OPERATING INSTRUCTIONS

AND

PARTS LIST

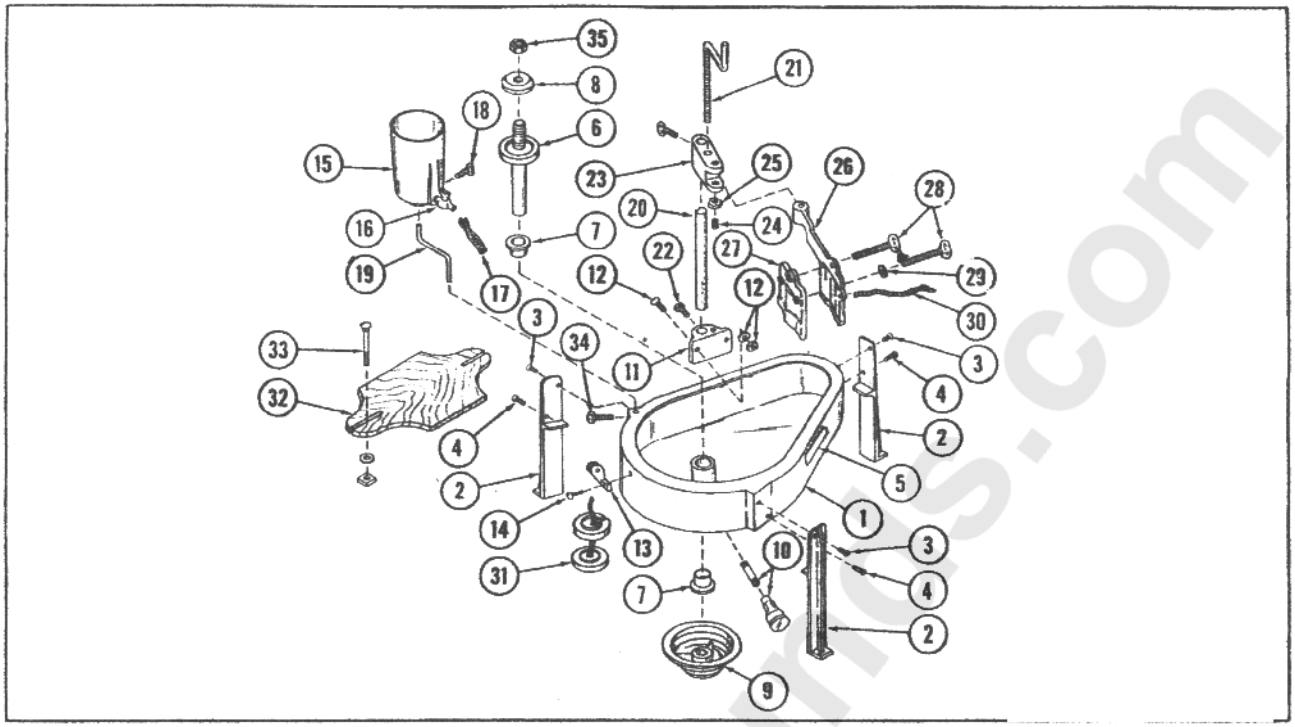
B & I 10" GEM MAKER

Model 1422

B & I MFG. CO.

BURLINGTON, WISCONSIN

B & I 10" MODEL 1422 GEM MAKER PARTS LIST



Ref. No.	Part No.	Part Name	No. Req.
1	201	Main Casting (Cast Aluminum)	1
2	202	Legs (Cast Aluminum) . .	3
3	203	3/16" x 3/8" F. H. Machine Screws for Legs.	3
4	204	3/16" x 1/2" F. H. Machine Screws for Legs	3
5	205	Gem Maker Label	1
6	206	3/4" Shaft with 1-3/4" Collar, 1/2" Thread . .	1
7	207	3/4" I. D. x 1" O. D. with Flange	2
8	208	Flange Collar (die cast) . .	1
9	209	4 Step Pulley, 3/4" bore (die cast)	1
10	210	#00 Grease Cup, 1/8" P. T. & 2" Pipe Nipple	1
11	211	Side Mounting Block	1
12	212	1/4" x 3/4" F. H. Cap Screws, Washer & Nuts . .	2
13	213	Rope Pulley	1
14	214	5/16" x 1/2" F. H. Cap Screws	2
15	215	Water Can	1
16	216	Brass Pet-Cock, 1/8" Pipe Thread	1
17	217	1" x 5" Lamp Wick	1
18	218	1/4" x 5/8" Thumb Screw .	1
19	219	5/16" Cup Bracket	1
20	220	5/8" x 7-1/2" Long Rod with 1/2" x 1/8" Keyway .	1
21	221	5/16" Raising Crank . . .	1
22	222	1/4" x 5/8" Hex Cap Screw	1

Ref. No.	Part No.	Part Name	No. Req.
23	223	Pivot Block	1
24	224	3/8" x 3/4" Headless Set Screws	2
25	225	3/8" Jam Nuts	2
26	226	Saw Arm Casting	1
27	227	Saw Clamp Plate	1
28	228	5/16" x 3" Thumb Screws .	3
29	229	5/16" S. A. E. Cut Washers	2
30	230	Rope for Weights, 2 ft. long	1
31	231	Cast Iron Weights, 1 with hole, 3 with slot	4
32	232	Wood Motor Base	1
33	233	5/16" x 2-1/2" Carriage Bolts	2
34	234	3/16" x 5/8" Thumb Screw for Water Cup	1
35	235	1/2" Hex hd Nut, Coarse Thread	1

ITEMS LISTED IN CATALOG:

10" Cast Iron Lap Wheel, 1/2" hole
10" Diamond Wheel, 1/2" hole
8" x 3/4" Silicon Carbide Grinding Wheel
8" Polishing Wheel, 1/4" felt on plywood
8" - 220 Gr. Silicon Carbide Scratch Wheel
Can of Soluble Oil for sawing
100 Grit Silicon Carbide Compound
220 Grit Silicon Carbide Compound
Polishing Compound
2-1/2 oz. Dop Cement
3 - 1/4" x 3-1/2" & 3-3/4" x 3" 3/8" Dop Sticks
3 - Brushes for applying compounds
Bag of Stones

OPERATING INSTRUCTIONS-

DIRECTIONS FOR MOUNTING GEM MAKER

Place the Gem Maker on a heavy piece of plywood or work table and fasten with the round head screws. Mount the Gem Maker with the narrow part toward the side on which you are going to work. This will allow the motor to be mounted away from your work.

For proper speed use a motor running at 1725 rpm with a 1-1/2" diameter Motor Pulley. Belt should be a 40" A section V-Belt. Motor, Motor Pulley and V-Belt can all be selected from either Sears Roebuck general catalog or power tool catalog.

Mount motor on plywood base by screwing the motor down with four wood screws onto the plywood; make sure that the motor is mounted squarely on this plywood. After the motor is mounted, place motor so that a perfect alinement will be had with the center of the shaft on the Gem Maker. Place the belt on the smallest step of the pulley on the Gem Maker and also onto the motor; this gives the furthest distance of the motor away from the Gem Maker.

Locate a hole in the slot of the plywood on the furthest end from the Gem Maker, approximately 3/8 of an inch from the motor side and drill a hole for the 5/16" bolt that is furnished, then equalize the location of the 5/16" bolt in the opposite side of the plywood, this being the slot closest to the Gem Maker. Locate this approximately 3/8 of an inch from the outer end and drill the hole. This will allow you to make an adjustment of sliding the motor base to change your pulley speeds, so that when you are running on the largest step of the step pulley the motor will be closer to the Gem Maker.

The only time that the higher speed should be used is in sawing with the diamond saw and also grinding with the silicon carbide grinding wheel. An intermediate step should be used on the sanding and polishing operation. The slowest speed should be used for the cast iron lap wheel, as an excessive speed will throw the grain off of the wheel, because of centrifugal action.

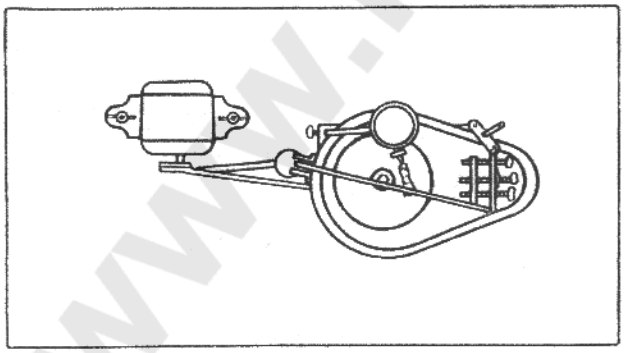


Figure 1. Gem Maker Mounted on Table

The Gem Maker should be mounted as level as possible to allow free drainage of lubricant. In attaching the belt to the motor make sure that the wheels for all cutting operate in a clockwise motion.

If possible, mount the machine on a table approximately 30" in height from the floor for convenient operation. Make sure the Gem Maker and motor are securely fastened so all possible vibration is eliminated.

Before running the Gem Maker, be sure to check the lubrication. The Gem Maker is lubricated by a grease cup on under side. Fill the grease cup with a good cup grease and turn cap until grease appears at the bottom and top thrusts of the main arbor. Care in lubrication will lengthen the life of the shaft and bearings.

CARE OF THE DIAMOND BLADE

The diamond saw furnished with the Gem Maker must be mounted so the arrow on the saw turns in a clockwise motion. The saw should be fastened securely on the arbor with the shaft collar and nut. Secure the nut firmly so when pressure is applied the blade will not slip on the arbor.

A can of soluble oil is furnished with the equipment. This oil should be diluted in the proportion of one part of oil to eight parts of water, by volume. Mix the oil and water by shaking vigorously. This will produce a milky white appearance to the lubricant. Pour the lubricant into the lubricator cup. Fasten the lub-wick on the brass petcock with the rubber band furnished with the wick. Adjust the flow so a liberal amount of oil flows down the wick onto the blade. (See Fig. 2.)

The diamond saw must be sufficiently lubricated when sawing to get the maximum amount of results and life from the blade. If there is any smoking or sparking when sawing, more lubricant should be allowed to flow onto the blade. The saw can be completely ruined in a very short period of time if not lubricated sufficiently, or give many hours of effective sawing if reasonable care is given in lubricating. Never let the saw cut while dry. Too much lubricant is more desirable than not enough. This lubrication can be reused.

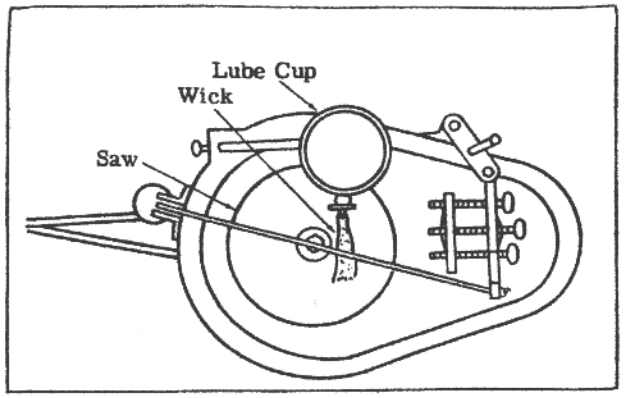


Figure 2. Lubrication

SAWING WITH THE DIAMOND BLADE

There are several steps in producing an effective gem that must be definitely followed. The first step is the sawing operation if your stone does not already have a flat surface from which to work.

Before making any cuts, analyze the stone carefully to secure the most effective results in design and color.

The saw clamp on the Gem Maker can be adjusted to hold gem stock from a very small dimension up to about 3" stones and also slabs can be held in the V slot.

Set the gem firmly against the back block and tighten the thumb screw, using a pliers, if necessary. Make sure that the gem is securely clamped. There should be not movement of the gem when securely fastened into the holder.

If sides of gem are too uneven grind them down so gem can be securely clamped. If gem cannot be held in clamp because of being too thin, and cutting is to be done parallel to the thin plane, cement gem to small blocks as shown in Fig. 3. This can also be done with a small round stone.

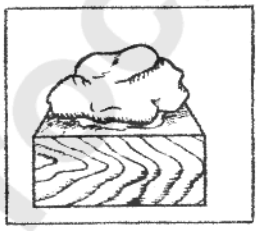


Figure 3.

When the gem is surely fastened into the holder adjust desired height for the cut you intend to make. The holder can be raised or lowered to adjust for thickness of the gem by using the crank handle on the holder. The diamond saw can also be raised on the arbor by placing washers under it.

Before starting the saw cut be sure the blade is sufficiently lubricated (as described under "Care of the Diamond Blade").

After this is done, apply a light pressure on the saw arm pushing the gem slightly against the saw blade. You will find the saw will cut very evenly if it is not forced. Even, uniform pressure should be maintained against the saw arm except when nearing the finish of the cut. Then the pressure should be reduced so the stone does not break off but is completely sawed.

After a few saw cuts the operator will be able to apply the correct amount of pressure for the various hardness of stone.

It is recommended that during the sawing operation an old one-pound coffee can be placed under the drain hole to catch the soluble lubricant which can be used over and over.

After the saw cut is completed, loosen the clamp on the holder and study the stone to determine the size and design of gem to be cut.

If rough stone is too large for saw clamp it can be broken down to size with a chisel and heavy hammer.

USE OF THE CAST IRON LAP WHEEL

When the saw cut is completed there are usually small irregularities left on the bottom of the stone which should be removed by the use of the cast iron lap wheel. This lap wheel should be used in making a smooth starting surface on gems that do not require sawing.

After the sawing operation is complete remove the diamond blade and place the cast iron lap wheel on the arbor fastening it securely with the nut. Remove the soluble oil lubricant from the lubricator cup, saving this oil for future use. Then fill lubricator cup with water and either remove the lub-wick or tie it back so that it does not rub on the lap wheel.

Furnished with the Gem Maker is a container marked "100 Compound". Place a small portion of this compound in a cup or glass and add a sufficient amount of water to form a fairly thick paste. With the lap wheel in motion, use one of the tin handled brushes that are furnished and apply this compound until the surface of the lap wheel is covered.

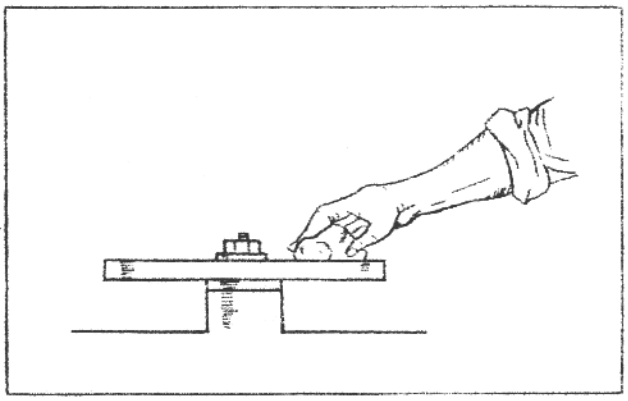


Figure 4. Grinding a Flat

A small portion of water should be allowed to drop from the lubricator cup on the lap wheel to keep the compound from drying. It is preferable to apply the water near the center of the wheel. If too much water is allowed to drop, the compound will be quickly removed from the wheel. Therefore, careful regulation of the water is important.

To smooth the stone that has been sawed, place the sawed surface on the lap wheel moving the stone back and forth from the center to the outer edge of the wheel, as shown in Fig. 4.

A continuous application of compound with your brush, preferably in front of the stone is necessary. When the material is cutting correctly, you will hear a definite grinding sound. If the grinding sound ceases, there is not sufficient compound being applied. Inspect the stone frequently and when the surface is flat and smooth this operation is complete.

This lap wheel can also be used for putting smooth surfaces on large stones for cabinet displays.

SHAPING A CABOCHON GEM

With the bottom of the gem flat and smooth, the shaping operation can be started. Usually the gem is of too small size to hold by hand while shaping. Therefore, the gem is cemented to a round wood stick known as the dop stick. Dop sticks and dop cement are furnished with the Gem Maker. Two sizes of dop sticks are furnished. Select the size dop stick most suitable for the size of the gem to be shaped.

The dop cement can either be melted with a match or alcohol lamp flame. A slight amount of heat should be applied to the gem so that cement will adhere to it. Then apply a thin coat of cement onto the flat surface of the gem. Also, a coating of cement should be applied to the end of the dop stick. Then reheat the cement on the gem and dop stick until they both get to a point of melting. At this time place the gem onto the end of the dop stick, centering it at the same time. (See Fig. 5.)

Work the surplus soft cement around the stick and up to the gem giving as large a bearing of cement as possible.

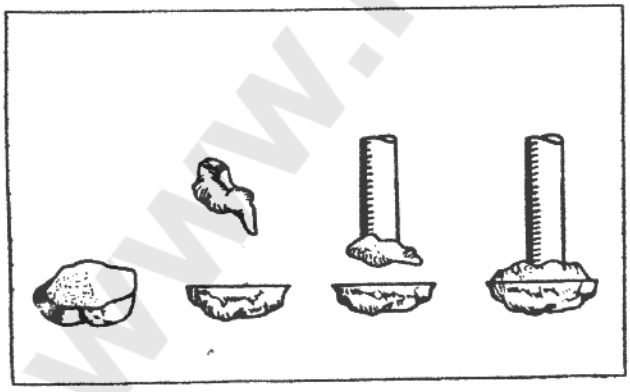


Figure 5. Attaching Gem to Dop Stick

Allow the cement to cool thoroughly before starting to shape gem. Cooling can be done more rapidly by dipping the gem in water.

Remove the cast iron lap wheel and place the silicon carbide grinding wheel on the arbor. Adjust the water flow from the lubricator cup to run a little more freely than when used on the lap wheel.

The first step in shaping the cabochon is to grind the edge to the shape of the design selected. This is done by holding the gem against the edge of the grinding wheel as shown in Fig. 6.

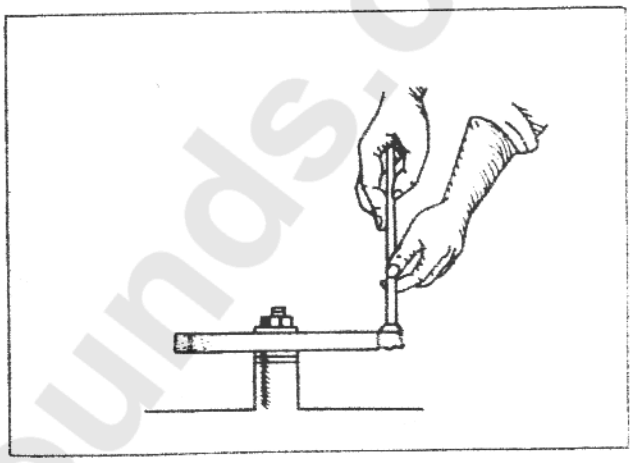


Figure 6. Shaping Edge of Gem

By constantly turning the dop stick and applying a moderate pressure of the gem against the edge of the wheel, the desired shape is then easily obtained. Check this operation frequently by holding the stone directly in front of you to make sure that it is symmetrical.

When you are sure the shape of the gem is as you desire it, the top of the gem can be shaped. The final shaping is done on the top of the wheel. Start the shaping by holding the dop stick in a vertical position and constantly turning the dop stick and gradually reducing the angle from a vertical position down to practically a horizontal position as shown in Fig. 7.

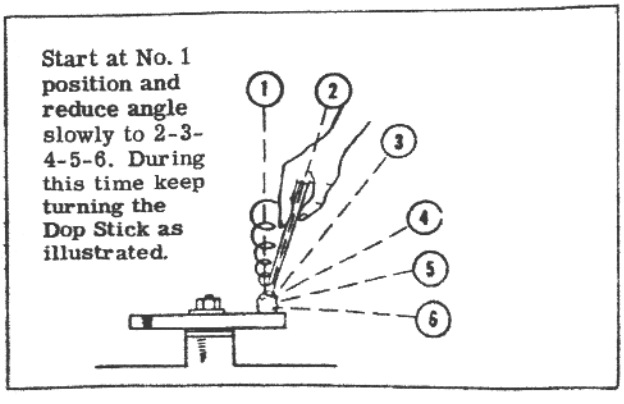


Figure 7. Shaping the Gem

By using this method the top will conform to the shape of the edge design selected. The height of the stone depends entirely on the thickness of the gem.

When this operation is completed, upon inspection you will find that the gem is dull and highly scratched. These scratches will be removed in the next operation.

THE SILICON CARBIDE SCRATCH WHEEL

After removing the grinding wheel, place the silicon carbide scratch wheel on the machine. This operation should be done without the use of any water. Follow through the same procedure used on grinding wheel, as shown in Fig. 7.

Due to the fact that this operation is done dry, there will be some heat produced from this grinding. Caution should be taken not to get the stone too hot as it might soften the dop cement and cause the stone to come loose from the dop stock.

Frequent inspection should be made of the gem in this operation to make sure that all the scratches and irregularities are removed from the gem. This will greatly reduce the amount of time necessary to put the final polish on the gem.

POLISHING

Remove the silicon carbide scratch wheel and place the felt polishing wheel on the machine.

Furnished with the Gem Maker is a container marked "Polishing Compound". Place a small portion of the polishing compound in a cup or glass and add sufficient water to form a thin paste. Apply this paste onto the felt polishing wheel with a clean brush to be used only for the polishing compound.

Adjust the water flow from the lubricator cup to flow about the same as used on the cast iron lap wheel.

Before starting to polish the gem, be sure to wash the stone and the end of the dop stick thoroughly to remove any grit that might remain on the gem or dop stick from the shaping and scratch removing operations. Caution should be taken to keep all grit from the polishing felt, as this will prevent the stone from taking a high luster polish.

Inspect the gem frequently by wiping the polishing compound from it, and when the desired luster is produced it can be removed from the dop stick.

To remove the dop stick heat the bottom of the gem until the dop cement reaches a point of melting and then remove the stone. The cement that remains on the gem can be easily removed with a knife blade.

If the cabochons that are produced are just for a collection of cabochons, an effective way to display them is to glue them onto a white card about two inches square and label the type of gem.

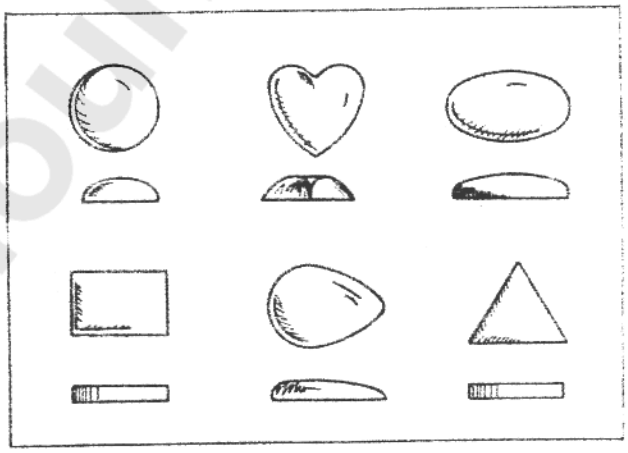
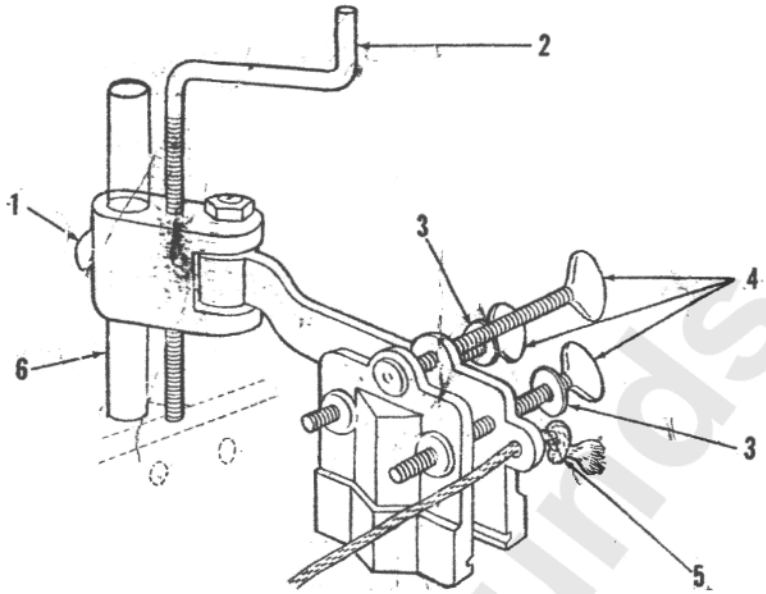


Figure 8. Cabochon Shapes

NOTES

How to Assemble Clamp Head

FOR 10" GEM MAKER



NOTE: SEE INSTRUCTIONS PART No. 33 2 ea. 5/16 x 2½ Carriage Bolts for Mounting Wood Motor Base

1. Screw in small thumb screw into threaded hole as shown.
2. Screw in adjustable crank screw into threaded hole as shown.
3. Use the two washers on lower thumb screws only.
4. Screw in long thumb screws into clamp as shown.
5. Insert rope into hole and tie a simple knot as shown.
6. Insert stand rod with key way in mounting block on outside of cutter. Tighten with cap screw on block.

If saw clamp does not move uniformly across the diamond blade adjustment is necessary.

To adjust saw clamp, set bottom of saw clamp just touching blade at edge. Push clamp towards arbor and if it rises off of blade, stand rod should be moved in direction "L" (see diagram). If saw clamp tightens on blade when pushed towards arbor, adjust toward "R". These two adjustments are made by loosening nuts "A" and "B" (holes are slightly larger than bolts). When satisfactory adjustment is made tighten nuts securely.

nsert the dop into holder furnished and lay in one side of he V block while the dop cement is still warm, place stone firmly into counter sunk hole with the wood dowel rom the opposite side of the V block, when this is lined ip accurately, add the necessary dop cement to hold the stone securely.

To match the Crown facets with the Pavillon facets, oosen the set screw on the top of the dividing head, eaving the divided head fastened in position with the rigger, turn the lower end of the dop holder in whatever lirection is necessary and line up the Crown facet with he Pavillon facet, then tighten set screw and this will eep the facets symmetrical; the Crown facets are cut nd polished in the same manner as the Pavillon facets. The table is cut last by adjusting the head so that the dop s brought to a 90 degree angle with the lap wheel. The ead is lowered by the means of the adjustment screw on he stand rod until the required depth has been reached, lthough this is the simple form, you can proceed with ome of the more complicated shapes of which there is lmost no end.

The faceted effects of a stone are limited only by the ndividual's artistic ability. The diagrams in figure 3 ive the various angles for the materials that are most ommonly used by the amateur. You are not limited enirely to standard faceted gems but the so-called buff ops, squares, rectangles, triangles, pyramids, cones nd even faceted beads of different sizes can be faceted vith the B & I Gem Facetor.

B & I MANUFACTURING COMPANY

BURLINGTON, WISCONSIN

UCTIONS FOR GEM FACETOR

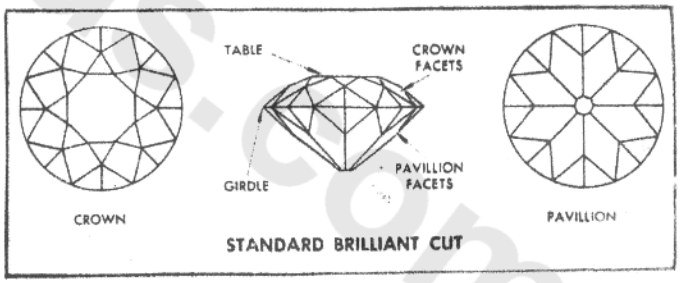
The faceting of gem stones has always been considered to be shielded by trade secrets and also is difficult for the amateurs to attempt, however, with the Gem Facetor available for the Gem Maker, faceting can be done successfully by anyone who possesses an average amount of patience.

The Gem Facetor is chiefly constructed of aluminum, equipped with an accurately 32 space dividing head. It is also equipped with a demountable dop stick, also a protractor scale for indicating angles. The Gem Facetor has both verticle and horizontal pivots so that there is a ry free and flexible motion and no excess weight is plied to the stone.

The Gem Facetor is also equipped with a compensator on the dividing head so that the Crown facets can be matched to the Pavillon facets when the stone is redopped.

The Gem Facetor is equipped with a stand rod that fits into the same hole on the Gem Maker as the saw arm and is locked into position with a wing nut and washers.

The Gem Facetor has an adjustment rod that operates the complete unit up and down and when the correct degree is determined, the stand rod block is fastened into position by tightening the thumb screw.



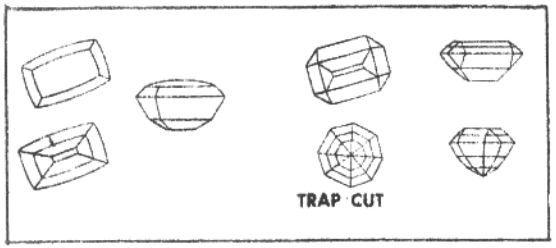
STANDARD BRILLIANT CUT

All motions are then derived on the pivots, these pivot points are easily adjusted if any signs of wear should occur. This type of adjustment however, is not possible

where the rotating is done on the stand rod, any slight wear on the stand rod causes an inaccuracy in operation. To change the index position, press trigger on the dop holder and turn index to the proper location, releasing pressure on the trigger will hold index in this position. The faceting angle is determined by setting the pointer on the desired degree, then moving the stop stud to the pointer and tighten into position, thus, when the pointer comes to rest against the stop stud, the cutting is completed on that particular facet. Care must be exercised and very light pressure used in this operation.

PREPARATION OF THE STONE

The stone should be oriented as to its axis if cut from a transparent crystal and the table should be ground flat on the grinding wheel or lap wheel. The lower part or Pavillon, should be shaped to a rough cone, the table is then cemented to the end of the dop, the dop is replaced into the holder and the angle pointer set to the desired degree, now, hold the trigger down or fasten same with string or rubber band to allow free rotation of the dividing head.



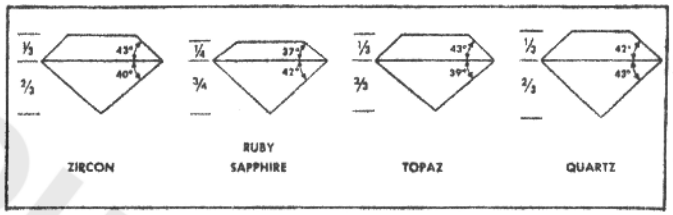
Use a fine grinding wheel or lap wheel and keep turning the dividing head and also developing a motion of the holder from a center of the wheel to the outer edge, this will produce a perfect cone.

The angle of the cone must however, be slightly smaller than the angle wanted on the finished facet; with the cone finished, you can now start cutting the facets, this should be done on the cast-iron lap wheel. Release the trigger so that the dividing head can be held in position.

A fine grit should be used for the lapping, somewhere between 400 grit and 600 grit, depending on the type stone, by mixing these, grit with whiting and water just glycerine and mix to a thin creamy consistency b fore applying to the lap wheel.

Set the stop stud to the desired degree on the protra tor and cut the first facet to the proper depth by lower the head with the adjustment screw on the stand ro When the proper depth is reached, the lower end of facet should coincide with the point of the cone.

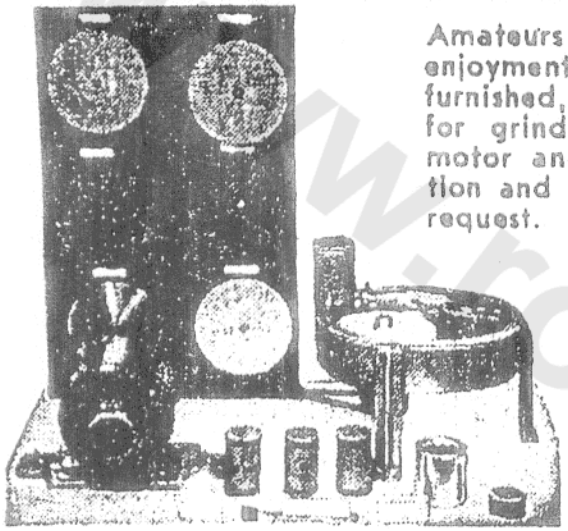
Lock the adjustment screw on the stand rod and char the position of the dividing head to the selected notch a cut the next facet, continue in this manner until all of t desired facets are cut at this one angle.



The co pound shou be well di tributed the lap whe and the mount of compound should be gaged so that towards t finish of the facet, no compound is added. If the lap too dry, add a slight amount of water; the polishing o eration is continued in the same manner as the cutti operation with the exception that a lap wheel either of t or lead should be used in the place of cast-iron lap whe The polishing agent furnished with the Gem Maker shou be used in the place of the abrasive, very light pressu should be applied. The most satisfactory results can obtained by working from the rim of the center of the l wheel.

When the Pavillon or lower part is completed, th stone must be reversed on the dop in order to facet th Crown. After removing the stone from the dop and clean ing the dop cement thoroughly, place the finished end in to the counter sunk hole of the dop, using the V block

GEM MAKER $36.50 and GEM FACETOR $15.00

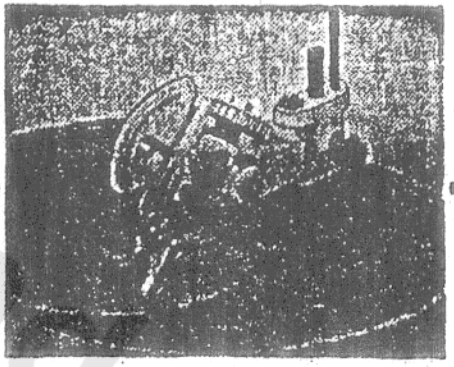


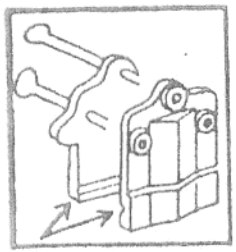
Amateurs or professionals . . . hobbyists or jewelers . . . ALL will find new enjoyment in this different Gem Maker. All necessary lapidary equipment is furnished, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing. The complete equipment as shown, less motor and belt ONLY $36.50 F.O.B. Burlington, Wis. Write today for information and literature on this 6" Gem Maker. Prices on other lapidary supplies upon request.

$36.50

THE GEM FACETOR

The B & I Gem Facetor can be used with the B & I 6" or 10" Gem Makers or any horizontal lap. Many new features incorporated. $15.00 FOB factory.





V slots in clamp for hard to hold stones.

The 10" B & I Gem Maker, shown at left, has all the features you have been looking for:—10" Diamond Saw, 10" Cast Iron Lap Wheel, Silicon Carbide Grinding Wheel, Sander, Polishing Wheel. Includes compounds and motor mount. Complete, less motor, only $64.50, f.o.b. factory.

Send for Descriptive Literature NOW!

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