DIFFICULTIES AND METHODS OF PLASTERING IN WINTER.

Plastering in winter is always attended with more or less unsatisfactory results. The walls possibly do not become hard or they are disfigured by yellow stains or smoked a dark gray color from the fires used to keep the house warm, or there is an unusual amount of cracking ; the white or finish coat rubs off like whitewash or most of the plaster peels from the walls, requiring it to be entirely replaced. These and many other defects are due to very simple causes, which with little care can be easily remedied. So little attention has been paid to the question that the causes of the ill results in winter plastering are little understood.

Heretofore wall plaster has been a mixture of varying proportions of slaked lime, sand and hair made at the building, usually out in the open with no protection from the elements. If cold weather came on the mixture would freeze and could not be used until thawed out, with consequent injury to the binding qualities of the material ; or, as often happens, the frozen mixture is applied to the walls to soon come off as the frost thaws out. Then, too, the quality of lime used varies greatly, and poor lime is cheap. Sand also differs greatly in quality, and sand that contains a large percentage of loam requires less time to bind it together ; but loamy sand makes a very inferior plastering mortar. When lime of the best quality is obtained and good sharp sand is at hand, the proportions that enter into the mixture are uncertain and are guessed at by the laborer who does the mixing. This laborer is the unskilled workman of the job, and if he does not properly manufactnre the mortar all the skill in the world in applying it to the wall by skilled workmen will avail little.

This unsatisfactory state of affairs in making plastering mortar has now been overcome, as many manufacturing plants have been established throughout the country which slake lime by machinery, dry the sand, card the hair, automatically weigh the proper proportions of each and mix the whole together thoroughly by machinery and deliver this mixture in a dry state to the building in suitable containers, usually jute bags. As the material so prepared requires only water to be added at the building to make it ready for use it does away with a great many of the disadvantages of the old way, and has the great advantage of insuring a uniform plastering mortar of very superior quality that is easily handled.

Plastering mortars prepared in this way can be taken into the building and mixed with water in water-tight boxes on the floor where it is to be used, and this avoids all chance of freezing if the building is properly heated, as it should be.

In the treatment of some of the troubles encountered in plastering in winter, we will not consider those met with when plastering mortar is made at the building in the open in the old way, but will consider that if the mortar is made at the building that it is properly protected as far as its manufacture is concerned. With this exception the following comments apply equally to all kinds of plastering mortar.

Plaster is necessarily applied in a wet state and the surplus water has to evaporate or be dried out of it. It is this surplus water and other dampness in a new building that are the chief causes of trouble in winter plastering.

The amount of dampness in a building is very much greater than is usually supposed. In frame structures there is moisture in pretty much everything that enters into it, the brick in the chimneys, the cement concrete in the cellar and bath rooms, even the lumber contains much moisture. In the larger brick or stone buildings with thick walls, concrete or tile floors the amount of moisture is very great. The greater part of this moisture will have to be dried out of the building sooner or later, but until this is done it is liable to be a source of trouble, and this is particularly the case in winter.

The methods used to get rid of this moisture are for the most part crude, and in many cases are the causes of greater trouble than the moisture itself. In hardening, the plaster of paris and lime in wallplaster combine chemically with some of the water, either in the form of water of cystalization or in formation of hydrates. Therefore, all of the water added to wet the plaster does not have to dry out. The so-called hard or patent plasters all contain more or less plaster of paris, they do not require as much water to be dried out as other plasters that do not contain plaster of paris ; in other words they dry quicker. This chemical change or hydration takes place gradually, and it is not desirable to dry the plaster so quickly as to prevent its taking place properly. An overheated building is quite if not more injurious than an underheated one. The majority of builders regard the ideal drying conditions in winter an overheated tightly closed building with no circulation. This is far from being right. Circulation of air is, if anything, more important than heat, if the outside atmosphere is above freezing. On such days as the atmosphere outside is very damp and moist, it is better not to open the windows.

The ideal condition is to have a gentle heat to keep the atmosphere warm, and allow sufficient circulation of air to absorb and carry off the moisture. It is especially important that the heat should be kept up during the night. The proper way to accomplish this is to have the heating apparatus installed in a building and in working order before any plaster is applied. Temporary connections can be made and heaters placed in the middle of the room. By doing this and observing the simple precaution of opening the windows from the top during the day time to allow a free circulation of air to let the moisture out, the greater part of the troubles of winter plastering would disappear. No time is gained by not doing this, and it is a mistake to think that a building can be plastered quicker by starting the work before the building is properly heated. On the contrary it is much quicker to delay starting the plastering until the heating apparatus is in working order, as the plaster dries out within a few days' time in this case, whereas it is liable to be weeks and months when this is not done.

With a temperature sufficiently high to evaporate the moisture, the plaster dries quickly, and the rest of the work can follow at once, but the usual method is not to wait until the heating apparatus is in order, but to enclose the building with muslin screens and use stoves, salamanders or open fires to dry out the building. Usually the fires are not kept going at night, and in consequence the building (which has probably been overheated in the day time, as is always the case of the ceilings in the rooms in which the stoves or salamanders are placed), is allowed to become cold at night. The chances are, too, that no precaution has been taken during the daytime to permit a draught of air to circulate through the rooms to carry off the moisture. What is the result? The heat of the day vaporizes the moisture and the cold of the night, after the fires are out, again condenses it and it settles on the plastered walls and is absorbed, or if the temperature is very low the moisture freezes on the face of the plaster, which is found covered with ice the next morning. In many cases this process of heating by day and cooling by night is kept up for weeks, with the moisture for the greater part still in the building at the end of that time, or possibly a sufficient amount of it has been gotten out to make the plaster appear sufficiently hard to finish, and the finish coat is applied. Each coat should be thoroughly dry before the next coat is applied.

After applying the finish coat of plaster all moisture from the under coats has to dry through the finish coat, and as the finish coat is denser and more compact than the under coats it takes very much longer for the latter to become dry after the finish coat has been applied than if this drying had taken place before the application of the last coat. The results are usually as follows :

1. The Effect of Dampness Remaining in Plaster.—The most serious effect of plaster remaining damp and