solely upon the outer edge portions of only the back faces of the teeth and under such close proximity thereto and such duration of blast as to remove only the teeth cap burrs while leaving intact the other metal of the file blank to present maximum initial tooth height and the desired sharp firm uniform cutting crests for the teeth.

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