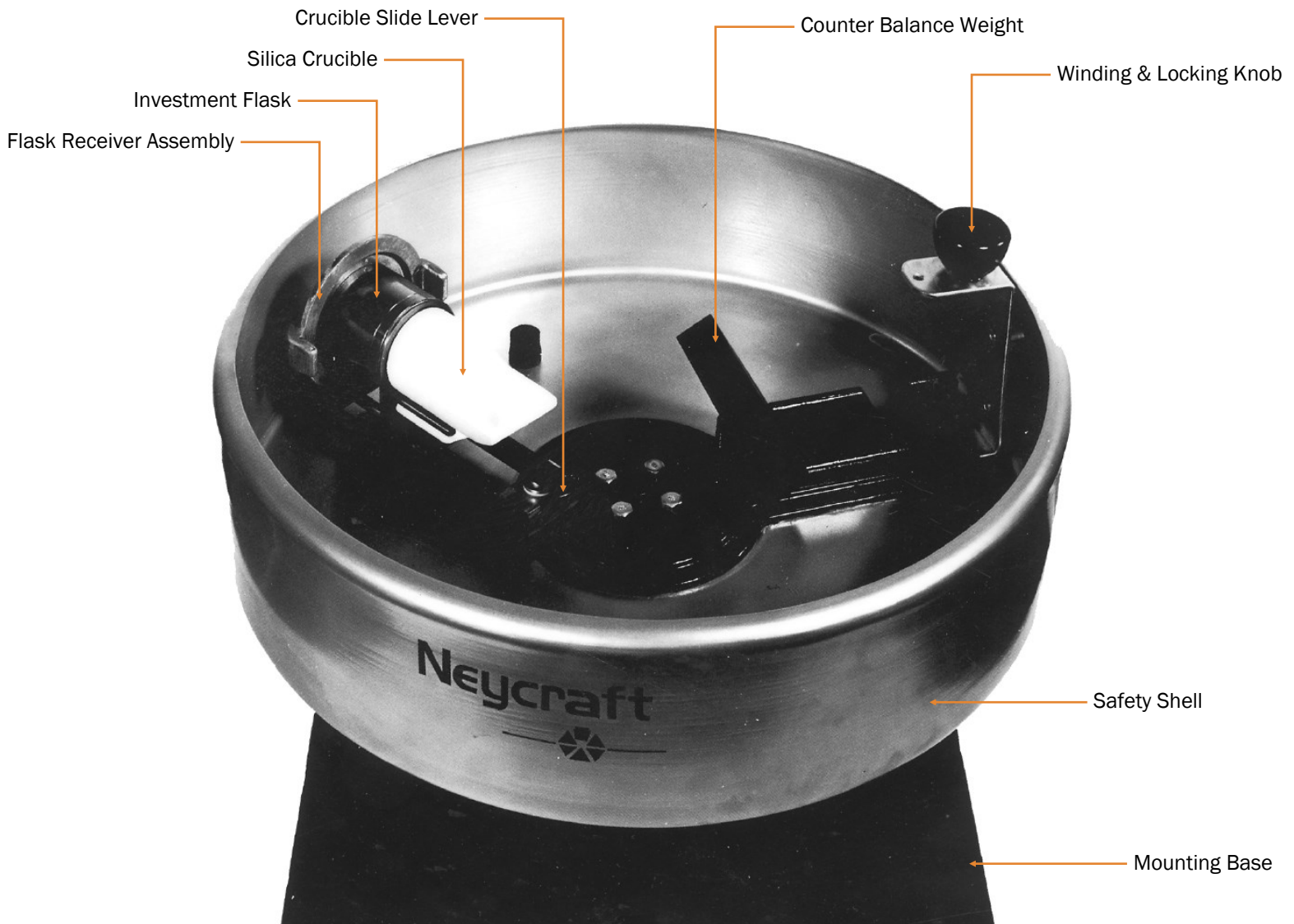


RANSOM & RANDOLPH

Owner & Operator's Manual

Neycraft™

centrifugal casting machine



Model No: 9491045

Patent #: 4,273,181



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NEYCRAFT™ CENTRIFUGAL CASTING MACHINE

Table of Contents

Part I. General Information on Lost-Wax Casting	4-6
Wax Model	4
Sprueing The Model	4
Determine Amount of Casting Metal	5
Investing the Sprued Model	5
Pattern Burnout	5-6
Casting	6
Finishing	6
Part II. Neycraft Centrifugal Casting Machine Operation Instructions	7-11
Machine Set-Up	7-8
Balance	8
Winding & Locking Your Machine	8-9
Loading the Investment Flask	9-10
Metal Melting	10
Spin-Cast Cycle	10
Maintenance Procedure	11
Warranty	11

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.

HOWEVER, EVERYONE USING THIS CASTING MACHINE (INCLUDING EXPERIENCED CRAFTSMEN) SHOULD BECOME FAMILIAR WITH THE SPECIFIC OPERATING INSTRUCTIONS IN PART II.

- **Part II** contains specific operating instructions for the Neycraft centrifugal casting machine (model 9491045).



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Part I. General Information on Lost-Wax Casting

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

- *Creative Casting*, by Sharr Choate, Crown Publishers
- *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 will burnout completely 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 an investment 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.

The pictures below show proper sprueing technique for a single ring (single pattern mounted on sprue base with 6-gauge wax wire) and for multiple pattern casting using a tree sprue (multiple patterns tree-sprued with ¼" wax wire for trunk and 6-gauge wire for branches).



Single Pattern



Multiple Pattern

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.



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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 ($\frac{1}{4}$ - $\frac{1}{3}$ oz.) for the sprue button.

Investing the Sprued Model

The mold for lost-wax casting is made with a material called investment, a powdered blend of refractories, gypsum and other inorganic materials. Investment is specially formulated to handle the temperature and strength requirements of casting precious metals and various pattern materials. Water is added to the investment powder in specified proportions. The investment water mixture is mixed (sometimes under vacuum) to a creamy smooth consistency. The liquid investment is then vacuumed (if not mixed under vacuum) and 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 is vacuumed again in the flask and 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.



Pattern Burnout

After the investment has cured, the next step is to burnout the model. Vulcan® single-stage and 3-stage burnout furnaces, available from R&R, are designed to accomplish this operation.



Vulcan single-stage burnout furnace



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The burnout cycle typically contains a series of ramp rates and dwell times at specific temperatures to properly dry the mold, melt out the wax and prepare the mold for casting. A properly burned out mold will be 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 burnout operation to ensure 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.

After reaching the temperature to achieve clean burnout, 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:

<u>Metal</u>	<u>Proper Flask Temperature</u>
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 (described in Part II) is the most popular.

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 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.



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Part II. Neycraft Centrifugal Casting Machine Operation Instructions

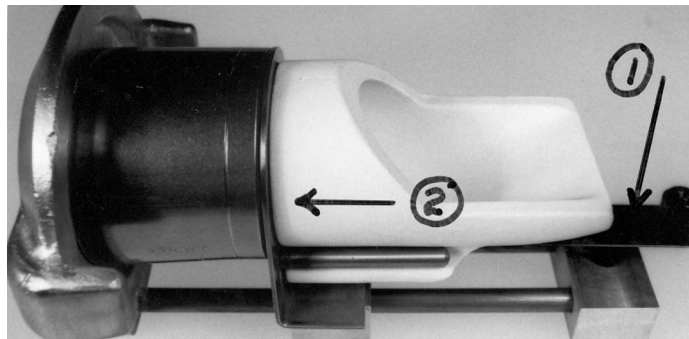
The Neycraft centrifugal casting machine is designed with a number of unique operating features. Everyone using the machine, including experienced casting craftsmen, should read this section thoroughly. By acquainting yourself with the unique operating features of the Neycraft centrifugal casting machine,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

Machine Set-up

The Neycraft centrifugal casting machine 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.



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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.

Balance

Balancing the machine is quick and simple. The machine is designed to be counterbalanced for three ranges of flask sizes: 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	To Balance	
Small	2 x 2"	No Counterbalance Weight	
	2 x 3"		
	2½ x 2½"		
Medium	2½ x 3"	Position Weight in Inner Slot	
	3 x 3"		
	3 x 4"		
Large	3½ x 4"	Position Weight in Outer Slot	
	4 x 4"		

Winding & Locking Your Machine

An externally mounted knob is provided on your Neycraft centrifugal casting machine to allow you to wind and lock your machine while your hands are clear of the path or rotation of the casting machinery.

Practice the wind, lock and release procedures several times before attempting your first casting.



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To wind and lock:

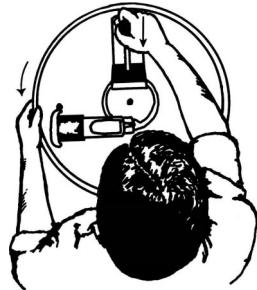
1. Make sure you have clean, firm footing in front of the machine.
2. To engage clutch, grasp the knob and rotate caster counter-clockwise until the knob is at the twelve o'clock position. The clutch is now properly engaged.



3. 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).



4. 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.

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.



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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.

Metal Melting

Place the proper amount of metal casting grain (not more than 5 oz. silver or 6½ 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.



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 PLACING 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.

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 you 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.



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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 & Accessories

<u>Description</u>	<u>Part No.</u>	<u>Description</u>	<u>Part No.</u>
2" Sprue Base	9357118	3" Sprue Base	9357002
2" DIA x 2¼" L Stainless Steel Investment Flask	9102019B	3" DIA x 3" L Stainless Steel Investment Flask	9102020B
Flask Tongs	9491010A	Silica Crucible	9353005
Counter Balance Weight (replacement)	9491066	Power Spring (replacement)	9356001

WARRANTY

LIMITED WARRANTY: Seller warrants each new product sold to be free from defects in material and workmanship under normal use and service. The obligation and liability of Seller under this warranty is limited to the repair or replacement at its factory, at the option of the Seller, of any such product, which proves to be defective within one (1) year after delivery, and is found to be defective in material or workmanship by Seller inspection. 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.

Seller disclaims any liability arising from any failure of its products which is caused by, in whole or in part, the use in or with products or component parts not manufactured by seller, or by an alleged defect related to design, labeling or manufacturing specification supplied by buyer.

Seller's liability for all claims, whether based on breach of contract, negligence, product liability, or otherwise relating to the products, shall not exceed the dollar amounts paid by buyer under this contract. In no event will seller be liable for any punitive, special, incidental or consequential damages (including without limitation, loss of use, loss of profit and claims of third parties), however caused, whether by the negligence of seller or otherwise.

INSPECTION: Buyer shall inspect the product upon receipt. The buyer shall notify R&R 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 of the above warranty are R&R'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 R&R 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 the warranty described in the first paragraph within one year after the cause of action has accrued.



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