

THE REPAIR SHOP

COMPREHENSIVE DENT REMOVAL TOOL LIST

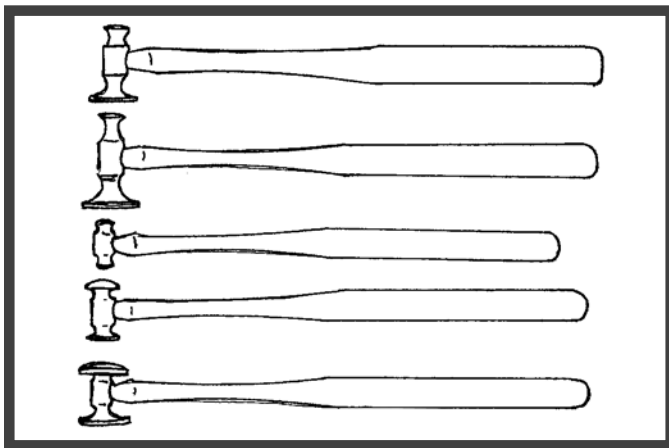
by Lars Kirmsner

Below is a comprehensive list of Dent Removal tooling that may be utilized in a broad variety of today's instrumental repair situations. The actual compliment of tooling that one needs will depend, for the most part, upon the specific requirements and individual preferences of the repairperson. With the exception of but a few isolated types and designs of equipment, the majority of tooling available on the market today will work effectively in the hands of a competent technician.

tubing with a small magnate. After each use, wipe the tumblers clean and apply a light lubrication of carnauba wax to inhibit corrosion between uses. The tumblers should be checked from time to time for damage (from dropping and routine use); polish and buff-out all blemishes as required. The various brass drivers (slugs) accompanying the tumbler set are used to "drive" the tumblers into the tube and past the dents.

DENT HAMMERS

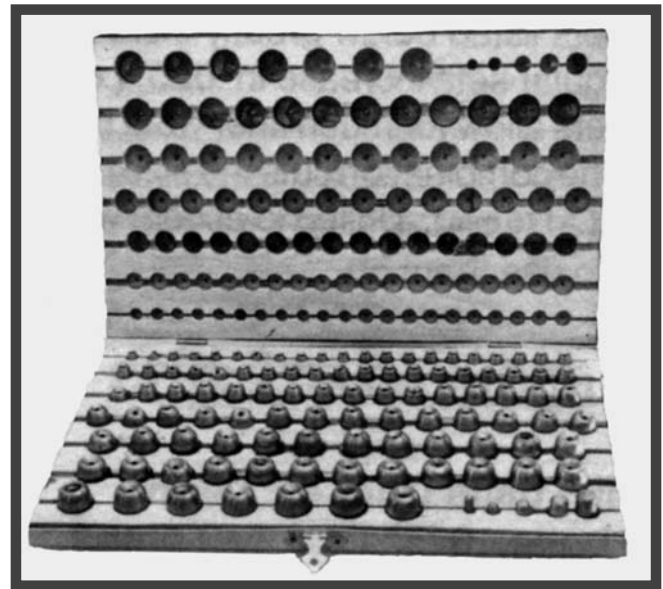
A good set of dent hammers is basic to both elementary as well as advanced, dent work. Select a set of hammers that offer a variety of faces and sizes to accommodate all your dent work requirements. The hammers must be properly hardened and tempered, and each face should be polished and buffed to a high luster so as to prevent causing any further damage to the surface that you may be working on. It is common practice to apply a protective face of self-adhesive Teflon to those hammers used directly on lacquered or plated surfaces.



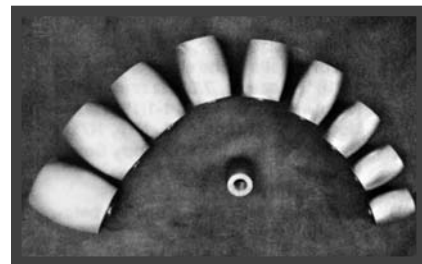
DENT HAMMER SET

DENT TUMBLERS AND DRIVERS

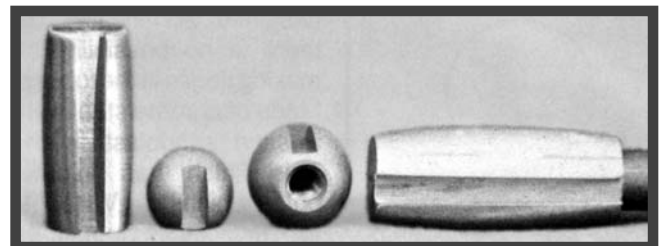
Another basic element to dent repair is an accurate set of hardened steel dent tumblers. A complete set will range from approximately 1/4" up to 3" graduating in small size increments. Most shops will limit the number of dent tumblers to fit the specific types and ranges of the tasks most often encountered. I strongly recommend that you drill-out and tap your tumblers to fit correspondingly threaded dent rods. This process will help to broaden the versatility of your tumbler set. Furthermore, I strongly recommend that you acquire steel tumblers so that you will be able to isolate them easily inside



SMALL DENT TUMBLER SET



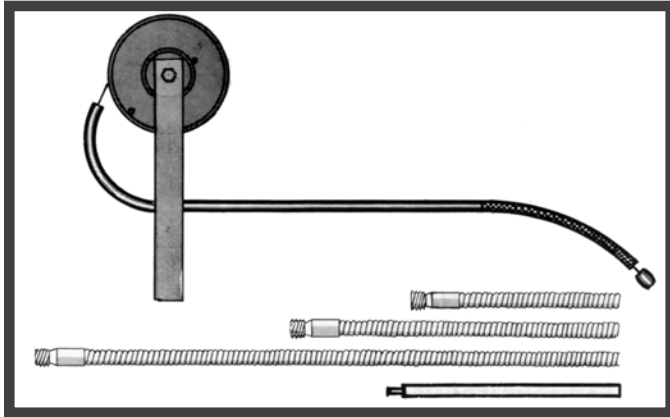
LARGE DENT TUMBLER SET



SLOTTED BALLS & TUMBLERS FOR SAXOPHONES

ROTH DENT REMOVAL OUTFIT

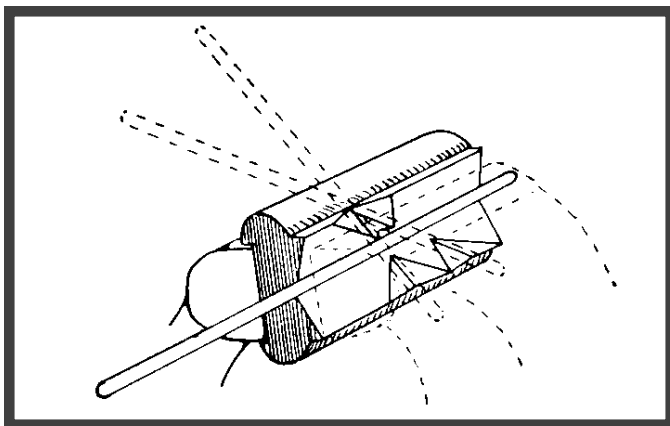
The Roth tool was developed by David Roth, a former instructor of Musical Instrument Repair at the Spokane Community College in Washington (this program no longer exists). It is a refinement of an idea that had been used in one form or another for many years by repair techs all over the civilized world. It is, in my opinion, one of the "must have" tools in any shop providing dent removal services. I still use one of the original versions of this tool, however the more advanced version, the Roth II, does offer some nice features. This tool will literally pay for itself in only a few applications.



"ROTH" DENT TOOL OUTFIT

'V'BLOCK

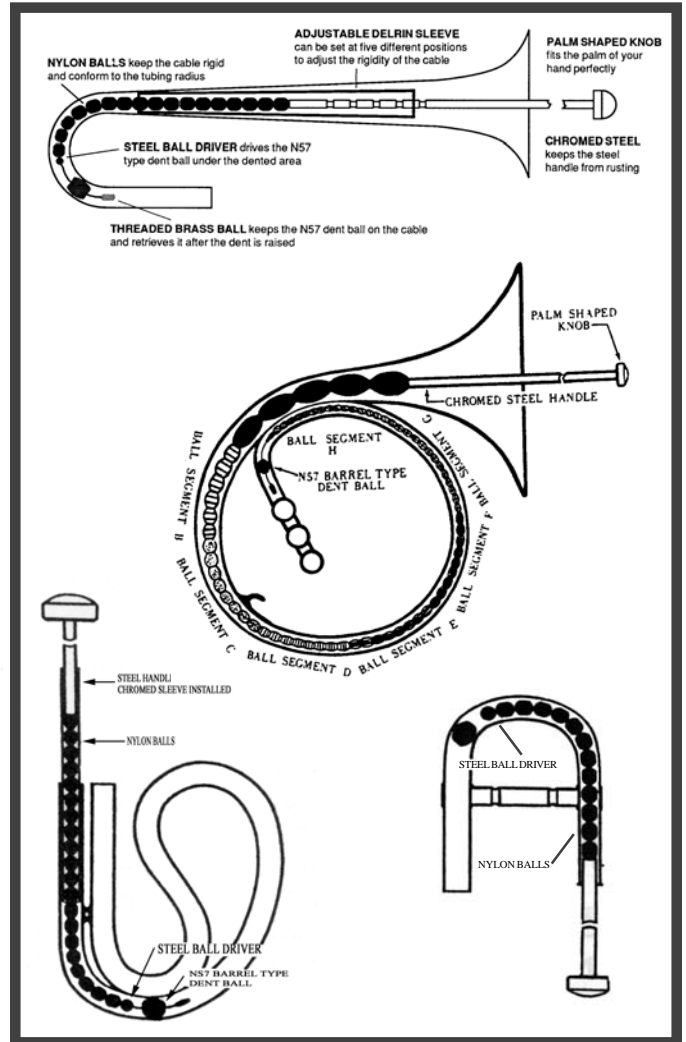
This device is used in conjunction with an opposing lead liner placed between the jaws of the vise and a round mandrel. This arrangement will stabilize the steel mandrel while in use. It will also help to reduce the extent of scratches and vise jaw marks on the steel mandrel. This is also considered basic in dent removal tools.



'V' BLOCK

FERREE DELRIN DENT BALL OUTFITS

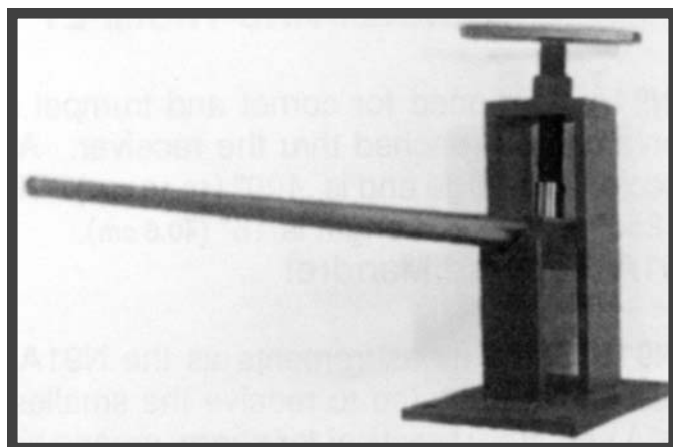
These tools are further refinements of the previously mentioned Roth system. They are relatively expensive. However, if you are required to provide french horn dent repair with any frequency, the initial expense may be more than justified. As with all the "system" tools, you must acquire skill through practice, as you can install many more dents than you actually remove if you jump-in feet first with this type of tool.



FERREE DELRIN BALL OUTFITS

MANDREL VISE

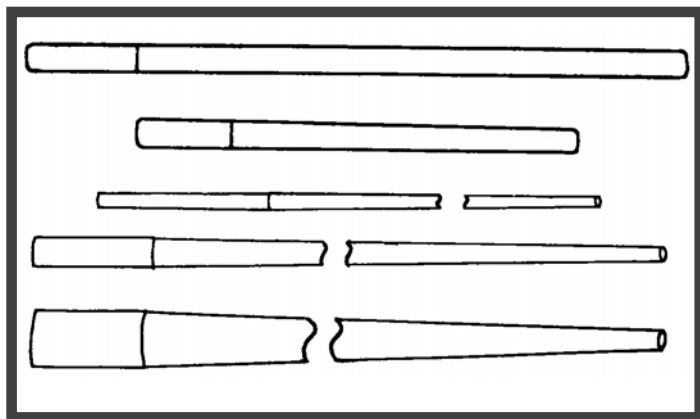
This is certainly one of my favorite tools when performing dent work. It provides all of the requirements of holding straight and tapered steel mandrels, in that you may remove and replace mandrels very quickly, and this tool holds/stabilizes mandrels extremely well. It also stabilizes expandable tenon mandrels (esp. flute tenon mandrel) exceptionally well. The vise I have is manufactured by Ferrees and is an extraordinary tool.



STATIONARY MANDREL VISE

TAPERED AND STRAIGHT STEEL MANDRELS

Steel mandrels are like blue eye shadow, you can never have too many steel mandrels. Steel mandrels come in two varieties; straight and tapered. Straight mandrels are used for straight tubing; when selecting (or making) a set of steel mandrels, choose a variety of outside diameters, tapers and lengths to cover your anticipated requirements. Additionally, be sure to store them lubricated and securely in an environmentally stable part of the shop (i.e. away from excessive moisture and corrosives). Periodic checks for scratches or other blemishes will be necessary to keep them in good working condition. When in use, the mandrel should correspond as nearly as possible (without exceeding) the inside diameter or taper being worked.



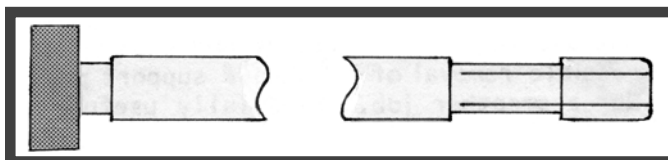
ASSORTED STRAIGHT & TAPERED MANDRELS

TROMBONE SLIDE MANDRELS

These long thin mandrels are usually purchased in sets of up to 15, ranging in O.D. from approximately .4219" (10.72 mm) up to .6094" (15.48 mm). These mandrels are approximately 4 feet in length and are used as a back-up surface for burnishing dents and other blemishes from the straight thin tubing of trombone slides. Caution should be taken to avoid applying excessive pressure to this type of slide mandrel while secured in a vise. If care is not taken, these mandrels may be easily bent out of alignment and be rendered relatively useless requiring that they be re-straightened.

EXPANDABLE TROMBONE SLIDE MANDRELS

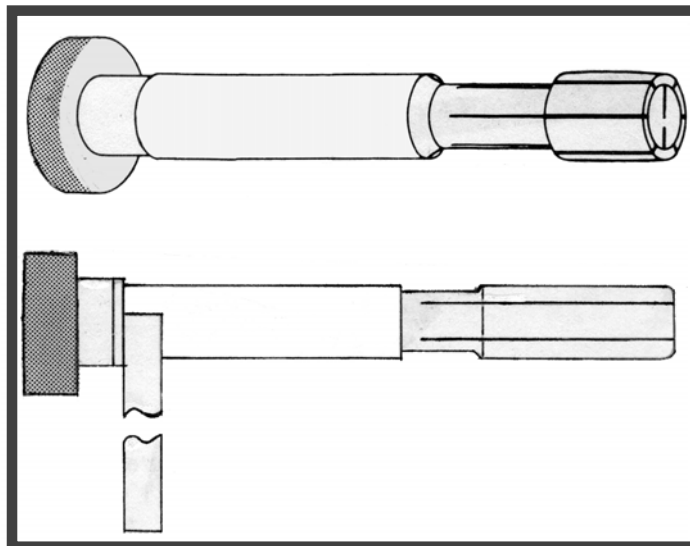
These tools will complement the aforementioned straight slide mandrels, and may extend the slide repair capabilities of your shop significantly. They, in effect, allow you to burnish dents and other blemishes from the *inside* of the slide. There are repair situations where each type of trombone slide mandrel may be more or less effective in application. It is for this reason we recommend both be included in your inventory of tools if possible. In a shop with a limited budget, however, I would recommend that they first purchase a set of rigid mandrels first, then acquire the expandable set at a later time as the cost may be justified.



EXPANDABLE TROMBONE SLIDE MANDREL

SHORT EXPANDABLE MANDRELS

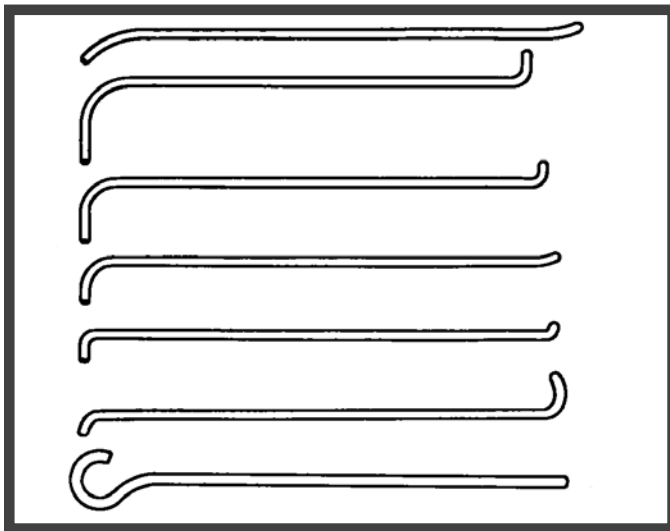
These mandrels are in effect, identical to the longer expandable trombone mandrels already mentioned, with the exception that they are much shorter and will be utilized primarily for adjusting and removing dents from short, straight tubing (i.e. brasswind tuning slides, flute and piccolo tenons, and saxophone neck tenons, etc.). As with all mandrels, care should be made so that the expandable jaws (bearing surfaces) are kept smooth, clean and lubricated. The expandable mandrels must also be disassembled from time to time, so that the internal threads may be cleaned and re-lubricated.



SHORT EXPANDABLE MANDRELS

RUBBING MANDRELS

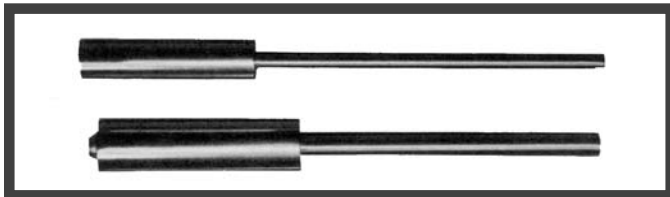
Although not utilized as often as some of the other tools, rubbing mandrels will come in handy in a variety of dent removal situations. The most common usage of rubbing mandrels will be in the rubbing-out of small pin-dents or other blemishes that are directly accessible on an instrument. These tools are made of a rigid steel rod with a very hard and smooth working surface.



ASSORTED RUBBING MANDRELS

“FAST EDDIE” ROLLER MANDRELS

This tool was refined by Eddie Strege (of Strege-Wuttke) when he was a tool designer for Allied Tool & Supply back in the late 60’s, I believe. Its principle advantage is that it largely eliminates the scratches one experiences when rubbing a dented brass surface across a conventional stationary mandrel. I find that it is especially handy when smoothing-out dents and ripples from lacquered or plated bells (esp. trumpets, trombones and french horns).



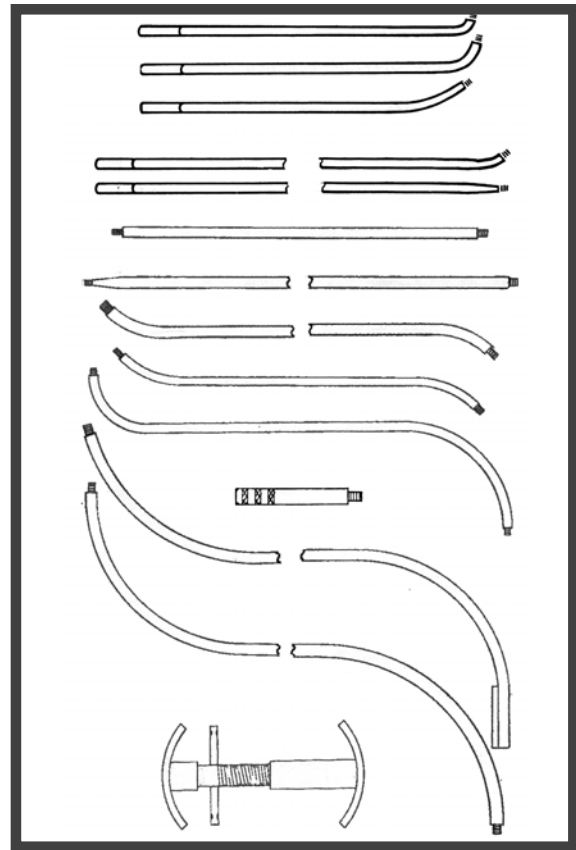
“FAST EDDIE” DENT ROLLERS

MOUTHPIECE SHANK MANDRELS

As is with many of the dent removal tools mentioned here, a set of mouthpiece receiver mandrels may be machined on a metal lathe with relative ease. As long as the taper corresponds closely with that of a specific mouthpiece shaft, straightening is an easy task with the aid of a leather mallet. Usually 3 or 4 common sizes are adequate for most shop situations.

THREADED DENT MANDRELS

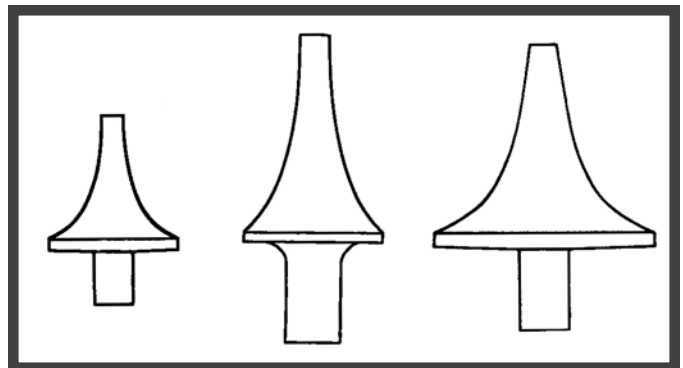
Naturally, the number and variety of threaded dent mandrels in your shop tool inventory will depend upon your overall anticipated requirements. Obviously, a shop which routinely performs complete overhauls will have a more extensive variety of threaded dent mandrels in its inventory than a shop which only performs routine playing-condition tasks. This type of dent mandrel is designed to fit a broad range of curvatures and sizes of musical instrument body types. The ends of the mandrels are threaded to accept various shapes of dent balls, each suited to a particular dent removal task or technique. Sets of compatible dent balls would be acquired along with the threaded dent mandrels. Following are examples of threaded dent mandrels.



ASSORTED THREADED DENT MANDRELS

BELL FORM MANDRELS

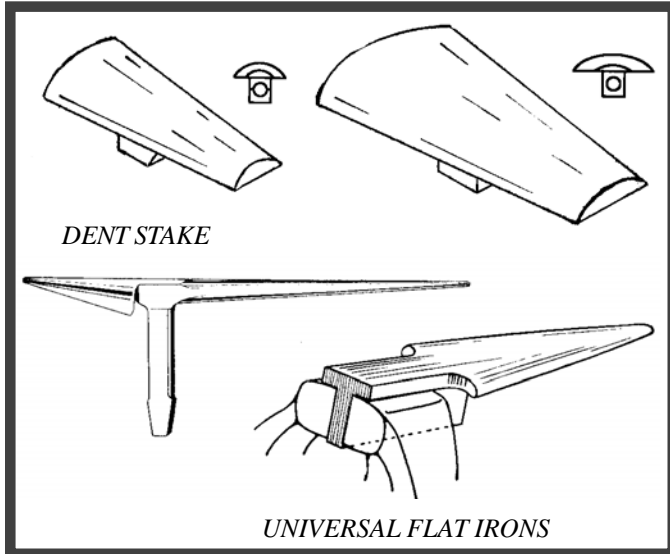
Bell mandrels for the smaller brasswinds (trumpet, cornet, and trombone), are readily available from most distributors of musical instrument repair equipment. These form mandrels are particularly useful in shops that handle a relatively large quantity of trumpets, cornets, and trombones. The initial expense of a bell mandrel will often be easily justified after only using it a few times, considering the ease and convenience this type of mandrel offers. As with all polished and buffed surfaces, these mandrels must be stored in a safe place and kept well lubricated to avoid corrosion. One technique that some repair technicians use to protect the face of their bell mandrels is to cut the flare off a scrap bell and place it over the mandrel when it is not in use.



BELL FORM MANDRELS

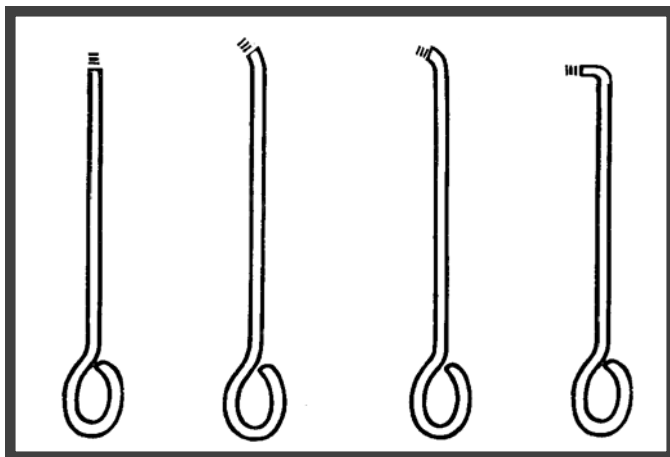
UNIVERSAL BELL IRON OR DENT STAKE

The application of this type of mandrel is identical to the previously mentioned form mandrels with the exception that this type is not formed per se to a specific taper, but instead offers a polished and buffed surface upon which a wide variety of bell tapers (trumpets to tubas), may be straightened in conjunction with burnishing tools and lubrication. Both the bell form mandrel and universal bell iron, will be required in the average shop performing brasswind overhauls.



KNUCKLE TOOLS

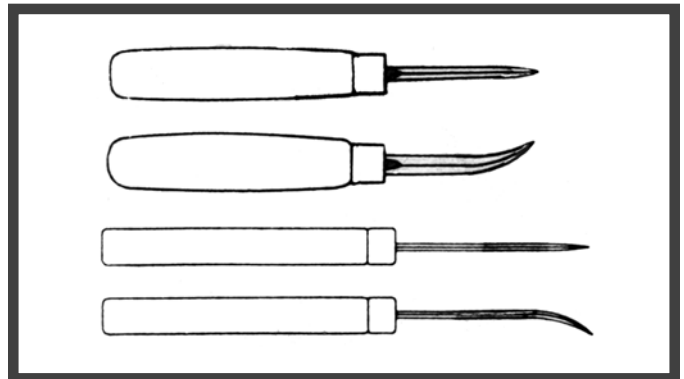
Often, a technician will be required to remove dents from a small crook or valve port, where the larger and more cumbersome equipment is ineffective. A set of knuckle tools will prove to be a worthwhile investment to even the small repair shop. The better knuckle sets are equipped with "T" handles and are made so that several sizes of small threaded dent balls may be easily screwed on or off the tips as required. To obtain maximum leverage, a knuckle tool may be set in a vise where simple hand pressure is inadequate.



ASSORTED KNUCKLE TOOLS

SMALL HAND BURNISHERS

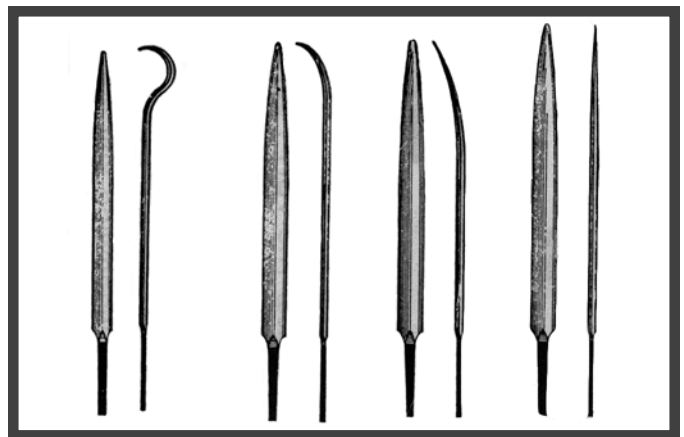
This type of burnisher is meant to be hand-held, with its primary purpose being the removal of blemishes from the surface of metal *without* removing any of the material itself (as is the case with an emery stick, file, buffing wheel, or grinding wheel). The blade of the burnisher is of a polished/buffed, hardened and tempered steel, and must always be kept in the best of condition, as it is possible to cause more blemishes on the surface with a burred tool than one can likely remove. The burnisher is often used in conjunction with a lubrication such as Teflon grease, oil, or waxed paper.



SMALL HAND BURNISHERS

LARGE BURNISHERS

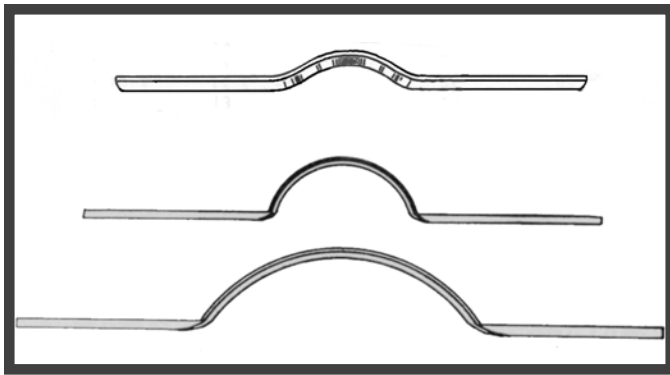
This type of burnisher is identical in function to the small burnisher, with the exception of their larger blade size and their longer handles (not shown) which may be placed under ones arm pit, for added leverage. These burnishers are best when working on larger areas or thicker metal stock. An accompanying lubrication is also recommended.



LARGE HOOK AND KNIFE BURNISHERS

DOUBLE HANDLED BURNISHER

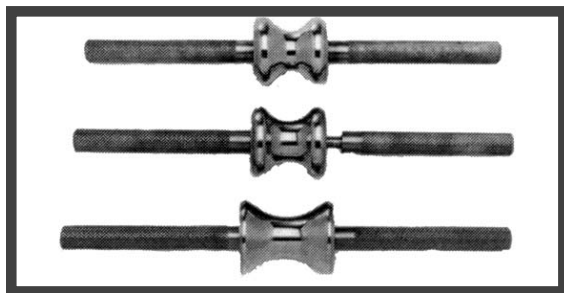
These may be purchased in a number of sizes, however, usually 3 sizes ranging in a diameter of from 3" to 8" is most common. This type of burnisher will come in handy where extensive leverage is required (i.e. on the larger brasswinds). As with the other types of burnishers, the polished/buffed inner working surface must be kept free of blemishes or metallic build up. Protect with carnauba wax between uses.



DOUBLE HANDLED BURNISHERS

DOUBLE HANDLED ROLLER BURNISHERS

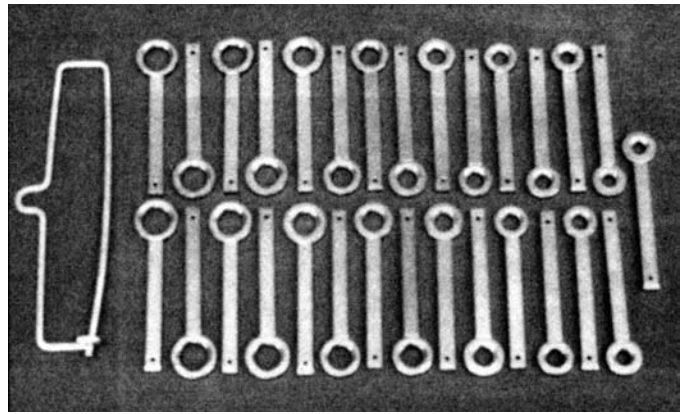
These tools utilize the same principle as the “Fast Eddie” roller mandrels mentioned earlier. They are used most often in conjunction with a straight or tapered steel mandrel of slightly smaller outside diameter. I find them to be invaluable when removing dents from flute headjoints and the straight portion of bell tapers especially. Trombone slides, goosenecks, and other straight slide tubes may be quickly straightened with a double handled roller, when used in conjunction with the appropriate back-up steel mandrel. As with all the smooth work surfaces of each of the mandrels and burnishing tools in the shop, you must wipe the surfaces clean and apply a protective wax coating after each use.



DOUBLE HANDLED “ROLLER” BURNISHERS

RING BURNISHERS

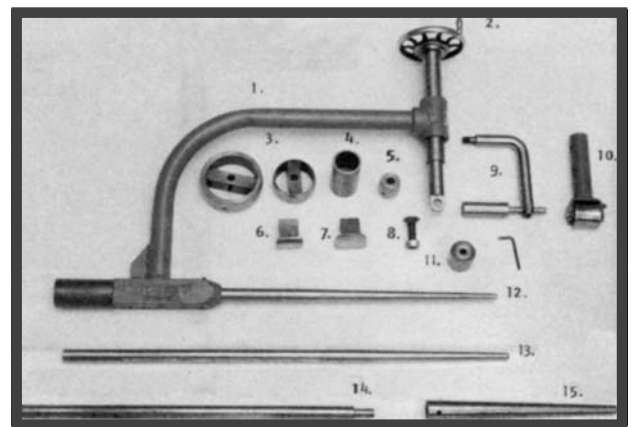
Applications for ring burnishers may be few and far between in most shops, however, there are times when a ring burnisher is the only practical solution for an isolated problem. One application that comes to mind is when you need to bring an oval-shaped trumpet bell bow back into round. Another application would be to burnish deeper scratches on slide tubes. In this manner, you would be able to render the scratch invisible without removing any material, thus avoiding the weakening of the tube. Additional weight may be clamped onto the shaft of the ring burnisher for added leverage. The advantage of the ring burnisher is that it is able to be matched-up perfectly with the OD of the tube size, and will allow the tech to use an intense focused amount of pressure without putting the tube continuity in jeopardy. A similar tool to the set of individual ring burnishers is the so-called ring plate, which is a hardened steel plate consisting of a series of graduated holes. It is used in similar fashion to the individual ring burnishers, however, it is more cumbersome to use.



RING BURNISHER SET

BURNISHING MACHINE W/BASE AND ACCESSORIES

This rather expensive outfit can be an invaluable tool in a shop that routinely handles a sufficient number of large brasswind overhauls (i.e. baritone horns, euphoniums, sousaphones, tubas). The application of this device is based primarily upon increased controlled leverage, and may eliminate some of the more cumbersome and time consuming conventional dent removal equipment. The main limitation of this piece of equipment is that dents and blemishes must be *directly* accessible (i.e. straight tubes, tapers, and bells). This burnishing machine will not replace any tooling already mentioned. Instead, it will only complement your existing tooling inventory.



TOP PORTION OF FERREE BURNISHING MACHINE

SLIDE HAMMERS (DENT PULLERS)

This is a tool borrowed from the auto body shop, albeit smaller. In the musical instrument repair shop it is particularly handy when you must remove dents in hard-to-get-to places. Sometimes, after completing an overhaul, small dents may be acquired in inaccessible areas of an instrument. The dent hammer is particularly handy in removing these dents. I have made several exchangeable tips for my smaller slide hammer to be used in a variety of situations. Larger slide hammers may be purchased inexpensively in hardware stores selling auto body dent tool kits.