

PLASTER AND MOLDS

Lecture XVI

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Plaster of Paris is made from the mineral Gypsum which is a substance, gray to white in color and rather soft. In composition it is sulphate of calcium with two molecules of combined water; $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. For the preparation of plaster, gypsum is heated to about 250°F . with the result that two thirds of the water is expelled. The material is then ground more or less finely according to the purpose for which it is used. In practice plaster is always mixed with water and when this is done, there is a double reaction, part is dissolved, part suspended. In the saturated solution fine crystals are formed so that the liquid gradually becomes thick and eventually solid. This action is accompanied by an evolution of heat corresponding to the heat absorbed in the first part of the operation. Heat applied to the crude gypsum drives off water and water added to the powdered plaster generates heat. If in reasting, the gypsum should be carried to a temperature too high, all the combined water would be driven off and the powder become "dead burned". It is no longer plaster because it has lost the power of setting.

Plaster can be bought from the makers and will keep indefinitely so long as it does not become wet. The best grades only should be used by potters. Plaster is indispensable to the clay worker and there should be a thorough understanding of its use and perfect familiarity with the processes involved in the working. It is well to have a part of the workshop

separated for plaster because it should be kept separate from clay. A supply of water is, of course, necessary and a large tub should be provided to receive the plaster washings. If these are allowed to flow into a drain there is danger of a stoppage. The plaster will accumulate in the pipes, with the consequent labor and expense of cleaning out. The tub can be emptied on the open ground. A pair of scales is necessary with platform and separate scoop which should hold at least five pounds. For mixing the plaster a large jug is needed. Earthenware is the best because it can be cleaned, but it is not easy to find an earthenware jug that is large enough. Sometimes a large batch must be mixed because the whole pouring must be done at once. It is not possible to add new plaster to old even if the old has only just set. Two or more jugs could be used, but there must be a worker for each. One person cannot successfully make two mixings at the same time. For large batches therefore, it is general to use a pail, or better, a tin can with a spout. The only objection to this is the difficulty of keeping it clean. Plaster insists on accumulating on the inside of the can and every mixing adds a layer. This is not fatal but it does not look neat. If any plaster should be found on the inside walls of the can it must be saturated with water before a new batch is mixed. If this is not done some of the mixing water will be absorbed and the proportions will be changed.

When a certain container, mold or form is to be filled with plaster, its capacity should be estimated as accurately

as possible and if this is to be done repeatedly this capacity should be carefully noted and recorded. The required amount of water is then weighed and for each 2 lbs. of water $2\frac{3}{4}$ lbs of dry plaster will be needed. The vessel containing the water is set on the scales and the weights adjusted to the required amount of plaster. The plaster is then fed in with a scoop, avoiding large masses or lumps, until the scale balances. For example: suppose the amount of water needed for a certain pouring is 4 lbs which is 2 quarts. The can is placed on the scale platform and balanced in any convenient way - a cup of shot is a good method - the scale is then set at 4 lbs. and the water poured in to balance. The weight is now changed to $9\frac{1}{2}$ lbs., that is 4 lbs. for the water and $5\frac{1}{2}$ lbs. for the plaster to be added. Now with a hand scoop the plaster is gently fed into the water until the scale is again balanced.

The can containing the water and plaster is left for a moment or two so that the plaster may be fully saturated and then the liquid is briskly stirred with the bare hand. A paddle could be used, but the sense of touch is important. The stirring is continued until the fluid is smooth. There may be small chips of wood or some other foreign material floating around. For some purposes such as molds or bats this will not matter but if the plaster is to be turned as a vase form any fragment that will mar the surface must be sifted out by pouring the liquid plaster through a fine sieve. This should be done as early as possible before setting begins. The stirring goes on slowly now so that bubbles may ~~not~~ be formed. Presently the

liquid thickens and begins to resist the movement of the hand. The art of plaster working lies in knowledge of the critical moment for pouring. The rule may be stated as "the last second before the plaster becomes too stiff." The tendency is to pour too soon. As the poured plaster sets it should frost over smoothly like sugar icing. If it appears wet with feathery markings it has been poured too soon.

An indispensable accessory to plaster work is a liquid soap called "size". A commercial soap will do or it may be prepared by dissolving scaphips in hot water. The fluid should be about the consistency of molasses. A painters brush about an inch wide is good for laying on the size and there should be two or three sponges of good quality. The purpose of the size is to permit the pouring of plaster on to a surface, whether wood, metal or hard plaster without adhesion. The surface is brushed over with the size and this is sponged off so that a smooth soapy film is left. Plaster will not stick to this.

It is a good plan to make a number of plaster bats; these are round, flat discs and there can hardly be too many of them in the workshop. Also the experience gained is valuable. A cast iron frying pan or "spider" makes the best container. This is scaped inside and set on a level support. Enough plaster is mixed to line the spider to a depth of one inch. When this is poured the pan is shaken so as to secure a smooth surface and left to set hard. When the plaster is cold the pan is inverted and the edge struck sharply against a brick

or stone. The bat will fall out on a waiting hand. At the edge of the bat there will be a sharp rim which is scraped off level with the surface.

With the experience thus gained the making of a form and mold may proceed. A simple piece, such as a bowl will be the best to begin with even though it presumes the use of a wheel. A drawing should be made first. This may be the exact size of the plaster form or it may be the fired size. In the latter case, the plaster form must be about one eighth larger to allow for the shrinkage of the clay. The design must have no undercuts or embossments because it is to be molded in one piece. One of the plaster bats already described is set on the wheel head and fixed with a little slip. The bat should be saturated. On the center of this is set a hollow cylinder made by rolling stiff paper or card; roofing paper is good. The cylinder is about an inch wider than the proposed bowl it is securely tied with cord and the lower edge where it rests on the bat is caulked with a roll of soft clay. The cylinder, known as a "cottle" should be practically water-tight. It now remains to mix the plaster, pour it into the cottle and wait for the setting. As the plaster becomes solid it should be touched lightly with a finger. If no mark is made the cottle may be removed. The turning should be begun as soon as the plaster will stand without support. The bowl is turned bottom up and when the shape has been worked out the surface is smoothed with fine sand paper. The finished form is now thoroughly coated with size and polished with a sponge; the cottle is arranged as before but now it must be wide enough to allow

for the thickness of the mold. A batch of plaster is prepared and poured, the cottle removed at the right time and the outside of the mold neatly trimmed. When the newly poured plaster becomes hot it can be detached from the form and dried for use. As many molds as are needed can be made from the same form.