Handy Man's Workshop

HOW TO MAKE CONCRETE POTTERY.—VI.

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(Concluded from the issue of August 14th.)

In the previous articles nothing much has been said in detail in regard to the numerous and various materials which can be used in making concrete, such as the different kinds of stones, pebbles, etc. Nor has anything been said about the quantity of each ingredient necessary to make a fixed amount of finished material.

Concrete is made by mixing together with water various proportions of Portland cement, sand, and stone. The sand and stone which go to make part of the mixture are commonly known as aggregates. It is by the careful selection of these aggregates that we are able to produce numerous pleasing and artistic results.

In many cases, if the proper aggregates are used in the right proportion, natural stones such as limestone, granite of all colors, brownstone, and French Caen stone, etc., can be so closely simulated that it takes an expert to tell it from the real material.

The ordinary concrete or cement surface as usually seen is most uninteresting in appearance. As a general thing, it is smooth and lifeless and of a dull gray color. The same general appearance as just described for ordinary concrete will prevail in almost any concrete surface, no matter what the aggregate used, unless the surface is treated so as to expose or bring out the aggregates used. If, however, the surfaces of the concrete in which selected aggregates have been used are property treated, a marked difference between these surfaces and those obtained with ordinary mixtures will be noted. By varying the kind, size, and proportions of the aggregate used, surface finishes of practically any desired color and texture can be obtained, the possibilities being limited only by the number of different kinds of aggregates available and the combinations of the same.

In small work, that is, where the thickness of the finished product is to be ½ inch or less, never use any aggregate exceeding ⅛ inch in size, especially so if the mixture is to be made thin enough to pour. In larger work having a thickness of 1 inch or more, aggregates up to ¼ of an inch can be used with good results.

Some interesting textures for pottery work can be obtained from the following mixtures:

A mixture composed of 1 part white marble chips not exceeding ¼ inch in size, and 1 part of trap rock or other dark stone of the same size mixed with 1 part of Portland cement and 1 part of marble dust will produce a surface similar in appearance to a light granite. This mixture should be allowed to set for twelve hours after pouring, then the molds should be carefully removed, as the concrete is still green, and the surface of the concrete should be lightly brushed with a stiff brush.

As the concrete is not thoroughly set or hardened yet, this operation will remove the surface cement, and thus expose the aggregates of marble and trap rock. After having performed the above operation, allow the piece to harden a few days, and then treat the surface with a solution composed of 1 part of commercial muriatic or hydrochloric acid to 3 parts of water. Dash this solution onto the face of the concrete surface with a brush, and allow it to remain for at least fifteen minutes. Then thoroughly scrub it off with a good stiff brush and plenty of clean water. This operation will remove all of the surplus cement, and will leave a good clean surface full of life and sparkle. Instead of using white marble chips and granite, as above, one can vary the results by using white marble chips and crushed-up red brick; or various colored marbles crushed to the proper size can be used, and then by treating the surfaces as explained, the colors in the various aggregates will be exposed, thus producing some very interesting surfaces.

A good light-colored surface somewhat simulating limestone can be procured by using 1 part Portland cement to 2 or 3 parts of white marble dust. After this has become thoroughly hard, treat it with acid as described above. The acid will eat off any surface cement, and thus the marble dust will be exposed, producing a pleasing sparkle throughout the entire surface. To simulate white marble, use 1 part white Portland cement to 2 parts of marble dust, and treat surface with acid as described.

By incorporating in the above mixture a small amount of yellow ocher a pleasing buff tint will be given to the mass, which will then very closely resemble French Caen stone. To simulate red granite, use red granite chips or screenings. These can be procured at almost any stone yard where they cut granite. The pieces to use should range in size from ¼ inch down to dust. If the pieces available are too large, they can be crushed up with a hammer. The proportions of the mixture should be 1 part of Portland cement to 2 parts of the granite. After having set for twelve hours, brush the surface out and treat it with acid as already explained, and the surface thus obtained will very closely resemble the real red granite. From the above details the reader will have grasped the possibilities to be obtained by the selection of aggregates, and now by using a little ingenuity can without further instruction experiment along original lines, which will be found most fascinating work.

In regard to the amount of the various ingredients to use for a fixed amount of finished material, the uninitiated often think, and naturally so, that if an amount of finished material equal in bulk to three glassfuls is required, all that is necessary to do, if it be a 1 to 2 mixture, is to take one glassful of cement and two glassfuls of sand, and then by mixing these together they will still have an amount of material that will fill three glasses. This is not so. The particles of cement are ground so fine that the cement is practically one dense mass; but the particles of sand are coarser, and between each of the particles appears a space or cavity. These cavities are called voids, and it is in these voids that the larger portion of the cement finds its place when the mass is mixed. The majority of sands used in concrete work contain from 25 per cent to 40 per cent of voids. If we take the larger figure for an example, then in two glassfuls of sand we will have 80 per cent of one glassful of voids. As we only have one glassful of cement to add to the two glassfuls of sand, and as

APPARATUS FOR MAKING ARTIFICIAL LILAC PERFUME.

the cement fills the 80 per cent of voids in the sand, it is plain that we have but 20 per cent left upon which we can figure for bulk. Therefore, instead of having three glassfuls of material, as one might naturally think, we will only have two glassfuls and 20 per cent of one glassful over, or two and one-fifth glassfuls of finished material. The percentage of voids varies largely in different grades of sands. The finer the particles of which the sand is made up, the smaller the percentage of voids. It is always best to use sand in which the particles are not uniform in size, or in other words, use what is commonly termed a well-graded sand. By this is meant a sand in which the particles vary in size say from 1/32 inch or less up to 1/16 inch or a trifle more. The heavier the work, the coarser the sand that can be used. Be sure that the sand used is clean. By clean sand is meant sand that is free from loam or clay. One can readily detect dirty sand by placing same in the palm of the hand and slightly wetting it. Then if by rubbing it around the hand becomes discolored, there is more or less dirt in the sand. A little dirt will not do much harm, but it is always well to have it perfectly clean. It is often found necessary to wash the dirt out of sand by means of water. This can be done by placing the sand in a pail of water and agitating it, thus making the dirt rise to the top. To thoroughly wash the sand, keep running the water into the pail and agitating the sand until the water discharged is practically clear.

When using a stone aggregate in the mixture, the spaces or voids between the particles of stone are filled by the cement and sand in the mixture, as were the voids in the sand filled by the cement. As in sand, the larger the particles of stone used, the greater the percentage of voids in it will be. Therefore a greater amount of sand and cement will be required to fill them.

By a little experimenting along these lines, one will become experienced enough to judge fairly closely the amount of each ingredient to use in mixing up any amount of finished material needed. It is always well to mix a trifle more material than is needed rather than not enough. For when one once starts pouring a cast, he should continue to pour until the mold is full. If not, a mark is very apt to show in the finished cast where pouring was left off and started again. Never try to use any material that has been mixed and let stand for more than half an hour. For in this time the concrete will have commenced to get what is called its initial set. If the mass is now disturbed and worked up again, the product produced will never have the same strength as one made with freshly-mixed material. In mixing, always mix the cement and sand together thoroughly before adding the water. One can judge by the color of the mass, fairly well, as to whether the mixing is complete. If the color is uniform throughout, it is a pretty good sign that the aggregates are well distributed through the mass. When making a mixture containing cement, sand, and stone, always mix the cement and sand dry first and then add the stone, which has previously been well soaked in water. In this way one is assured of having each stone coated with the cement and sand; for as soon as the damp stone comes in contact with the dry cement and sand, they adhere to it and cover the stone completely; thus a compact matrix of cement and sand is formed between each and every particle of stone, which binds them securely together into a dense and compact mass.

HOME-MADE CHEMICAL PERFUME.

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Early in the nineteenth century, chemists generally thought it impossible to make organic compounds out of the elements found in them. Synthesis they believed to be practicable only in the case of minerals. Woehler, with his remarkable synthesis of urea, shook that belief at least as much as the Curies recently shook the common belief of chemists in the integrity of the atom. Other organic syntheses followed that of urea, and some of them, as that of the alizarin dye, were made in conditions so favorable that it became unprofitable to grow the plants from which the chemical had hitherto been extracted. Thousands of acres have thus been so far given back to the cultivation of food stuffs, and one may confidently expect a time in which most, if not all, of our drugs, dyes, and even food will be made through synthesis. Agriculture then will be a thing of the past. Factories will make for us sugar, starch, fats, proteids, that is to say bread, eggs, milk, fruits, besides some new foods which may prove as superior to the old ones as antipyrin and pyramidon have proved superior to the natural alkaloids formerly used in similar circumstances.

The most recent and greatest advance in the organic synthesis of industrial products can be observed to-day probably in the perfume industry. The fragrance of heliotrope, hyacinth, pink, rose, violet, hawthorn, lilac, musk, wintergreen, vanilla, cinnamon, bitter almonds, and that of many fruits, are now produced with chemicals which frequently have but a repugnant smell or no smell at all. Most of these syntheses require complicated apparatus as well as considerable chemical skill, but in one case at least, that of terpinol, an essence now sold sometimes under the name of lilac, sometimes under that of lily of the valley, the operations are simple enough, and the synthesis is but an enjoyable experiment easily performed at home or in the class room.

Besides the vessels found in every kitchen, the only needed apparatus are a round-bottom flask (capacity about one pint), a rubber stopper with one hole, and two glass tubes united with a piece of rubber tubing. The preparation may be divided into two operations, i. e., the transformation of common oil of turpentine into terpin and the transformation of terpin into terpinol. The first operation requires much time and no care whatever. The second operation is made in less than a quarter of an hour.

One-half of a quart bottle is filled with oil of turpentine. Three-fourths of a pint of alcohol at about 80 per cent is mixed with it, and one-fourth of a pint of nitric acid is added to the mixture, which is left to itself for several days, until crystals are formed. These are collected, and dried with some blotting paper. They are pure terpin. To get the full amount formed in such circumstances, one should wait over three months; but, for experimental purposes, such a delay is, of course, unnecessary. Moreover, should the experimenter wish to prepare the perfume at once, he may get the ready-made terpin at the drug store, as it is prescribed by physicians for a kind of lung trouble.

To transform odorless terpin into fragrant terpinol, terpin must be heated with water containing a small amount of sulphuric acid. The round-bottom flask is half filled with water. Two or three large spoonfuls