

R. BROOKS

JUL 12 1937

INSTRUCTION BOOK and PARTS CATALOG

For Standard Type Pantograph Machines



This book to be used in combination with:

Accessories Catalog . . . 1317
Copy Catalog 1309
Samples of Work Catalog 1370

Form 1385

GEORGE GORTON MACHINE CO.
RACINE, WISCONSIN, U. S. A.

INSTRUCTION BOOK and PARTS CATALOG

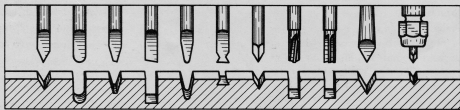
For Gorton Pantograph Machines • Standard Type •
 Models 3-F, 3-U • 3-X, 3-Z • 3-S • 3-K • 3-H • 3-R • 1-H
 also Parts List covering obsolete models
 1-A, 1-C, 1-D, 1-J, 1-T, 3-A, 3-C, 3-G, 3-J.

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GRINDING CUTTERS . . SHAPE OF POINTS . . WHEELS



Typical Cutter Points and Cuts

General

The importance of correct grinding of the cutters used on Gorton Pantograph machines cannot be stressed too strongly. Satisfactory work cannot be produced if the cutters have been incorrectly ground. The following instructions on cutter grinding should be read and carefully followed. It is *absolutely essential* that suitable equipment be available for grinding the small cutters used with Gorton machines. If you do not have such equipment, we would suggest the purchase of a Gorton 375-1 or 265-4 grinder, as shown in separate booklet. Both these machines do the same class of work and operate in the same manner. The 375-1 is the more expensive and has many refinements not incorporated in the 265-4.

If no cutter grinding equipment is available, Gorton taper shank cutters can be ground on the Pantograph machine by using the mounted wheels described on page 10, Accessories catalog. Use maximum speed of 8,000 R.P.M. (The attachment will not handle straight shank cutters.) These have a taper shank and fit in the cutter spindle. The cutter is held by Attachment 288-1 illustrated on page 11, Accessories catalog. We do not recommend this method unless it is impossible to purchase a cutter grinder, as it throws grinding dust over the machine which works into the slides and bearings.

Shape of Cutter Points

Practically all of the cutters used in Gorton Pantograph machines are of the single lip type. A typical assortment is illustrated above. Occasionally for special work, 3-, 4- or 6 sided cutters like cut above, are used. Standard spiral flute end mills are also used for side milling, as in profiling, and

for some types of die-cutting. Reference to pages 2, 3, 4, 5, 6, 7, of Accessories catalog will show suitable cutters, with collets, etc., for holding. In general, the single lip straight shank cutters are used for heavier work, and the Gorton taper shank type for the lighter engraving of small characters and designs.

Single lip cutters are usually ground with a conical point, the angle depending on depth and width of face required. A table of suggested angles and clearances for different types of work is given on page 25.

Grinding Wheels

The wrong grade of wheel will easily draw the temper of small cutters and make them soft. Use the correct grade of wheel. Suggested grades for different purposes are listed on page 10 of Accessories catalog. Dress wheels frequently with the diamond dresser provided, and also listed in Accessories catalog. This is very inexpensive and will repay its small purchase price many times over. (One is furnished with each Gorton grinder.) Occasionally go over wheels after diamond dressing with a star wheel dresser. Keep wheel free of grease and avoid touching with greasy fingers. Never grind continuously in one spot; keep tool moving. Keep wheel spindle snug and free from vibration.

Special wheels for grinding and lapping the new hard alloys are listed on page 10 of Accessories catalog. These permit much faster grinding and lapping of these materials than heretofore possible. When grinding tungsten carbide tools dry, never dip in a coolant,—it may cause checking. Do not force the tool against the wheel,—use light pressures only.

GRINDING CUTTERS WITH GORTON CUTTER GRINDERS

Truing Grinding Wheel

True up grinding wheel, using diamond tool 7566-A (page 11, Accessories catalog) which is furnished with grinder. This tool has a taper shank and can be inserted in grinders having tool heads fitting Gorton taper shank tools only, or it can be held on its diameter in a $\frac{3}{8}$ " collet in any of the collet type tool heads. After inserting the diamond, set the tool head at approximately the same relation to the wheel shown in Fig. 1. Then swing across face of wheel by rocking the tool head in much the same manner as for grinding a cutter.

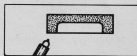


Fig. 1—Truing Wheel

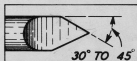


Fig. 2—Set Tool Head to Desired Cutter Angle

Grinding Conical Point and Cutting Edge.

Set tool head of grinder to angle desired on cutting edge. This usually varies from 30 to 45 degrees, depending on the work desired. See Fig. 2. Now place cutter in tool head and rough grind to approximate size by swinging across face of wheel as with the diamond dresser above, and like Fig. 3. Do not rotate the cutter while rough grinding the bulk of stock, as it will burn more easily. After roughing, the cone should consist of a series of flats like Fig. 3. Now continue as above, but rotating the cutter also, to produce a smooth finish, free as possible from wheel marks.



Fig. 3—Before and After Roughing

Grinding Clearance

The cutter is now the correct angle, with a cutting edge, but it has no chip clearance. This should be approximately 5 degrees on back side of cutting edge (the exact angle of cutter and proper clearance will be determined by the various classes of work, see pages 25 and 27). For example, set tool head at 30 degrees and grind conical point, then reset tool head at 25 degrees for clearance. Feed cutter with back side (round side) against grinding wheel and grind a flat as close to cutting edge as possible, but *be careful not to disturb cutting edge*. Do not rotate cutter when grinding this flat. Now revolve cutter by turning cutter back and forth, and at the same time swinging across face of wheel just as when grinding the conical point, but being careful not to revolve cutter too far against grinding wheel and so disturb the cutting edge. An enlarged view of the cutter point should now appear like Fig. 5, and a cross section like Fig. 6. Note that the cutters should rotate in a clock-wise direction when viewed from above.

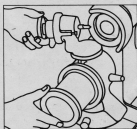


Fig. 4—Grinding with 375-1



Fig. 5—Cutting Edge and Clearance

Grinding Flat Side to Center—Tipping Off, Etc.

Most Gorton single lip cutters have a flat side ground to exact center, but in some cases this is a trifle full, for additional strength, as indicated by dotted line in Fig. 7. After proceeding as above, examine the conical point with a magnifying glass to see if flat and point coincide. If not, grind the flat back until it does, taking especial care to get it square with original surface.

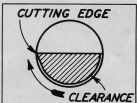


Fig. 6—Section Through Fig. 5 on Dotted Line

(Continued page 24)

GRINDING CUTTERS WITH GORTON CUTTER GRINDERS

Continued

It will often be found desirable to use a cutter with a blunted point or "tipped off," particularly on work requiring severe service where the very point could easily be broken off. This is done by hand, holding the cutter against the face of wheel and grinding at an angle back from the cutting edge, which is always the high point. See Fig. 7. This tip should also be sloped back from the flat as shown. When straight-sided single lip cutters are ground, they are always tipped off in this manner as Fig. 8, unless all the cutting will be done with the side of cutter, in which case the end will not matter. Cutters tipped off in this way enable them to penetrate like a drill when first fed into the work to begin cutting a line.

3 and 4 Sided Cutters

Sometimes it is desired to grind cutters with 3 or 4 sides like Fig. 9, and in such cutters no clearance or flat, etc., is required. Such cutters are indexed for the desired number of sides by using the index dial and plunger of grinder tool head. This type of cutter is used for very light engraving, and will produce a smoother finish than the single lip cutters.

GRINDING CUTTERS WITH ATTACHMENT 288-1 ON PANTOGRAPH MACHINES

(As shown on page 11, Accessories Catalog)

First: Insert Pantograph style into hole in copy holder. This holds cutter head rigid.

If cutter head is equipped with depth gauge, loosen foot nut and swing foot outward. Now insert grinding wheel and bolt cutter holder base in place, with cutter point at inside edge of wheel, all as photo at lower right.

Remove cutter holder by lifting spring slightly and insert cutter tightly, using small wrench.

Replace cutter holder and grind cutter point to the proper angle by revolving cutter and shifting table with cross slides.

With cutter pointed as desired, it must be ground for clearance, as shown on Fig. 5, page 23, which means grinding away the metal back of cutting edge so that cutter will cut free and raise no burr on work. To grind this clearance, table must be shifted slightly so that wheel will grind above the cutter point.

By rotating cutter (half turn) back and forth, clearance can be ground without actually grinding the point and cutting edge more than just enough to bring it to a sharp edge. Remove point slightly with a fine oilstone.

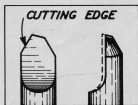


Fig. 7—A "Tipped Off" Cutter



Fig. 8—Straight Side Cutter

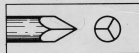


Fig. 9—3-Sided Cutter



Grinding Cutter with Attachment 288-1

GRINDING CUTTERS—Continued . OPERATION OF CUTTERS

Recommended Angles and Clearances

Single lip, conical point cutters, as illustrated on pages 23 and 24, are usually ground to about 30 degrees (60 degrees included angle) for general engraving, with a clearance of five degrees. This clearance will not vary more than two or three degrees, regardless of the material to be cut or angle of conical point. However, with soft materials the clearance may be greater, and with hard materials, less. See page 27 for recommended cutter angles on steel stamps.

Grinding Very Fine Cutter Points

Most of the difficulties experienced when using extremely small cutters on small lettering in dies and stamps are caused by improper grinding. This applies especially to the *very cutter point* where possibly only .01" of the point is used.

This *very point*, therefore, is the part that *must* be accurately sharpened. If the actual *point* is not perfect, a cutter that may be beautifully ground in all other respects is simply no good for doing the work. Examine the point with a good magnifying glass, and do not try to use the cutter until you are satisfied that it is in perfect condition for doing the kind of work you have a right to expect of it. When trouble is experienced, usually the point is *burned*, or the flat is either *too high* or *too low*. Perhaps the clearance does not run clear out to the *point*. Sometimes stoning off the flat with a small fine oil stone will make the cutting edge keener.

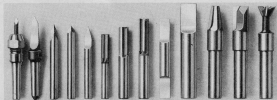


Grinding Cutters on 375-1
Cutter Grinder

For small, fine sunk letters 1/32" to 1/16" high and say, .005" to .015" depth of cut, grind the cutter in place in the spindle of the machine to an angle of about 25 degrees. Trace the copy *evenly and steadily* as a sudden jerk will be almost certain to break off the cutter point. A correctly ground cutter should engrave from 30 to 50 characters this size in annealed tool steel before resharpening.

Operation of Cutters—General
After the cutter has been placed in operation, it must be kept sharp and with proper clearance

at all times. This is particularly important when running at extremely high speeds as a dull cutter burns quickly. If the cutter raises a burr, it is pretty certain to be dull or without clearance, or both. Cutters will not always cut the same kind of material with equal facility as materials vary in density and hardness, even in the same piece. A dirty or worn collet may cause a cutter to run out of true. Loose or badly worn spindle bearings will frequently cause the cutter to break. Wring the cutter (if taper shank) in the spindle very tight. Do not continue with a cutter if it comes loose, or the spindle will be worn so that no cutter can be held properly. If this happens, check taper of cutter in spindle by rubbing on a little Prussian blue. The cutter should fit more tightly at small end than large. If the blue shows otherwise, and the spindle is old, it is probably worn out of true and needs replacing.



Typical Cutter Shapes