

## WARRANTY

**WARRANTY:** Except with respect to those components parts and uses which are described herein, DENTSPLY Neytech warrants the Neycraft Centrifugal Casting Machine to be free from defects in material and workmanship for a period of two years from the date of sale. DENTSPLY Neytech's liability under this warranty is limited solely to repairing or, at DENTSPLY Neytech's option, replacing those products included within the warranty which are returned to DENTSPLY Neytech within the applicable warranty period (with shipping charges prepaid), and which are determined by DENTSPLY Neytech to be defective. This warranty shall not apply to any product which has been subject to misuse; negligence; or accident; or misapplied; or modified; or repaired by unauthorized persons; or improperly installed.

**INSPECTION:** Buyer shall inspect the product upon receipt. The buyer shall notify DENTSPLY

Neytech in writing of any claims of defects in material and workmanship within thirty days after the buyer discovers or should have discovered the facts upon which such a claim is based. Failure of the buyer to give written notice of such a claim within this time period shall be deemed to be a waiver of such claim.

**DISCLAIMER:** The provisions stated herein represent DENTSPLY Neytech's sole obligation and exclude all other remedies or warranties, expressed or implied, including those related to MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE.

**LIMITATION OF LIABILITY:** Under no circumstances shall DENTSPLY Neytech be liable to the buyer for any incidental, consequential or special damages, losses or expenses.

**LIMITATION OF ACTIONS:** The buyer must initiate any action with respect to claims under warranty described in the first paragraph within one year after the cause of action has accrued.

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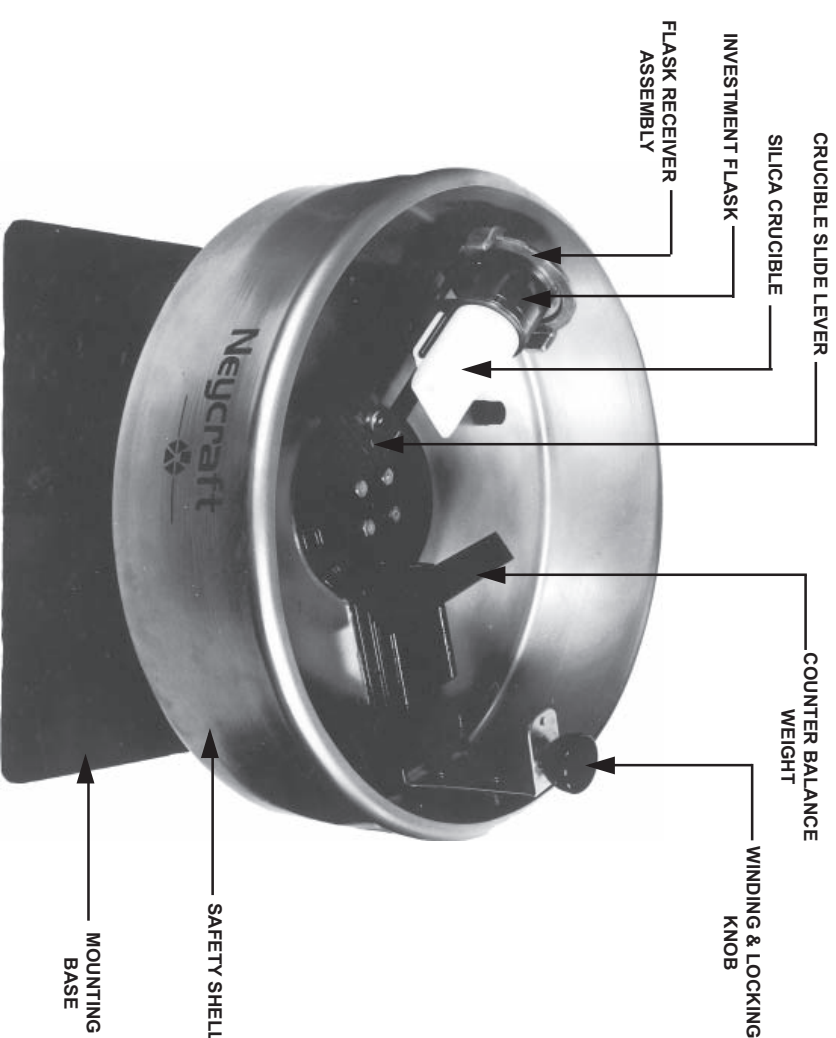
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**DENTSPLY**  
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# NEYCRAFT™ CENTRIFUGAL CASTING MACHINE



## Owner & Operator's Manual

**Model No:** 9491045

**Patent #:** 4,273,181

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For the convenience of our customers, these operation instructions are divided into two sections. Part I contains general background information regarding the lost wax centrifugal casting process. This section is provided to familiarize the beginner with the casting process. Part II contains specific operating instructions for the Neycraft Model 9491045 Centrifugal Casting Machine. Experienced craftsmen may wish to skip reading the general background information in Part I. *HOWEVER, EVERYONE USING THIS CASTING MACHINE (INCLUDING EXPERIENCED CRAFTSMEN) SHOULD BECOME FAMILIAR WITH THE SPECIFIC OPERATING INSTRUCTIONS IN PART II.*

## Part I General Information on Lost-Wax-Casting

**The following is a brief description of the steps or procedure involved in lost-wax-casting. If more detailed information is needed, a number of good instruction books are available such as:**

Creative Casting, by Sharr, Choate, Crown Publishers and  
Centrifugal or Lost Wax Jewelry Casting, by Murray Bovin, Bovin Publishing

Also, in many areas of the country, classes in lost-wax-casting are offered by public schools and colleges, community activity centers and through local lapidary and jewelry supply dealers.

**WAX MODEL.** The pattern from which cast objects are made is usually wax, however, other materials which readily "burn-out" at temperatures of 1000° - 1400° F (such as plastic or natural organic matter) may also be used as the model.

The wax models may either be designed and created by the jewelry craftsman, or may be purchased ready-made. The hand tools and materials for creating original jewelry are available from many lapidary and jewelry retail suppliers, as are the ready-made wax models.

The model will be mounted on a sprue and imbedded in a plaster like material and then burned-out to leave a cavity replica into which the molten metal will flow in the casting operation.

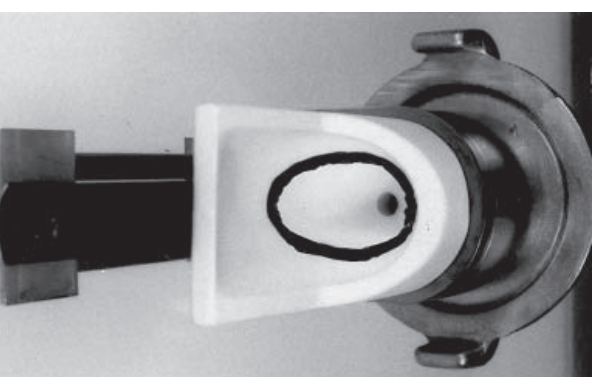
**SPRUEING THE MODEL.** The model is held in proper position in the investment flask by a wax wire sprue. After burnout, the sprue cavity will serve as a channel or gateway through which the molten metal flows to enter and fill the model replica cavity. The sprue is attached to the wax model (either using a heated tool or sticky wax) and is then embedded in the center of the sprue-base.

**7. MAINTENANCE PROCEDURE.** The only maintenance required on the Neycraft Centrifugal Casting Machine is a periodic cleaning of the inside of the safety shell. After a period of time or a good number of casting cycles (this may vary from one week to several months, depending on the frequency of use), some debris will collect in the safety shell (investment powder, metal grains, flux, etc.). This debris should be removed by either vacuuming the shell interior or by turning the shell upside down and brushing out the interior. This periodic cleaning will prevent a build up of particles which could clog the crank handle locking mechanism.

### REPLACEMENT PARTS AND ACCESSORIES

Description	Part Number
2" Sprue Base	9357118
3" Sprue Base	9357002
Stainless Steel Investment Flasks 2" Diameter x 2 1/4" Long	9102019B
3" Diameter x 3" Long	9102020B
Flask Tongs	9491010B
Silica Crucible	9353005
Counter Balance Weight (replacement)	9491066
Power spring (replacement)	9356001

**NOTE: WHEN CASTING SMALL AMOUNTS OF METAL (LESS THAN 2 OZ.), THE CRUCIBLE MUST BE PREHEATED TO AVOID CHILLING THE MOLTEN METAL BEFORE IT TRAVELS INTO THE INVESTED FLASK. THIS CAN BE EASILY ACCOMPLISHED BY PLAYING THE TORCH FLAME ON THE FRONT AND BOTTOM INSIDE OF THE CRUCIBLE JUST BEFORE THE FINAL MELT AND SPIN. WHEN HEATING LARGER METAL MELTS (MORE THAN 2 OZ.), THE CRUCIBLE WILL BE SUFFICIENTLY PREHEATED IN THE PROCESS OF MELTING THE METAL. AN ALTERNATE METHOD TO PREHEAT THE CRUCIBLE IS TO PLACE IT IN THE BURNOUT OVEN WITH THE INVESTED FLASK, THEN REMOVE THE CRUCIBLE WITH YOUR TONGS AND LOCK IT IN POSITION ON THE CASTING MACHINE.**



**6. SPIN-CAST CYCLE.** The lock mechanism is released by grasping the outside shell with the left hand and rotating slightly in a clockwise direction until the spring loaded wind-lock handle snaps back into its outward or unlocked position. With the torch in your right hand, continue heating the metal until the moment your release your grasp on the shell with your left hand and start the spin cycle. Both hands should be pulled away smoothly and simultaneously to begin the cast spin.



**UNLOCK**

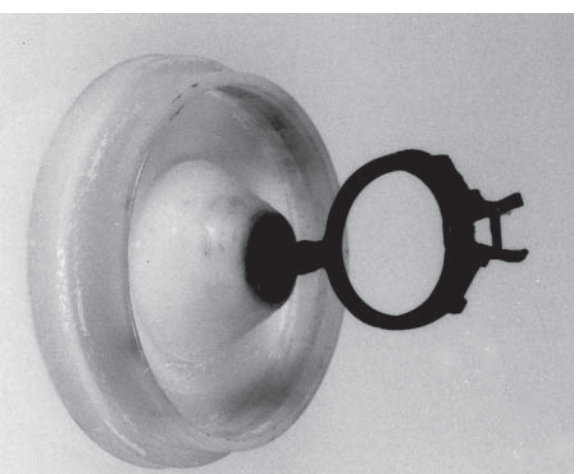


**RELEASE**

**CAUTION: KEEP YOUR HANDS CLEAR OF THE UNDERSIDE OF THE SAFETY SHELL WHILE IT IS SPINNING.**

The casting machine will continue to spin for a couple of minutes after it is released. When the machine has come to rest, grasp the flask with the tongs in your left hand. Grasp the crucible clip knob with your right hand and pull the crucible away from the flask. As soon as the red color disappears from the sprue button, the flask may be dropped into a bucket of water. The rapid cooling of the flask in water will usually break most of the investment materials away from the completed casting. After a minute or so, the casting can be retrieved from the bottom of the bucket, and the flask cleaned out for its next use.

The pictures below show proper sprueing technique for a single ring, in diagram #2, and for multiple pattern casting using a "tree" sprue, in diagram #3.



*Diagram 2*

*Single pattern mounted on sprue base with 6-gauge wax wire.*



*Diagram 3*

*Multiple patterns "tree-sprued". 1/4" wax wire is used for "trunk" and 6-gauge wire is used for branches.*

When sprueing, remember that "branches" to individual wax models must be positioned like tree branches (from which this sprueing system is named). That is, the branches must be pointing upward, at least slightly, when set on the sprue base as shown above.

**DETERMINE AMOUNT OF CASTING METAL.** At this time, a measurement is made to determine the required amount of casting metal to be used.

To calculate metal weight, first weigh the sprued pattern. Note this weight and multiply by 10.5 to obtain proper weight of sterling silver. For 14k gold, multiply the wax weight by 13.5. Weigh out the proper amount of casting metal and then add 7-10 grams (1/4-1/3 oz.) for the sprue button.

**INVESTING THE SPRUED MODEL.** The mold for lost-wax-casting is made with a Plaster-of-Paris like material called investment. Investment is a powdered blend of Cristobolite and Gypsum with a few other inorganic materials included. Water is added to the investment powder in specified proportions. The investment water mixture is stirred to a creamy smooth consistency. The liquid investment is then poured into a stainless steel cylinder, called a flask, which has been mounted on the sprue base with sprued model in position.

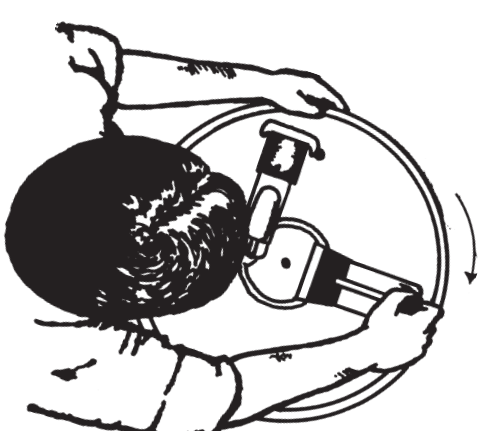
The investment mixture begins to solidify or harden in about 10 minutes. After about 1 hour the sprue base may be removed from the cured investment flask and the burnout cycle can begin.



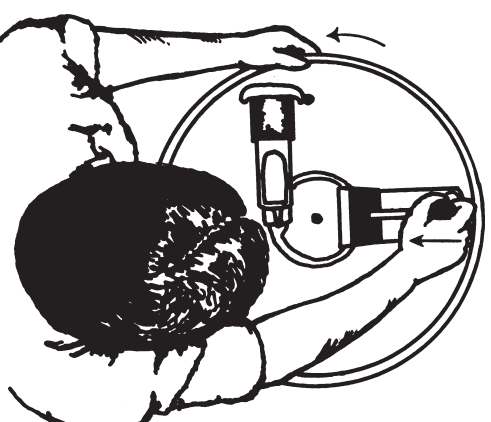
***TIPS FOR INVESTMENT TECHNIQUE.*** *The liquid investment mixture will contain a considerable number of trapped air bubbles. It is important to eliminate as many of these bubbles as possible, because they will create replica bubbles on your cast jewelry piece.*

The most effective method for removal of bubbles from the investment mixture is to vacuum debublize with a vacuum pump and bell jar apparatus. If this equipment is not available, the following procedure should be used.

1. Coat the sprued model with a surface tension reducer (dip or brush on). Shake off excess liquid and allow model to air dry.
2. Mix a small batch of investment and paint the pattern with a small soft brush. If a vibrator is available, rest your hand holding the wax pattern against the operating vibrator while you brush on the thin coat of investment. Allow this coat to air dry for 10 minutes.
3. Mix sufficient investment liquid to fill the investment flask. If a vibrator is available, use it to vibrate bubbles from the investment liquid while in the mixing bowl. Next, set the vibrator on low power and tilt flask at an angle while sprue base rest on the vibrator surface. Slowly pour investment mixture into the inside wall of flask, and then fill the flask to the brim.



c. Next, wind the machine three full turns clockwise until the knob is at the one-o'clock position then grasp the outside of the safety shell with your other hand to hold machine steady against the power spring. (Winding is much easier if you wind quickly and continuously the full three turns).



d. Now, lock the machine by sliding the wind/lock knob inward toward the center of the machine as far as it will go (about 1/2"), then ease the safety shell back counter-clockwise until the lock engages at the twelve-o'clock position.

The machine is now wound and locked, and you may proceed to the next operation.

4. **LOADING THE INVESTMENT FLASK.** When the invested flask is thoroughly burned-out and heated to the proper temperature, remove from furnace with tongs in left hand. Place the back end of flask into the recessed step of receiver and with your right hand on crucible slide lever knob; slide the crucible nose firmly into the sprue button cavity in the invested flask. Next, with the flask firmly in position, swing the entire broken-arm assembly clockwise against the rubber stop to the nine-o'clock position.

**NOTE: BEFORE GOING FURTHER, BE SURE THAT THE FLASK IS SECURE IN THE RECESSED STEP RECEIVER, AND THAT THE CRUCIBLE IS PUSHED FIRMLY AGAINST THE INVESTMENT FLASK.**

5. **METAL MELTING.** Place the proper amount of metal casting grain (not more than 5 oz. silver or 6 1/2 oz. of 14K gold) in the crucible. Heat with a torch (acetylene, oxy-acetylene, gas-compressed air, etc.): until metal is liquid and shining. A small pinch of flux should be added just before casting.

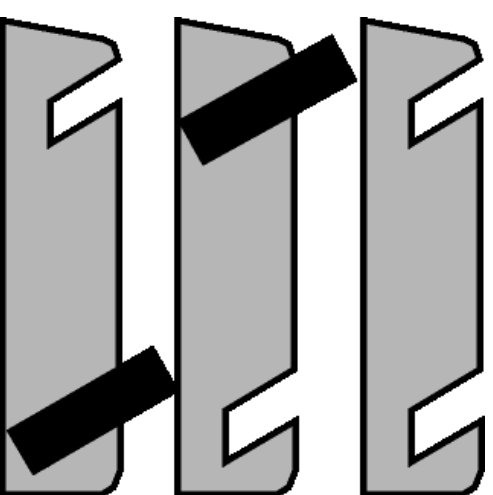
**2. BALANCE.** Balancing the machine is quick and simple. The machine is designed to be counterbalanced for three ranges of flask size: small, medium, and large. A 2.75 lb. counterbalance weight is provided for installation in one of two position locating slots on the counterbalance arm.

When casting with small flasks, the counterbalance weight is not installed on the casting machine. For medium flasks, the counterbalance weight is installed on the inner slot. For large flasks, the counterbalance weight is installed in the outer slot.

See Table and Diagrams below:

Flask	Diameter & Length	No Counter-balance Weight	Position
Small	2" x 2" 2" x 3" 2 1/2" x 2 1/2"		
Medium	2 1/2" x 3" 3" x 3" 3" x 4"		Position Weight in Inner Slot
Large	3 1/2" x 4" 4" x 4"		Position Weight in Outer Slot

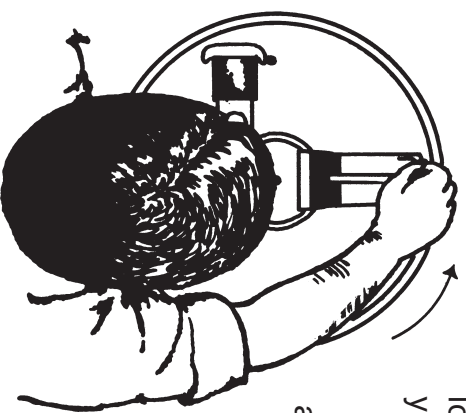
To Balance



**3. WINDING AND LOCKING YOUR MACHINE.** An externally mounted knob is provided on your Neycraft Centrifuge to allow you to wind and lock your machine while your hands are clear of the path or rotation of the casting machinery.

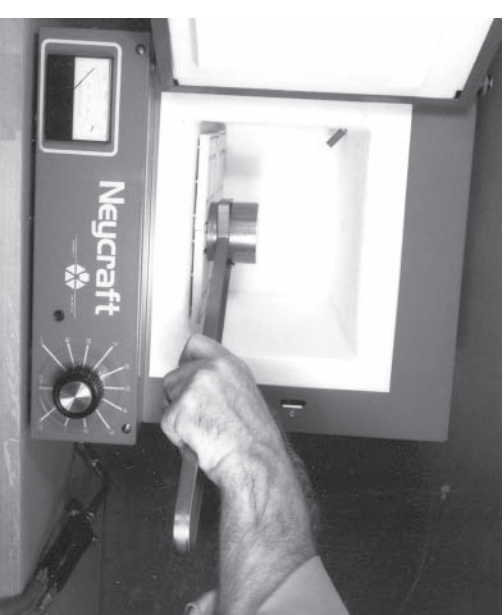
To wind and lock: It would be advisable to practice the wind, lock, and release procedures several times before attempting your first casting.

- Make sure you have clean, firm footing in front of the machine.
- To engage clutch, grasp the knob and rotate counter-clockwise until the knob is at the twelve-o'clock position. The clutch is now properly engaged.



If no vibrator is available, tilt the flask and pour the investment as described above. When the flask is filled to the brim, tap the flask continuously for about two minutes (use the mixing spatula handle, or a spoon) to release as many bubbles as possible.

**PATTERN BURN OUT.** After the investment has cured, the next step is to burn-out the model. The Neycraft Fiber Furnace™ is designed to accomplish this operation. The burn-out cycle is the step immediately before the casting operation. In the burn-out cycle, the flask is placed on the furnace floor,



Investment flask being placed in a burnout furnace (Note sprue hole is down).

sprue side down. The wax model is melted and then burned clean at 1200°-1300° F, leaving an exact replica cavity in the investment material into which the molten metal will flow in the casting operation. Temperature control is important in this operation to insure that the investment mold is burned clean and that the cavity and surrounding investment is at the proper temperature to assure a good clean flow of metal into the cavity, and therefore, a good solid casting.

There are a variety of procedures used in investment burn out, depending on the preference of the individual craftsman. Some prefer a short 2 hour burnout for one or two small flasks, others use a 4 hour burnout cycle, and still others accomplish burnout on an overnight cycle. Whichever method you choose is fine as long as the following points are kept in mind:

- To burn out the wax model completely, the inside of the investment flask must reach 1200° - 1300° F. It is important to remember that the inside of the investment flask is heated more slowly than the inside of the furnace. That is, once the furnace pyrometer indicates a temperature of 1200° - 1300° F, the flasks inside must be allowed time to heat saturate (so that the temperature inside the flask will be equal to the furnace temperature). Small flasks may only require 30 minutes to heat saturate, while large flasks may require 2 or more hours.

2. The temperature of the flask must be reduced to the proper level before casting in order to produce a complete casting which is not excessively oxidized. The following are ideal casting temperature points:

METAL	PROPER FLASK TEMPERATURE
Sterling Silver	800-900° F
14K Gold	950-1050° F
Brass	800-900° F

**CASTING.** Jewelry metal, usually gold or silver, is melted and cast into the replica investment cavity by centrifugal, vacuum, or pressure forces. The centrifugal method is the most popular. The details of centrifugal procedure are described later on pages 7-10.

Once the metal has been cast and allowed to set briefly (usually a couple of minutes), the hot investment flask may be transferred with a pair of tongs into a bucket of water. The boiling action created by the hot flask in water will usually break the investment materials away from the complete casting. The casting is now cleaned with running water and a toothbrush to remove all remaining investment material.

**FINISHING.** The finishing procedure consists of three operations; pickling, sprue removal, and abrasive buffing and polishing.

Pickling is the process of removing surface scale and oxidation from the cast piece. The cast piece is immersed in a heated acid solution for several minutes to etch away the surface oxides.

Sprue removal is next. Sprues are removed from the finished casting with heavy-duty cutting dykes (sprue cutters) or with a jeweler's saw. The point of connection is then filed and sanded to eliminate any trace of the sprue attachment.

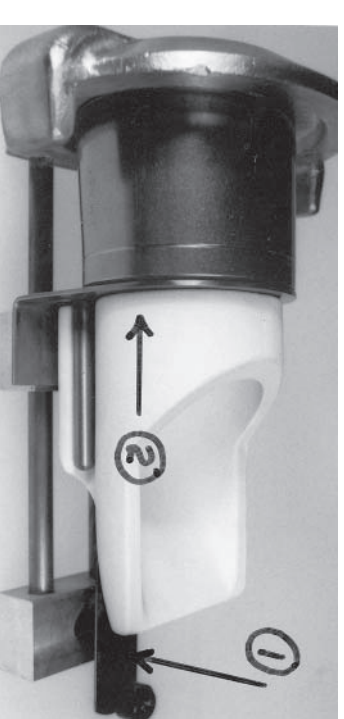
The cast piece is finished to a high luster through buffing and polishing. This can be accomplished with either hand or power tools. In either event, the process begins with a coarse abrasive and advances to a very fine finishing polish.

## Part II Neycraft Centrifugal Casting Machine Operation Instructions

The Neycraft Centrifuge is designed with a number of unique operating features. Everyone using the machine, including experienced casting craftsmen, should read this section thoroughly. By acquainting yourself with the unique operating features of the Neycraft Centrifuge, you will be able to produce quality castings, safely.

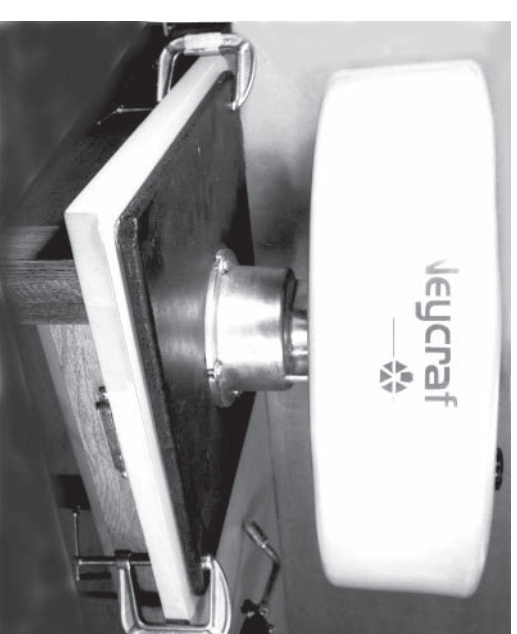
1. **MACHINE SET-UP.** The Neycraft Centrifuge is shipped from the factory completely assembled except for the installation of the crucible.

**CRUCIBLE INSTALLATION.** Install crucible in place by depressing the crucible clip (1) and sliding the crucible into position against the crucible bracket (2) as shown.



**MOUNTING.** The centrifugal caster may be mounted either portably or permanently.

No external shield or container is required for either type of mounting. The base is to be mounted with the **red dot facing the operator.**



**PORTABLE MOUNTING.** The casting machine may be portable mounted to a solid, heavy bench or table with C-clamps (not included with machine) as shown. The bench used for mounting should be firmly fastened to either the floor or an adjacent wall.

**PERMANENT MOUNTING.** The casting machine may be permanently mounted to a heavy bench or table with wood screws, or with machine screws and nuts, placed through the four corner holes provided on the base.