

HIP SCRAPING

Hip scraping is a technique used where a large amount of material removal is required. This is generally in the 0.005-in.-to-0.010-in. range where machining the part is not practical. The large, round, slightly curved handle is positioned on your hip and held with both hands on the shank of the scraper. The left hand is close to the blade while the right hand is midway between the handle and the blade. The workpiece should be positioned at a height just above your knee. The scraper is placed on the work and the handle on your hip with your knee pointed at the work. As the knee is bent your body weight will fall on the scraper. This provides much more power to the scraper than pushing with your arms. The same technique is used as in hook scraping. Start the cut shallow and increase the pressure as the cut progresses, then release the pressure at the end of the cut (Fig. 20).

PULL SCRAPING

Pull scraping is employed when scraping a polymer bearing surface. Pull scraping is the act of pulling the scraper towards you in place of the push technique, and is used to prevent scraping sharp edges into the soft plastic material. Tercite is a popular brand of polymer bearing material widely used by manufactureres of CNC and NC machines because of its antifricition characteristics. Machine tool rebuilders use tercite to build up badly worn surfaces (machined off) to restore the original geometry of the parts.

The pull scraper blade is bent at about a 45° angle, and an angle of 20° positive rake is ground on the cutting edge. The blade is also curved as on the push scraper. High speed or some other tool steel should be used to allow hand sharpening on an oil stone. The Anderson scraper with a steel blade works fine, but it must be short coupled to prevent chatter.

To sharpen the blade, use a 1-by-2-by-8-in. oil stone. Place the stone on a towel to prevent sliding. The scraper blade is left on the handle when sharpening. Holding the scraper with your right hand close to the blade end and your left hand on the shank close to the handle, contact the stone with the blade to maintain the 20° angle. Swing the blade across the face of the stone following the curve of the blade. Two or three passes with moderate pressure should be sufficient. After sharpening the blade you should hone the



FIG. 20. Hip scraping.

flat side of the blade to clean the cutting edge. Use kerosene on the stone as a lubricant (Fig. 21).

Before starting the scraping, clean the part of excess glue and slightly chamfer the edges to prevent burrs. The burrs that are raised when scraping must be removed and a stone will not work on tercite. A high-speed steel tool bit that has been lapped to sharpen the edge works fine. Pull the tool bit across the surface being scraped and it will slice off the burrs (Fig. 22).

The technique in pull scraping is similar to push scraping by the fact that the cut must begin shallow, and increase in depth at the spot of bearing. The pressure is then released to pull the scraper out of the material.

To begin the cut, the blade is very close to the surface ahead of the spot to be cut. The pull stroke is then begun by lowering the scraper onto the material. As the point of bearing is approached, the scraper should be at its maximum depth. The pressure is then released by lifting the scraper off the material and then proceeding to the next spot to be scraped. This action will generate a circular motion (Fig. 23).

Red lead and bearing blue are used as the markers for tercite. The bearing spots will be large and blotchy. Judge the bearing by the even coverage of the surface with the large spots.

POWER SCRAPING

The use of the power scraper is usually determined by the work to be done. Where large heavy-duty machines are concerned, a power scraper will suffice. If heavy material removal is required, a power scraper can be used in the beginning and hand finishing at the end. Scraping steel is an excellent application of the power scraper.

All of the procedures used in hand scraping are also employed with power scraping; red lead, bearing blue, rock test, step cutting, etc.

Most power scrapers have adjustable strokes for rough or fine scraping. With scrapers that have a straight stroke, such as the Biax Power Scraper, the most efficient and even material removal will be accomplished by using a full length stroke and moving the scraper sideways to the stroke of the blade. Move the scraper randomly across the surface at a quick pace. This will make the cut more even and the tendency to scrape holes in the surface will be reduced.

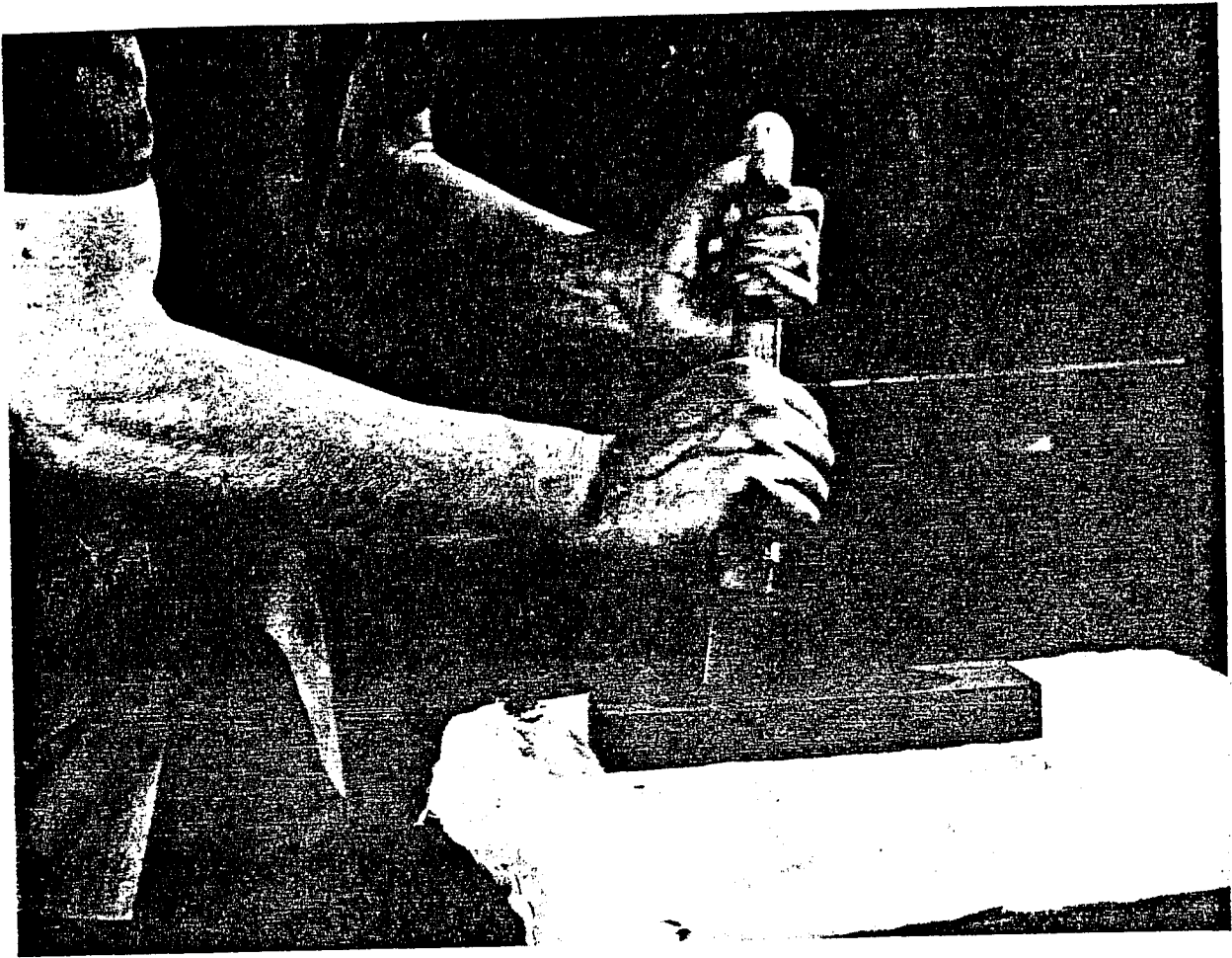


FIG. 21. Sharpening the pull scraper.



FIG. 22. Deburring tercite.

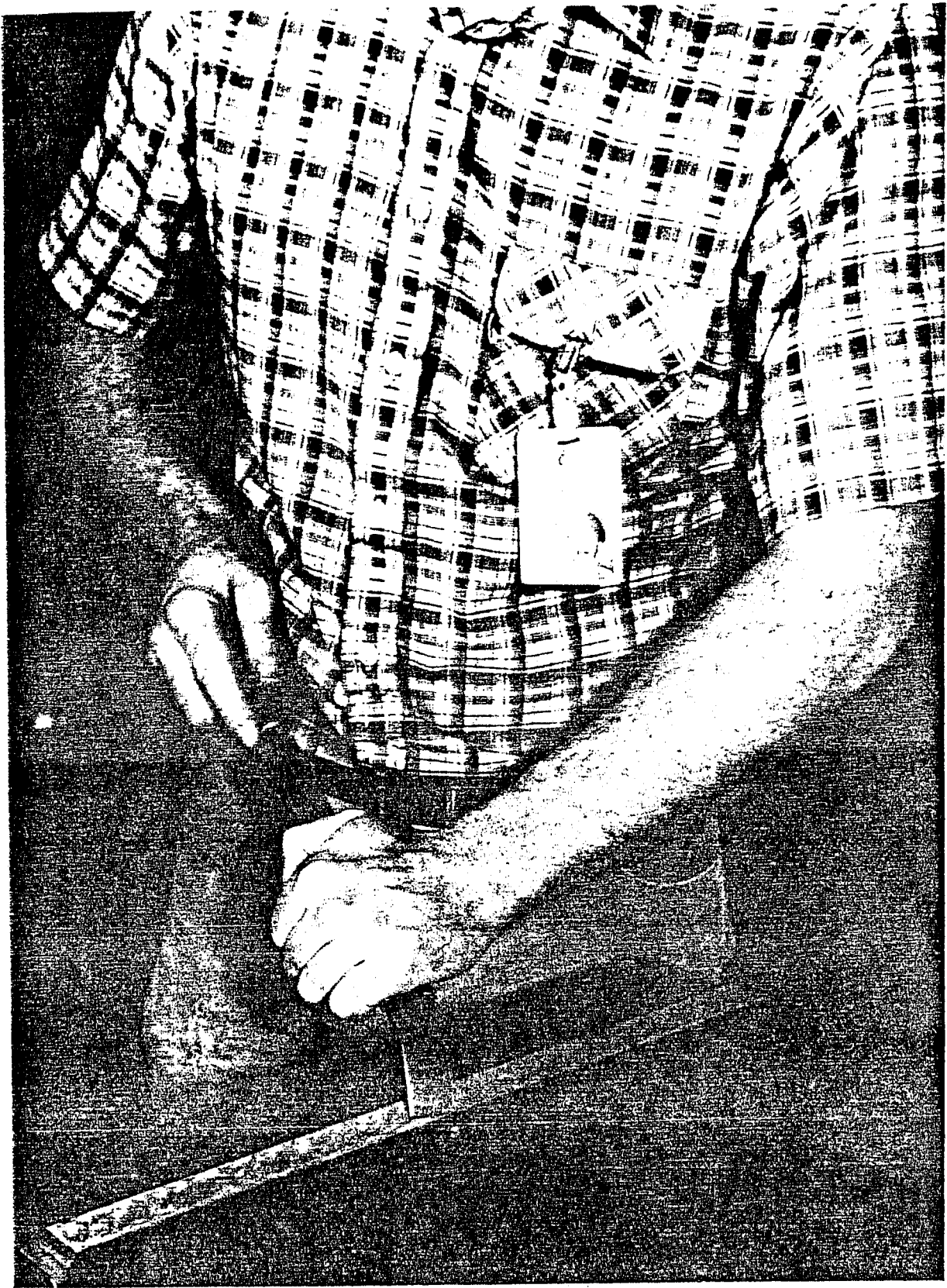


FIG. 23. Pull scraping.

A word of caution; when moving the scraper from side to side do not allow the scraper blade to rock over the corner because this will cause deep scratches (Fig. 24).

FLAKING

There are three purposes for flaking machine tool ways. First and foremost is to break up the smooth scraped surface, consequently reducing the area of contact and reducing friction. The second purpose is to provide pockets for lubrication, and the third is the decorative effect to enhance the appearance of the scraped surface.

Hand flaking is performed with the same tool used for scraping. Some prefer a longer shank than the standard scraper, but that is a matter of preference. For a more attractive appearance, flaking is generally done in two layers at a 45° angle to the bearing surface. Flake in the direction that is the most difficult first, because the pattern will not be as attractive; then cross this in the easier direction. The pattern that is applied last will be the most pronounced (Fig. 25).

To generate the crescent or half-moon flaking pattern, use the Anderson Scraper. With your left hand hold the shank of the scraper about midway between the blade and the handle. Rest the handle on your left shoulder. Place the scraper on the work at about a 45° angle, slightly tilted toward the left edge of the blade with moderate downward pressure. With your right hand make a tight fist and then reach around to the front of the scraper and strike the blade with a sharp rap with the heel of your fist. This striking is done in an even succession for the length of the pattern. You must learn to do this left-handed also.

To help develop this technique, I offer the following suggestions. Keep your left forearm in line with the line of flaking. When striking the blade, swing your right fist parallel to the part being flaked. Maintain a constant angle with the flaking tool as it is moved back by the striking. This is accomplished by moving your body back instead of moving your left arm while pivoting at the shoulder.

The half-moon flaking is the most popular and attractive method of flaking and lends itself well to flat surfaces but becomes very difficult, if not impossible, to flake bearing surfaces such as dovetails and vee ways.

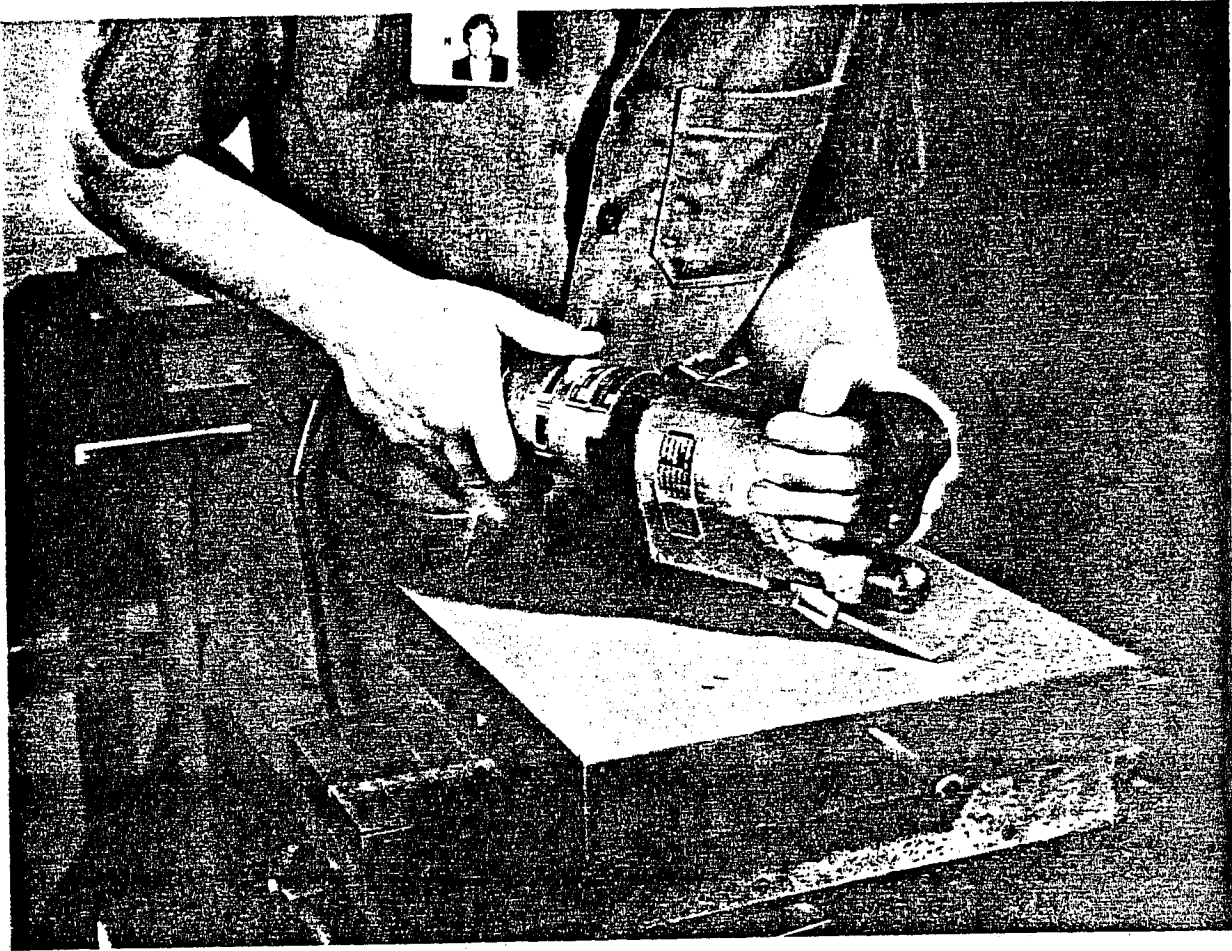


FIG. 24. Power scraping.

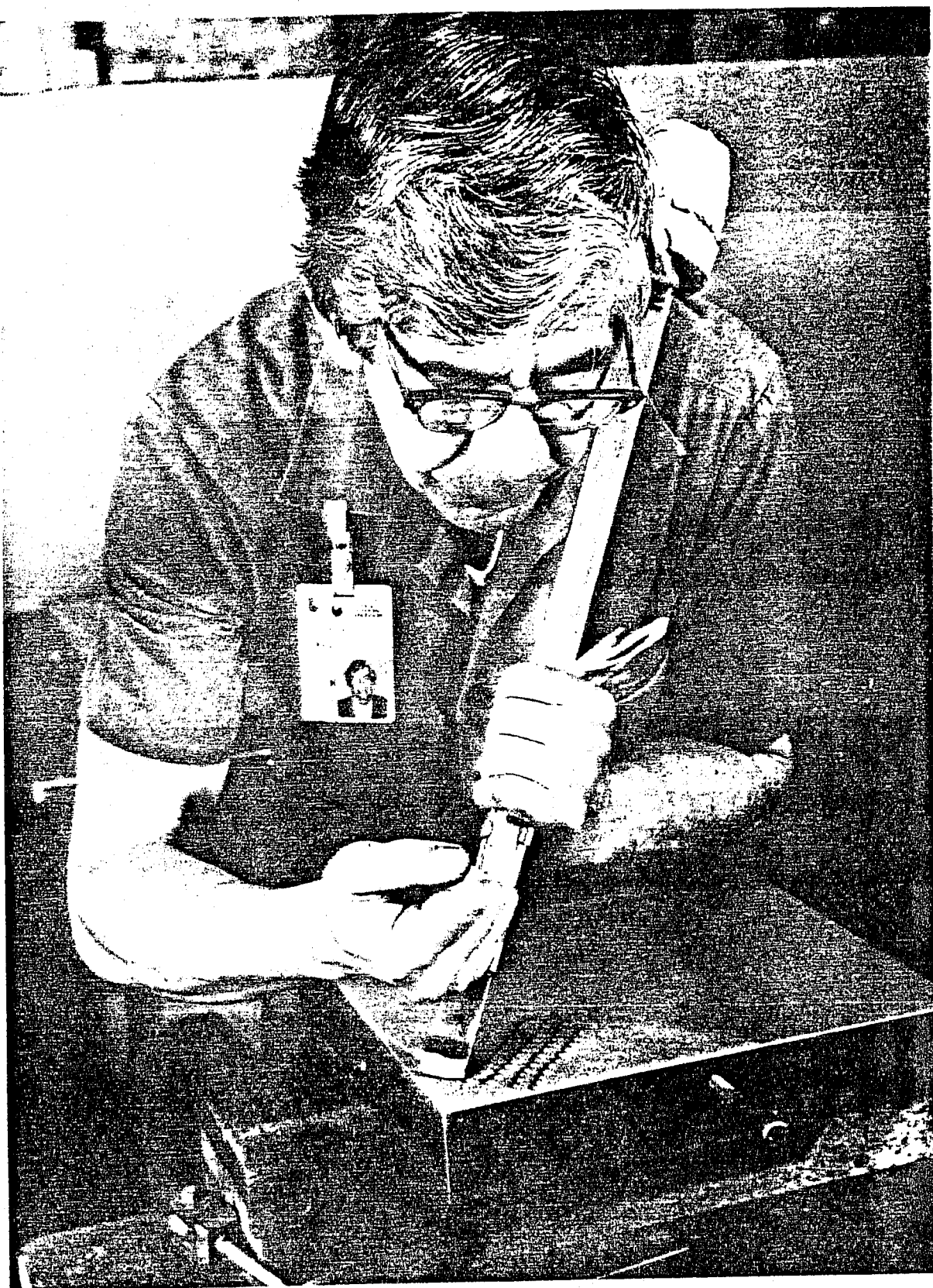


FIG. 25. Flaking a half-moon pattern.

Flaking dovetails requires the push method of flaking where a long tool such as the scraper can be pushed into the corner of the dovetail. This procedure is accomplished in several ways. The best but most difficult method is to use the same procedure as hook scraping, but keep the scraper moving in a straight line so as to generate a pattern. To master this procedure requires a great deal of practice, but it makes flaking dovetails very simple (Fig. 26).

Another procedure is to use the scraper and holding the shank with your left hand strike the handle with the palm of your right hand, again moving in a straight line. This method will produce a rectangular pattern that is very functional if not attractive (Fig. 27).

A variation of this method is to use a scraper blade welded to a light slide hammer. A word of caution in the use of this tool. It is very easy to strike the blade too hard, thus causing deep gouges in the surface. Therefore, use this tool with prudence (Fig. 28).

POWER FLAKERS

A power flaker is a very useful tool. These flakers produce a very uniform pattern and depth, at a very rapid rate, thereby producing a more functional and attractive job. The speed of the power flaker is significant as it can produce about 75% faster than hand flaking. The normal operation of the power flaker, which is a straight line push, lends itself to flaking dovetails and vee ways (Fig. 29).

REFERENCE READING

Wayne R. Moore, *Foundations of Mechanical Accuracy* (Moore Special Tool Company, 1970).

REFERENCE VIDEO TAPE

Video tape (12 minutes), *The Art of Hand Scraping* by Robert R. Wade. Production #385, Technical Information Department, Lawrence Livermore National Laboratory, Livermore, CA, January 1, 1981.



FIG. 26. Push hand flaking.



FIG. 27. Flaking push/with hand.



FIG. 28. Slide hammer flaking.

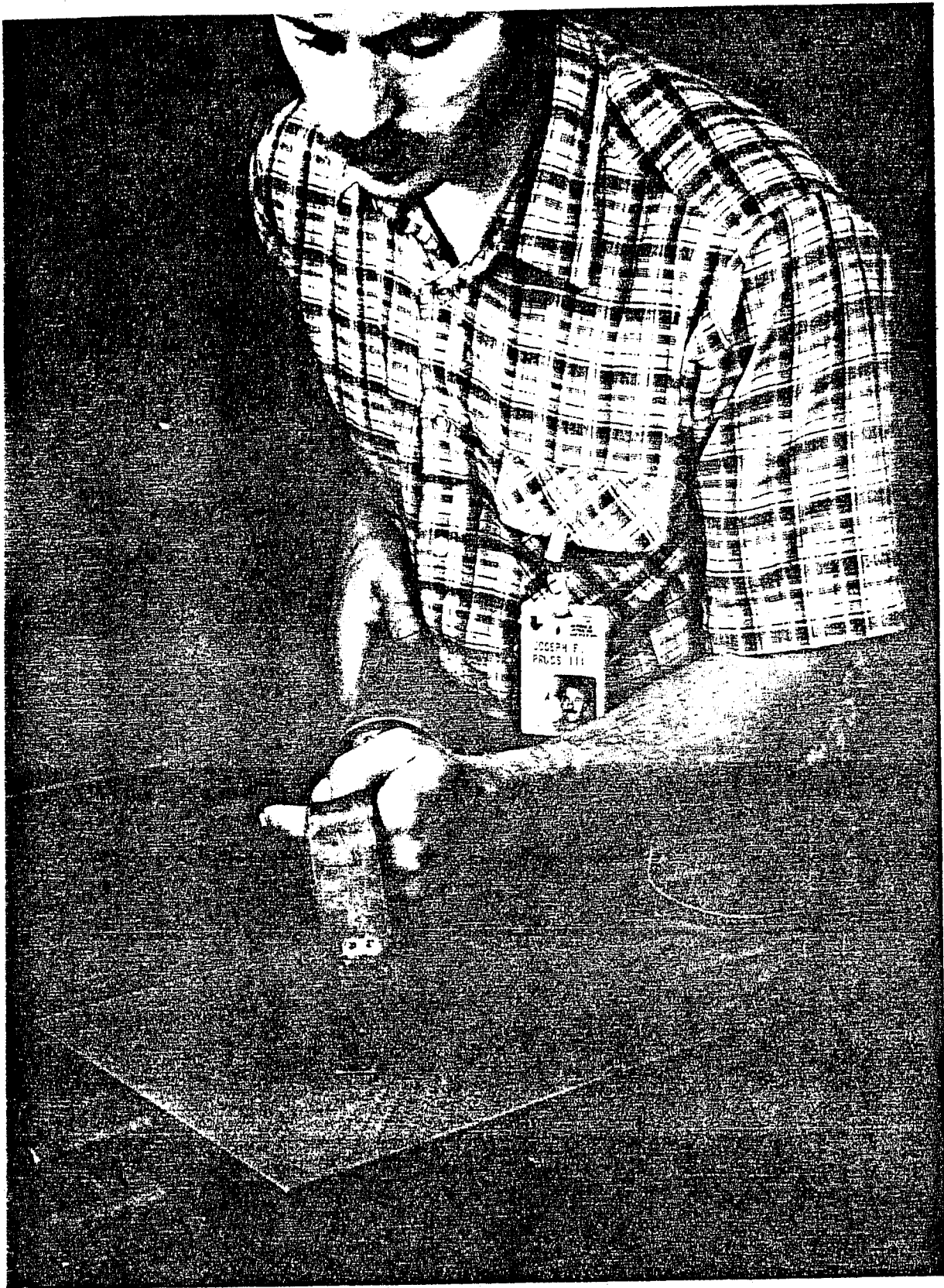


FIG. 29. Power flaking.

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