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# SHARPENING AND TEMPERING CARBINE TIPPED MILL PICKS

By Robert Grassi, SPOOM member and miller

Like Charlie Howell, I rely on carbide tipped mill picks for sharpening French buhrs and some very hard composition millstones, but often use hardened steel picks for granite millstone work (Including Meadows Mills). The point, of course, in using carbide inserts for very hard millstones is the difficulty in finding someone to harden (temper) the picks correctly for such stones. The picks are either too soft (dull very quickly) or too hard (spatter and break, rendering them useless quickly). Years past, some blacksmiths and mill furnisher companies performed this particular hardening process to great effect. Charlie Howell once revealed that his father's picks were hardened at one particular local blacksmith for years. One day he went by to drop off some picks to be hardened, but found that the old blacksmith had passed away. The son had no idea how to harden the picks correctly.

As millstones lost favor to roller mills, the art of hardening mill picks was eventually all but lost. Carbide (very high carbon tool steel), which I believe is a 20th century development, came into use on stone cutting tools. It holds an edge well, but is brittle and difficult to sharpen without the proper tools. It is also quite expensive.

The old recommended recipes for tempering mill picks are as follows:

- Heat the pick to blood-red heat, hammer until nearly cold. Again heat to blood-red heat and quench as quickly as possible in three (3) gallons of water in which are dissolved two (2) ounces oil of vitriol, two (2) ounces of soda, 1/2 ounce of saltpeter; or two (2) ounces of sal-ammoniac, two (2) ounces of spirits of nitre, one (1) ounce oil of vitriol. The pick should remain in the liquid until it is cold.
- Dissolve one (1) ounce of white arsenic, one (1) ounce of spirit of salts, one (1) ounce of sal-ammoniac in four (4) gallons of spring water kept in a tube or iron phial for use. Heat the pick to blood-red heat, then quench it in the liquid mixture. Draw it gently over the clean fire until the spittle flashes off it and let it cool.
- Add three (3) ounces of spirits of nitre, three (3) ounces spirits of hartshorn, three (3) ounces of white vitriol, three (3) ounces of sal-ammoniac, three (3) ounces of alum, six (6) ounces of salt, with a handful of hoof parings to three (3) gallons of water. Heat the steel to a dark cherry red. This formula is used to temper picks for cutting French buhr stones.
- Another formula requires two (2) gallons of rainwater, one (1) ounce of corrosive sublimate, one (1) ounce of sal-ammoniac, one (1) ounce of saltpeter, and 1-1/2 pints of rock salt. Heat the picks to cherry red and cook in the bath. The salt gives hardness to the steel; the

other ingredients toughness. The picks will not break if they are left without drawing the temper.

After working the steel carefully, prepare a bath of lead which has been heated to the boiling point (indicated by a slight agitation of the surface). Place the end of the pick into the bath to a depth of 1-1/2 inches until heated to the temperature of the lead; then plunge immediately in clear cold water. The temper will be just right if the bath is at the required temperature.

These formulas were taken from a millwright/miller book written and published in the 1870's. Unfortunately, Grassi reported that he does not have the title, author, or publisher of this work. His reference is a photocopy of several chapters given to him many years ago by Charlie Howell. (*Editor's Note: Can anyone supply the publishing information concerning this book?*)

This article was generated by the interest shown in Robert Grassi's demonstration at Pears Mill in September 1995. The accompanying photograph was taken by Eliot Johnson of Coraopolis, PA during the 1995 SPOOM Conference. It was Johnson's initiative that made the article possible.