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INSTRUCTIONS FOR ROTATING TUMBLERS

INTRODUCTION

These instructions are applicable to the types of tumblers that have revolving barrels (drums). The barrel may be in a horizontal position, rotating on a set of rollers or it may be in a tilted position as on a cement mixer.

DESCRIPTION

Covington Roll-N-Tumble tumbler series provides single, double and triple drum units in quart, half gallon or gallon size. The thick polyvinyl drums run quietly. Spiral riffles inside the drum move the load from side to side while the drum is in motion. Proper rotary speed is preset to ensure maximum abrasive or polishing action.

Covington Deluxe Tumbler Model #250 (cement mixer type) provides 3-way tumbling action. Hexagon drum shape forces stone to abrade and change position within the load. Small hole in drum cap vents gas pressure.

Covington 40-lb. Production Tumbler Model #268 is capable of extended use for large production loads. Unit comes with heavy steel hexagonal barrel and rubber liner.

SETUP

Place tumblers units on a sturdy work bench, table or flat surface. Each unit comes with 110V, 60 cycle motor, switch and 3 prong electric cord. Before plugging into your electrical supply, read Covington Safety Demand Sheet enclosed.

MAINTENANCE

1/18 HP Motor: No lubrication of motor is necessary. It is normal for the motor to run hot. The motor's interior should be "blown out" occasionally by using an air hose. This cleans out lint and dust which collects inside the motor. Keep the unit clean.

1/10 HP and 1/3 HP Motors: Do not require periodic lubrication unless grease fittings are provided, in which case lubrication twice a year is suggested. Follow re-oiling instructions on the motor, if any. DO NOT over lubricate.

Barrel: Wash clean before storing and before each cycle. After loading, ensure the cap is securely fastened.

Gas Pressure: A build-up of pressure will occur due to acid in the water, metal in the stone temperature. A tablespoon of soda per 8 lbs. of stone will help prevent formation of gas. Load should be inspected and gas vented at least every 24 hours.

LOAD

Careful selection of the gem material is important. Mixing of varying stone hardness is not recommended (see Gem Material Hardness List). Some smaller material, however, should be mixed with the larger stones. One manufacturer advises using smaller stones while the other recommends ceramic filler.

It is suggested the barrel be filled 50 to 75% full when loading. Weighing of rough materials is not always necessary, but this will help in judging necessary requirements for abrasives and polishing powders. Loads for the barrel may not always be up to maximum as recommended in pounds. This is due to the varying densities of materials. For instance, 4 lbs. of obsidian will not occupy the same "space" as 4 lbs. of garnet. Sizes and shapes of material will also govern to a certain degree the "poundage" that is possible to process in the barrel. The important thing to remember and one of the most essential in rotary tumbling is the load be "balanced."

"Balancing" the load is accomplished by proportioning materials by size. For instance, a load of gem materials which are all 1-1/2" in size would result only in chipped edges, spalled material and poor final results. **DO NOT** attempt to process loads of rough materials which are all the same size. Approximately 20% to 25% of the load (by weight) should consist of smaller materials from 1/4" to ½" in diameter. In the event smaller stones are not available, it is suggested filler material be used as this media.

For Best Results using a 1-Gallon Barrel:
Load - Tumble 9 to 12 lbs. Of stone (60% full).
Rough Grind - Use l lb. Of 80 silicon carbide grit.
Other Grinds - Use 3/4 lb. of 220, 400 or 600 silicon carbide grit.
Polish - Use 3/4 lb. of Covington Tumbling Polish, Cerium Oxide or Tin Oxide.
Detergent Wash - Use 4 or 5 cups of detergent soap.
Quart Size Barrels - Use 4 heaping tablespoons of grit or 3 of the polish.

FILLER MEDIA

Normally on materials of 6-1/2 or more in hardness, Filler Material need not be used except in the polish phase. On obsidian and stones of 5 or less in hardness, Filler Material should be used on all grind and polish cycles as the stones will abrade themselves. Approximately 1/4 cup of filler per pound of load is a good general formula for use of this tumbling aid. Fillers may be of most any type of suitable material. To mention a few, hardwood sawdust, maple pegs, small masonite chips, rice hulls, etc. When using Filler Material, it is well to remember that it is being used for a specific purpose.

Filler Material aids in thickening the solution surrounding the stones and in addition cushions the load. This in turn reduces the impact of one stone against the other, reducing fracturing, and spalling. When using Filler Materials as mentioned before, additional liquid may have to be added to the load to obtain the desired consistency. It is also probable that tumbling times may have to be increased to compensate for the thickened solutions.

When processing loads of extremely soft or fragile materials, the use of cushioning agents, fillers and thickened solutions is mandatory.

ROUGH GRIND

Wash the stones thoroughly and fill barrel about 60% full. Add 80 grit and enough water to cover the load. The all important element in tumbling with a revolving barrel unit is slurry thickness. As the stones wear away, the rock dust, moisture and abrasive mix to form a slurry which coats the gems. Only a thin coating is needed for the right abrasive action. If the slurry becomes too thick, grinding action is halted. It may be necessary to add a little more water or sometimes the slurry must be discarded.

ROUGH GRIND CONTINUED:

Rock dust will thicken the mass and adding water will slow the grind. To wash, remove the barrel and slowly flush inside with a stream of water (DO NOT allow flushing into piping or sewer. This material will cause plugging and damage.) By flushing in this manner, the remaining good grit will stay in the bowl for continued grinding. Pour off excess water from barrel. Remember, under ideal conditions with no rock dust, the thicker the slurry - the faster the cutting action of the abrasive. The slurry, however, must be fluid enough to allow motion.

Periodic checks of the load and slurry thickness are important. After the coarse grind, everything must be washed thoroughly. Stones with deep pits are saved back for another run in coarse abrasive.

DAILY CHECKS

After 24 hours, open the barrel and determine if the slurry is in the proper thickness. Check the stones with fingers to feel grit. The grit will not be worn out in this first test. Usually coarse 80 grit will last at least 100 hours. The first finger test, however, will inform you what the stone should feel like in subsequent tests.

Pick out a few stones and thoroughly wash and dry. Water on stones hides blemishes. Inspect the gems thoroughly to see if the abrasive is rounding them. During the last days of the grind, check to see if blemishes are being removed and the stones are forming pleasing shapes. Also check for grit breakdown. Wash stones over a pan. Let the pan set until the grit settles to the bottom. It should be partially broken down, but not completely. If it is reduced to fine powder, more grit must be added to the tumbler. If the load has become a thick mass that is not tumbling properly, pour off some grit and add fresh water. If the grit has broken down, add only about 1/4 as much grit as you started with and continue to tumble.

GRINDING TIME

A round barrel running at proper speed and carefully checked will rough grind a load of selected beach agate in 100 hours, fine grind in 100 hours, polish in 50 hours and detergent run in 12 hours. The same material in a hexagonal tumbler will require about 50% more time.

Hammer broken hard materials such as India Bloodstone or Montana Dendritic Agate in round barrels may require 3 or 4 rough grindings of 5 days each, with fine grind of 4 days, polish of 3 days.

Grinding time in rough grit varies and is difficult to specify. Keeping a log of your findings is very important. Set up a chart to show the type of stones, abrasive used, slurry consistency, how long it took for each step, and any other pertinent data.

The objective is to grind out the pits, surface fractures, rough spots, preparatory to finishing the surface by finer grinding. Do not expect every stone to be perfect. Use judgment about when to quit. Continuation of the grind after 75% is done is poor economy. Keep in mind the stones will not change much from rough grind to finish. Only minor blemishes will be removed and no amount of fine grind or polish will cure a defect.

Let the stones dry for a final test. When you examine them, look at each stone. Turn it over under good light. If 20 or 30 are rough grind completed, take the 20 and proceed with a finer grit grind.

OTHER GRINDS

Suggested sequence of grinds depends on the hardness of the material. The harder the material, the more steps of grind must be made to get a smooth semi-gloss surface. A good polish can only be had when all marks of the coarser grind have been removed. Stones having a gem material hardness of 6 or more should use the following grind sequence: 80 grit (repeat optional), 220 grit (medium), 400 grit (fine), 600 grit (pre-polish), then polish.

OLD MISER

To aid in the slurry formation and achieve a more uniform grit distribution, it is suggested Covington "Old Miser" be added. This causes the even distribution of the grit and helps the grit to adhere to the rocks. Only a small quantity of 1 to 4 teaspoons need to be used.

PROCESSING PREFORMS

If stones come directly from sawing or grinding operations and are free from saw marks or pronounced grinding marks, the Rough Grind cycle may be omitted. Begin with the Find Grind cycle. If the stones have been sanded, then the Fine Grind cycle may also be omitted. Preforms do require a buffer material (filler media) or sharp edges will be chipped.

FINE GRIND

The next grind is with 400 or 3F grit. Use 3/4 pound of abrasive for a one gallon barrel and enough water to cover the load. The barrel should be at least ½ full. If not, more material should be added. Only material that has gone through the previous grinds should be used as filler.

In the fine grind it may be necessary to add water if the slurry becomes too thick. **DO NOT** add fresh grit during this process. Sometimes it is necessary to thicken the slurry, Old Miser, sugar, or oatmeal can accomplish this. Some prefer to add fillers such as plastic pellets, corncob, or walnut shells. The important thing is to keep the stones from chipping during final grind.

Remove stones as soon as desired texture has been reached. Stones will normally appear hazy over the entire surface and when hand rubbed on a piece of felt or similar cloth, a semi-gloss will appear. This means the stones are ready for the polish cycle. Sort out pitted stones remaining and re-run in your next rough grind cycle. Continue with the remainder of the load to the next polish cycle, cleaning and washing as per previous instructions.

FINAL POLISH

When stones are absolutely ready for polishing, wash everything until it is super clean and absolutely free of grit. It may be necessary to scrub the stones individually with a brush. Sort out any rough or broken stones that can scratch others.

Put stones in barrel. Be careful. More stones are damaged at this stage by rough handling than in the tumbling process. It is advisable to use a filler to cushion the stones (refer to fine grind). Add just a pinch of detergent soap to break surface tension.

Tin Oxide, Cerium Oxide or Covington Tumbler Polish will polish most gemstones. For a brilliant polish, use Covington Tumbler Polish as a pre-polish and Tin Oxide or Cerium Oxide as a final polish. It is well to remember that normally, running materials longer will produce far better results than attempting to cut running times short.

All Stones will not polish. Stones that are porous, even slightly, when viewed with magnification, will not take a smooth glossy polish. When stones have reached the desired polish, remove, wash load thoroughly with a final wash in detergent (burnish) and rinse in clean water. Drying stones and rubbing with terry cloth towel will remove any film left.

GEM MATERIAL HARDNESS LIST

(Mohs Hardness Scale)

Diamond	10
Corundum	9
Chrysoberyl	8 ½
Spinel	8
Topaz	8
Beryl	7 ½ - 8
Phenakite	7 ½ - 8
Zircon	7 ½
Euclase	7 ½
Tourmaline	7 - 7 ½
Iolite	7 - 7 ½
Andalusite	7 - 7 ½
Danburite	7
Period	6 ½ - 7
Idocrase	6 ½
Scapolite	6 ½
Zoisite	6 - 7
Sillimanite	6 - 7
Epidore	6 - 7
Benitoite	6 - 6 ½
Pyrite	6 - 6 ½
Microline Feldspar	6 - 6 ½
Hematite	5 ½ - 6 ½
Rodonite	5 ½ - 6 ½
Brazilianite	5 ½
Enstatite	5 ½
Turquoise	5 - 6
Lazulite	5 - 6
Lapis Lazuli	5 - 6
Opal	5 - 5 ½
Obsidian	5 - 5 ½
Sphene	5 - 5 ½
Apatite	5
Diotase	5
Smithsonite	5
Kyanite	4 - 7
Hemetine	4 - 6 ½
Fluorite	4
Malachite	3 ½ - 4
Azurite	3 ½ - 4
Coral	3
Calcite	3
Pearl	2 ½ - 4 ½
Chrysocolla	2 - 4
Gypsum	2
Steatite (Soapstone)	1 - 2 ½
Talc	1

GARNET GROUP

Almandite	7 ½	
Pyrope	7	- 7 ½
Spessartite	7	- 7 ½
Grossularite	7	
Andradite	6 ½	- 7

QUARTZ

Amethyst Citrine	7	
Clear	7	
Smoky	7	
Chalcedony	7	
Agate	7	
Jasper	6 ½	- 7

JADES

Jadite Jade	6 ½	- 7
Naphrite Jade	6	- 6 ½

MAN MADE PRODUCTS

Silicon Carbide	9 ½	
Synthetic Rutile	6	- 6 ½
Glass	5	- 6

STANDARD SIZES FOR ROCKS (CLARK SCALE)

1 Millimeter or less .....Particle
1 Millimeter to 1/8 inch .....Fragment
1/8 inch to 2 ½ inches .....Pebble
2 ½ inches to 10 ½ inches .....Cobble
Above 10 ½ inches .....Boulder

METRIC GEMOLOGICAL WEIGHTS

1 Gram equals.....5 Carats
1 Carat equals.....200 Milligrams
1 Kilo equals.....1000Grams
1 Ounce equals.....141.5 Carats
1 Ounce equals.....28.3 Grams
1 Pound equals.....433.6 Grams
2.2 Pounds equals.....1000 Grams

MICRON - GRIT EQUIVALENTS

Micron Size	Grit Size
45	325
30	600
15	1,200
6	3,000
3	8,000
1	14,000
½	50,000
1/4	100,000

INSTRUCTIONS FOR TUMBLING JEWELRY CASTINGS

PRE-TUMBLING PREPARATION

When the castings come out of the mold they must be cleaned up for the cutting and burnishing cycles to be effective. Final hand grinding on the surface can be done with a medium Cretex wheel, sandpaper, needle file, etc.

CUTTING CYCLE

Use plastic pyramids such as PP400, or coarser if de-burring is expected to be difficult. The cutting operation removes metal from the work piece surface, but only small amounts. With a little care, no detail or prongs will be damaged. However, deep scratches or other imperfections will not be removed. Such imperfections should be taken care of in the pre-tumbling preparation.

For the first cycle, use plastic pyramids. Fill the barrel 2/3 full and put in no more than one part of jewelry work-pieces by volume to 10 parts media. Add only enough water to make the load wet with a pinch of burnishing compound (BURCOM) to form a very light foam coating over the load. Close the lid and tumble long enough to thoroughly mix the load. Check the inside again and, if you are not getting a light foam, add a little more water. Repeat until foam appears on the surface of the work-pieces.

If the foam is too heavy, it will cushion your work-pieces and slow down the amount of cutting action taking place. This means you have too much water or too much compound (soap) in the mixture. Stop the cycle, rinse the entire mass in a strainer under water, and repeat from the beginning. The cutting time can run between 30 minutes and 6 hours. If you hear the cascading action begin to slow down, it is time to add a splash of water.

After the machine has been running one or more hours, you will notice a slurry starting to build up in the mixture. Once the slurry has reached a certain density it will start to cushion and inhibit the cutting cycle. Stop the cycle, rinse the entire mass and start the cutting cycle again. Keep a record of past runs in order to judge how long the cutting cycle can run before it needs attention.

To determine when the cycle can be ended, inspect the work-pieces carefully to make sure all pits, scratches, and bumps have been removed form the surface and the surface is totally smooth with a dull satin finish.

Silicon carbide is a very fast cutting abrasive, but usually not recommended. It breaks down easily and tends to darken metal surfaces. Aluminum oxide is a tough abrasive, but it tends to impinge into the surface of metal and makes burnishing more difficult.

CLEANLINESS

It is important to keep the work-pieces, media, and tumbling barrel clean. Prior to using new burnish shot, run it in the tumbler with a small amount of low suds burnishing soap (BURCOM) and concentrated cleaner. An alternate is sudsy ammonia. Run the mixture for ½ hour. If the foam is the least bit gray in color, repeat the cycle until the foam is absolute snowy white. Then rinse the shot completely with warm water.

BURNISHING CYCLE

Fill the barrel about 2/3rds full of steel shot either dry or thoroughly drained of any storage solution. Put in no more than one part of jewelry work-pieces (by volume) to 10 parts of steel shot. Make up a mixture of 2 ounces of burnishing soap to 1 gallon of water. Add only enough of the mixture to make the load wet. Close the barrel lid and tumble long enough to thoroughly mix the load. Check inside again and, if you are not getting a light foam, add a little more of the mixture. Repeat until a very light foam begins to cover the surface of the steel shot as it moves. As you approach the correct amount of water - soap mixture, the cascading action **WILL NOT** be effective if the barrel is overloaded with water, soap, or a mixture of the two.

BURNISHING CYCLE CONTINUED:

Your cycle time for complete burnishing can be between 15 minutes and 3 hours. If evaporation takes place, add a splash of water to get the cascading effect back to maximum.

Important: If you see signs of a grey foam developing, stop the run immediately and put it through a cleaning cycle. This can be done successfully with jewelry left in the steel shot by adding two or more tablespoons of household cleaner and a cupful of water. Let the media run for 15 to 20 minutes, then thoroughly rinse the entire mixture under running water using a strainer.

Re-start the burnishing cycle immediately using the correct mixture of water and burnishing soap. **DO NOT** let the steel shot remain exposed to air after rinsing, as it will start to rust within 5 to 10 minutes.

Ceramic Media: Ceramic media (CRAM) that has been precondition so that it is not abrasive will also accomplish burnishing. It is much lighter than steel shot and produces a superior color on gold pieces. Steel shot produces a bright, plated look while ceramic produces a deeper, hand-buffed look that most people seem to like better.

Walnut Shells, or Corn Cob with Red Rouge: These media, used dry, can produce a finish very close to the hand-buff look. The procedure is to run the work-pieces, after burnishing in steel shot or ceramic media, in a mixture of walnut shell or corn cob (12 mesh) and red rouge powder. Use only enough rouge to color the media. This finish cycle usually requires a time of 6 to 12 hours.

TYPICAL CYCLE TIME

Plastic Media, 400 Grit: Run ½ to 2 hours.
Steel Shot: Run ½ to 2 hours.
Ceramic Media: Run 1 to 2 hours.

STORAGE OF STEEL SHOT

Up to One Week: Store shot in a solution of 8 oz. Of soap (BURCOM) to 1 gal. of water Mix in a 10 minute cycle and store in a closed container completely submerged.

More Than One Week: Thoroughly rinse shot, treat with a commercial rust inhibitor and store in sealed container.