

# The TOOL SHED

NUMBER 71



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## Electro-Chemical Cleaning of Metals

by Al Hodge

Observers of Jack Whelan's February demonstration may have further interest in the subject. The reasons to be interested include:

1. A savings in time and effort for articles that are rusted and/or dirty, or with convoluted or inaccessible surfaces, or with small parts.
2. Avoidance of damage caused by mechanical or acid cleaning methods.
3. Stoppage of continued rusting that inevitably proceeds under an existing layer of rust.
4. Disassembly of articles too frozen by rust to be disassembled by conventional means.
5. Recovery of manufacturers' marks and dates.
6. Restoration of articles that would otherwise be discarded or kept out of sight.

My introduction to electro-chemical cleaning was a demonstration given by Ronald Pearson and Philip Cannon. I later learned of articles by Kinsey (1), Tahk (2), and Whelan (3). This article brings together information from these sources and adds my own experience.

The procedure uses a low voltage direct current in an alkaline bath. The anode (positive or red connection) is an austenitic (non-magnetic) stainless steel (lesser metals corrode). The cathode is the work piece. Oxidation and the generation of oxygen occurs at the anode. Reduction and the generation of hydrogen occurs at the cathode. There are many forms of rust; all contain iron in the trivalent state, nominally  $Fe_2O_3$ . The action of the bath reduces this to the black oxide  $Fe_3O_4$ . This disrupts the deposit and the bulk of the rust flakes off, leaving a finely divided, weakly adherent, black deposit. The alkaline bath and the action of the bubbles remove grease and dirt. Metal (iron, steel, copper and

its alloys) is not affected. Clean areas remain clean. Pits become more obvious because they get cleaned. The same action recovers markings. Threaded assemblies rusted tight are often loosened sufficiently to permit disassembly.

There are surfaces on which the procedure should be used with caution. Paint is stripped completely. For japanning, much caution is advised. If there is oxidation under the japanning it will be stripped. Note that japanning can not always be distinguished from black paint. Articles may have parts japanned and other parts painted. Nickel plating in good condition is not affected. If there is oxidation under the plating it will be flaked off. Blueing will not survive but heavier black oxide coatings will, using the lower alkalinity range and keeping exposure short. Alkali will damage aluminum, zinc, or cadmium. The procedure works slowly on a dense, smooth, brown oxide coating found on some steels.

*continued on page 4*

### April 5, 1992 Crafts Meeting

#### *Making Molding Planes Using 18th Century Techniques*

Mario Rodriguez, nationally known woodworker and teacher, will demonstrate the methods used to make 18th century molding planes. Special plane-making tools will be used and discussed. He will make a simple profile plane, and show us how to shape, harden, and temper the iron. If you have a plane that you have made, please bring it to the April 5th meeting.

# CRAFTS of New Jersey

Collectors of Rare and Familiar Tools Society  
of New Jersey

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The purpose of CRAFTS of New Jersey is to encourage interest in early trades and industries, and in the identification, study, preservation and exhibition of tools and implements used and made in New Jersey as an integral part of our heritage.

Membership in CRAFTS is open to anyone who shares the above interests. Annual dues per person or couple are ten dollars for the membership year of July 1 through June 30. Membership fees may be sent to the Treasurer: Helen Whelan, 38 Colony Court, Murray Hill, NJ 07974.

CRAFTS of NJ meets at the HOST Masonic Lodge, High Bridge. Take I-78 to Route 31 exit at Clinton. Go north on Rte. 31 two miles to second traffic light at the High Bridge exit. Turn right and go about half a mile to Dennis Ave. Turn left, then straight to the Masonic Lodge (on the left). Tailgate sales in the parking lot begin at 1 P.M.; meeting is at 2:00.

## THE TOOL SHED

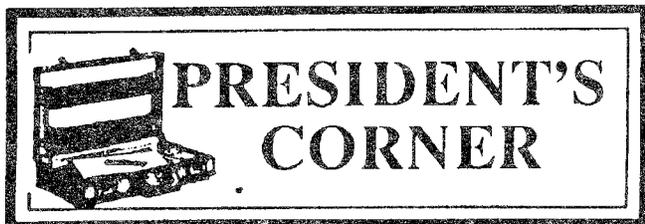
Published five times a year for members of CRAFTS of New Jersey. Editor: Stuart Shippey, 251 Hillside Ave., Chatham, NJ 07928-1732. Articles, especially about New Jersey tools and trades, are encouraged and may be sent to the editor. Text can be hand written, PC ascii, *Word Perfect*; FAX 201 301-9780.



Dominic Micalizzi's presentation on drilling tools at the February 2 CRAFTS meeting.

Greg Welsh displayed his *Neophyte's Rule Collection*.





Our Editor's idea for a membership information form has proven to be a good one. Thanks, Stuart, and thanks to the ten percent of the membership who have already returned these. The information is valuable, and provides opportunity for better service by your Club.

In returns to date, wooden planes and blacksmith's tools head the list in popularity, followed closely by primitives. All of the tool types specifically listed on the printed form were cited by over one-quarter of the responses. Of particular interest are the additions via the *Other* box, which added wrenches, pliers, travelers, hammers, hatchets, patented planes, whatsits, hollow augers, speed indicators, and historical tool documents. Also cited were tools of the farmer, tinsmith, luthier, machinist, bookbinder, pewterer, leatherworker, glassmaker, broom-maker, shipwright, and filemaker. Another group included tools by specific manufacturers (Stanley, Starrett, H.D. Smith) and, of course, New Jersey tools.

This underlines the fact that there is an enormous amount of information available from our membership. The *Other* items provide a resource for response to inquiries on specific subjects. I know for sure that there are other categories not yet included which are dear to the hearts of members not yet heard from. Won't you add these to our information bank? This is in my computer memory now, and will be kept up to date for quick retrieval.

Perhaps the additional classes cited above will spur you to return your questionnaire with your specialties. All of us have at least some interest in any tool type, but your responses will be most useful for reference purposes if only your primary interests are listed.

Even more valuable have been your offers to provide program or *TOOLSHED* material, which exceeded our expectations! These have been turned over to our Program chairman (Don Kahn) or our Editor (Stuart Shippey) - who were delighted!

Suggestions of topics for either of these were also most welcome. To list just a few of these named so far: machinist's tools, commercial shad or herring fishing, harness- or buggy whip-making, lumbering, weaving, medical/surgical instruments, foot-treadle machinery, demonstration of woodworking techniques (hands-on, if possible), blacksmithing demonstration (outside-picnic?). Also listed were topics which have been covered in past meetings; some of these may be due for a repeat for the newer members.

If any of these strike your fancy particularly, second them with your return - along with your ideas, as well. Your offer to provide program or *TOOLSHED* material on the topics suggested - or any others - will be warmly received.

The auction season is upon us! Patina (too late for this announcement) March 7-8, Barry Hurchalla (who knows no season) March 21, Tom Witte (Indianapolis) March 22, David Stanley (England) March 28, ours (the easiest to get to) April 4, and Dick Crane's (Nashua) April 10-11. Prepare your bank account for the onslaught! I hope the enclosed flier whets your appetite for our auction. Steve Zluky and Greg Welsh have been working hard at cataloging the consignments, and tell me we have some great pickings! Greg will have some *TOOLSHED* back issues for sale. See you there!

Welcome to new members joining since the February *TOOLSHED* went to press: Laurent and Rumiko Adamowicz (Paris, France), Douglas and Alicia Delong (Moorestown), Thomas and Marybeth Czech (Toms River), Peter and Annette Habicht (Sheffield, MA), Jim Marsh (Mendham), Frank Reis (Philadelphia, PA), Frank Scordo (Metuchen), James and Susan Travis (Peapack), and Byron Wenger (Woodstock, VA).

## Electro-Chemical Cleaning of Metals continued

Articles with non-removable wood can be treated, at the lower end of the alkalinity range, and with no more exposure than necessary. I have done two articles with rosewood. They needed only a bit of waxing afterwards. I do not have experience with mahogany or cocobolo. Ordinary wood is stripped of finish (also of oil and grease) but it is not bleached. After thorough rinsing and a few days drying, a rub-down with a fine 3M pad followed by tung oil restored a good appearance. Some articles can be arranged to keep the wood out of the bath. Plastic wrap helps to protect the wood from the spray generated by the bubbles.

Kinsey suggests, as a power source, a 4 ampere battery charger of the 6/12 volt type with an ammeter. Mine contains some sort of spike protection and a thermal cutout with automatic reset. By setting it on billets to provide air circulation, I can run about 5 amps. A higher amperage rating would permit faster working on larger or more sensitive items. Whelan described the building of a power source (and in February showed alternatives), but the charger is compact and metal encased.

To supply power to the charger, I ran a line with switched receptacle to a convenient location. This provides a power cutoff when inserting, rearranging or removing articles. It's not that 6 or 12 volts is dangerous, but combined with some slipperiness (caused by the alkali) it can cause a dropped article. The splash is hazardous and won't do your clothes or the surroundings any good either.

There has been debate as to electrolyte composition, principally as to safety. I feel that these are all weak solutions and there is no reason not to use the whole range, depending on the article to be cleaned. Kinsey's recommendation was one heaping teaspoonful of lye pellets per quart of water. Tahk suggests the use of sodium carbonate (common washing soda) at the rate of one heaping tablespoon per quart. Whelan suggests a teaspoonful of washing soda per pint. Cannon suggests one heaping tablespoonful of lye powder (*Red Devil Drain*

*Cleaner at Pathmark*) per gallon of water. I generally follow Cannon's formula because I often run fairly dirty items and don't see any reason to preclean if the bath will do the job for me. I cut back if wood or japanning is involved. DO NOT use *Drano*. *Drano* contains aluminum pellets which cause heat and gas evolution.

The bath can be used until it gets too dirty to see what's going on. Add water to make up evaporation. Disposal is by pouring it down the sink, followed by a water flush. Pour slowly and check for small parts.

Some suggest that the bath can be left indefinitely. I get rid of it if I'm not going to use it the next day. I can setup again quickly and don't like even a minor hazard lying around.

The container should be plastic of reasonable quality. The largest I've heard of was used by Cannon who did a blacksmith's post vise in a 30 gallon garbage container. I usually use an ordinary 11½ quart *Rubbermaid* dish pan (interior dimensions 11" x 13" x 5½"). If necessary, longer objects can be done in two sections. This requires more than twice the time of a complete immersion since it requires thorough cleaning to avoid overlap or water line marks. I have one item on which I was not able to eliminate such marks. I am currently assembling a setup based on the bottom of a 20" *Plano* tool box which has a useful length and depth.

I don't like Kinsey's suggestion of a *Pyrex* container because of possible breakage from a dropped article. Whelan's use of a stainless pan as both anode and container is workable, but requires careful propping to avoid electrical shorts, and is less flexible in orienting the piece.

The anode setup I use is made with stainless screen in pieces about 4¼" by 7" obtained by cutting open cylinders purchased from a surplus supply catalog (American Science and Surplus, formerly Jerryco). Whelan uses stainless sheet from the same source. I use two of the screen pieces, overlapped and held by a clamp to line each long side of my dish pan. The two sides are electrically connected by a jumper.

Anything that isn't stainless stays above the water line. This arrangement works both sides of a piece. The arrangement is fairly well balanced to run in the 3 to 5 amp range at 6 volts when handling my normal assortment of articles.

Alternate anodes can be stainless tableware or gadgets used close up for spot treatment or inserted in a cavity. The side anodes are disconnected when working in this manner. When doing a cavity, a separator is needed to avoid an electrical short. Plastic mesh obtained by unrolling scouring balls is convenient. Shapes to suit a need can be obtained by bending stainless screening.

For making the work connection you have a choice of methods since metals are not damaged on the cathode side. Try to get the whole piece in the bath and make a wet connection. This is easier to do on a rusted article than a dry connection. Soldering pliers (the kind with long thin steel legs - spring to close) are useful since when propped or clamped against the end of the dish pan they help to hold the orientation of the work. Cannon prefers connectors made from heavy steel wire with alligator clamps on the wet end. I also use clip leads (*Radio Shack*) which come about a dozen to the pack and consist of insulated copper wire about 14" long with a small alligator clip at each end. These are useful when a piece has multiple parts not tightly connected. In such cases it is desirable to make a connection to each part.

Sometimes 12 volts are needed to break down rust under a connection before dropping back to 6 volts. Once I had to file off some rust to make a connection. The only other problem encountered is that the leg of a soldering pliers can get warm if you push the 5 amps down it. This isn't good against a polyethylene container. Now I jumper the two legs.

If a piece is flat, it's best to have the major surfaces vertical. This lets the bubbles loose and keeps them from blanketing the surface and also lets dirt and rust fall away. If the object is square or round, give it a quarter turn half way through the procedure.

Props keep the work out of dirt in the

bottom of the container. You can make all the shapes needed by breaking up a brick. Whelan's plastic grid method is an alternate. A container, lower than the dish pan, is useful for resting a piece just removed while starting up another. You can then carry it to the sink without drips.

A small parts rig can be made from 1/8" copper tubing. Cut this about a foot longer than the span and bend 6" down on each end to give it stability. Cutting 6 clip leads in half and making soldered connections to the bridge, yields a dozen small clips hanging in the bath to process 12 small parts. Whelan uses wire hooked over the bridge without soldering. Suspension rigs can be made using a wooden bridge and insulated bell wire.

A non-immersion method was shown by Whelan using a stainless plate, upon which a piece of toweling saturated with electrolyte is laid. The work surface is then laid down on the toweling and connected to the negative lead.

Precleaning of the work piece has been suggested. I don't do this and the only negative effect is more frequent changing of the bath.

By now you may be thinking that all of the above seems complex and wondering if it's worth while. In addition to the reasons first listed, my answer is that I don't stand around and watch it. I set it up, get it running, and go away. I had one piece where somebody spray lacquered down a mess of rust. I let this run overnight while I slept - that's efficient.

The "normal" time to run a piece might be of the order of one hour, but varies greatly depending on the size and condition of the piece, and is best learned by practice. My inclination is to let it run longer than necessary as this reduces the chance of having to return a piece for additional processing, and I think makes subsequent cleaning easier.

The first step after removal from the bath is thorough rinsing. Whelan then scrubs with brass wool. I use a fine, dense, brass wire brush of the shoe brush style with frequent flushing, followed by smaller brushes to get at less accessible areas. Sometimes a fine wire stainless brush is used and at times a nylon fiber "toothbrush" is useful because the flexibility of

the bristles lets some of them get down into pitted regions. Bottle and tube brushes are useful for cavities. The wet brushing is messy because of the finely divided black oxide. The black enters any cracks in the skin and is persistent. A rubber glove on the hand holding the work is advisable. When handling small pieces, a stopper or strainer in the sink is a necessity.

Brass and bronze usually require little brushing. They do acquire a darkened tone. They may be readily brightened with *Flitz*. Whelan reports less success with brass and bronze. I do not have a reason for the discrepancy but note differences in the alkalinity and voltage ranges we normally use.

After brushing, I rinse again in hot water, towel the piece off and set it aside to dry. Before I stop for the day, I use a hot air gun to heat up any pieces that have accumulated and let them dry over night. Whelan favors more prompt drying.

All parties emphasize thorough drying before application of a protective coating. To remove more black after drying, I sometimes use brushing while wetting and flushing with *WD-40*. Cannon makes use of a wheel made with sisal fibers (obtained at a shoe repair establishment). For a coating, Kinsey prefers the use of a hard wax (*Trewax*, *Simonize*) applied to an object preheated sufficiently to just melt the wax. Whelan suggests oil or wax. Pearson likes oven drying (at the lowest setting) followed by black shoe polish. This is based on a desire to obtain color uniformity. Cannon advocates the use of a solution of paraffin in turpentine.

I find the paraffin in turpentine works well for most of the pieces I do. It wets and penetrates well; leaves a clear, thin coating; and the work involved is minimal. I gather that this is an old method, but for those who haven't tried it, fill a bottle 1/3 full (loosely) of paraffin shavings from a cheese grater and then to the 2/3 mark with turpentine. After that, it's a perpetual bottle. If too thin add paraffin. If too thick add turpentine.

This article requires a safety review, and for that purpose I assume the use of the more alkaline electrolyte compositions. The major consideration is eye protection. The rules are:

1. Keep your hands away from face and eyes.
2. Be aware of the potential for a splash and try to minimize it. Cut off the power when handling pieces and handle them carefully.
3. Wear eye protection. Theoretically, splash resistant goggles should be used. I use regular glasses with the addition of side shields.
4. Have a source of clean, cool, water nearby and unimpeded access to it.
5. Don't put your face near the bath. There is a small spray generated by the breaking bubbles.

Don't let the above unduly alarm you. The electrolyte compositions suggested are all relatively weak alkaline solutions and should be respected rather than feared.

The second consideration is ventilation. The bath generates oxygen and hydrogen, and there is no way you can keep them apart. You will occasionally generate sparks at connections. Work in a moderately well ventilated area and do not cover the bath. I work in my basement and have had no problems.

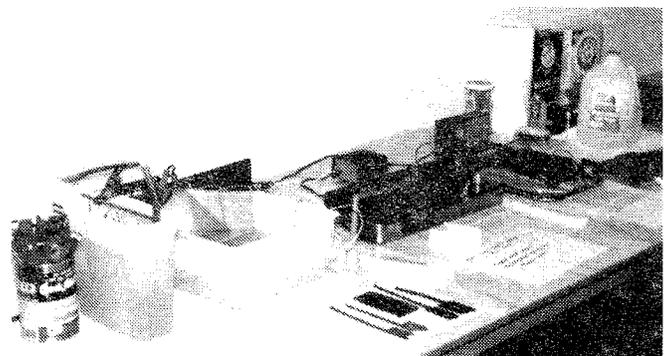
Rinse your hands promptly after exposure to the electrolyte. Long contact is not kind to the skin and increases the chance of transfer to the eyes.

I hope the above has been a useful supplement to Whelan's demonstration and that some of the members will give the method a try. For appropriate articles it really does give decent results at a reduced labor input.

#### References

- (1) Kenneth F. Kinsey, Chronicle 37 #2
- (2) Christopher Tahk, Chronicle 37 #4
- (3) John M. Whelan, Toolshed #45

\* \* \*



Jack Whelan's System for Cleaning Metal at the February 2 CRAFTS meeting

## A CHINK IN THE ARMOR

by Herb Kean

Since I started collecting, I have steadfastly considered myself a functional collector; i.e.- someone who collects things in accordance with what those things do, rather than who made them or their model numbers. This style of collecting has always been fascinating to me, in addition to giving me a wide range of buying opportunities.

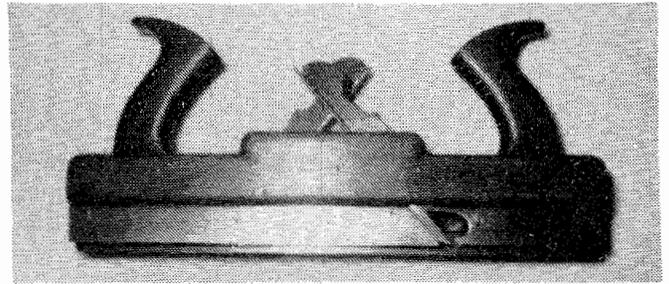
Over the past few years, I've had to cut back on some of my collecting categories or I'd have no room for display. As such, I sold off all my farm implements, kitchen utensils, domestic primitives, and just about everything that was not a true working tool. It still left me quite a wide range.

I've always had one rule that helped keep the collection under control: only one of each type of tool. So, I only own one bead plane, one American goosewing, etc. It gets a little hairy sometimes when you have to decide on unique sizes, shapes, or type of wood. I gave ground in this respect and allowed one tool for each difference in those variables mentioned above, along with modifications in mechanics and type of trim.

Yes, there were exceptions here and there, but they didn't amount to much. I rationalized away 18th century planes by collecting only one plane per maker. All in all, I was satisfied with the guidelines that fenced in my collection. But the best laid plans of mice and men oftentimes go awry.

As hard as I tried to ignore makers (except for resale purposes), the growing clamor seemed to sweep me along with everyone else. I realized it when I found myself sneaking pieces into the collection that had nothing to do with function; at times even duplicating a piece I already had! The maker's name was the drawing card in each case. Woe unto me and my precious guidelines.

Two recent instances really brought to light this change in collecting style. The first one concerned a combination match plank plane (see photo). Although I already owned a homemade one like it, this one caught my eye because it



was signed, "P. Brooks/Patented", with the same style imprint as "P. Brooks/E. Hartford". By rights, unless I could get it cheap enough to upgrade the homemade one, I should pass it by. But I became stuck on the fact that no one seemed to have any knowledge of the patent. So I bought it, and at a price that made me slightly ill. It took a few days to recover from this minor trauma.

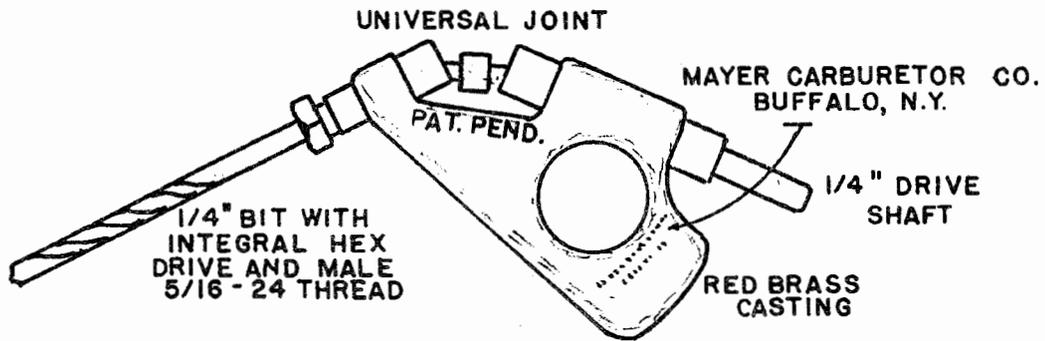
Just when I thought I was back on the wagon, my second trip down temptation lane arrived. I fear this one has taken me over the brink. I came across a wooden jointer plane that had a patented blade adjusting mechanism, (Harris' patent 1855). It intrigued me, but I was not in the habit of buying expensive planes, (at least not so soon after my prior trauma). A friend of mine owned one just like it, and I called him to find out whether the price was right. He convinced me that the price was O.K. but nothing to write home about. That turned me off and I was ready to forget about it when a funny thing happened.

My friend mentioned that he understood my hesitation to pay big money for a plane without a maker's imprint on the nose. I told him that the imprint really didn't matter to me, and joked about the fact that there was at least an owner's imprint on the nose, even though it was upside down. He thought that was unusual as his plane also had an upside down owner's imprint on the nose. You guessed it, they were the same, J. KELTER, who I have since found out to be a rare maker. The excitement about that maker's mark was enough to overcome my financial concerns, and I now own the plane.

My guidelines definitely forbid flagrant conduct of this kind, and I feel strangely guilty. Is there any hope for recovery, or am I doomed to forever walk around with a want-list of maker's names?

# WILLY TELLUS WHATSIT

AN ANGLE DRILL ATTACHMENT - BUT DID IT HAVE ANYTHING TO DO WITH A CARBURETOR?



No. 7

WHATSIT No. 6 in the February issue is a veneering hammer. The commercial ones are of steel, but early cabinetmakers made their own of wood with working surfaces (usually) of brass. They were used to apply pressure to veneer after it was laid, before the hide glue cooled. The heel of one hand applied pressure on the back of the head, while the other hand moved the handle from side to side to "walk" the brass bar in zig-zags from center to edge. This squeezed out excess glue and ensured close contact.

\* \* \*

## Letter Received

"I just re-read your remarks on your No. 6, Whatsits in the February issue. I had not read this and consequently was under the impression that this was a "real" whatsit. Not so, so I see. I'm sure many did identify it as a veneer hammer. Some years ago I wrote an article on veneering tools in *Chronicle* and the hammer was included, with illustrations. I would assume Dan Commerford has it in his hammer book."

Raymond Townsend, Williamsburg, VA

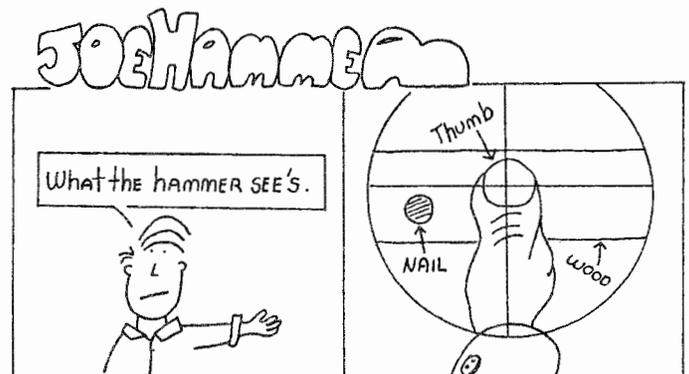
## CRAFTS Calendar of Events

April 4 - Auction, Clinton *Holiday Inn*

April 5 - meeting at High Bridge

April 30 - *TOOLSHED* deadline

June 7 - meeting at High Bridge



Joe Hammer cartoon drawn by Peter Yuschak  
122 New St., Cranford, NJ 07016