absorb water from the humid air before reaching the moisture content permitting the action of the destructive agent,—the moisture was there already. Lastly, a large quantity of the timber used was of the character shown in Fig. 1; that is to say, of rapid growth and low density.

Woods Differ in Powers of Resistance

Different pieces of wood, even of the same species, differ in their ability to resist attack. Fig. 2 shows timber of slower growth and higher density and possessing much greater resistance to wood-destroying fungi. What occurred, therefore, was that timber of low resistance, in a condition to invite decay (*i.e.*, unseasoned), was placed in a building in which the operations to be carried on gave rise to very favorable conditions for the growth of several extremely destructive kinds of fungi. It is therefore obvious that it could have been predicted that, in all human probability, decay of the timber would occur.

Such instances, and they are numerous, raise an important point for the consideration of the engineer. They do not simply happen without warning like an earthquake nor are they due to some mysterious and unknown cause. The cause is known and the trouble can be prevented by proper procedure. Wood initially sound will last for an indefinite period, so far as decay is concerned, if any one of the factors essential to the growth of fungi is lacking or can be effectively controlled. The moisture factor is especially important. If the required amount of moisture is present in the wood, the fungi can grow in it. If it can be kept thoroughly air-dry, their growth is absolutely prevented.

It is, of course, rarely practicable under ordinary conditions to control the moisture content of the wood, the humidity of the air, temperature or air supply. The food supply of the fungus, however, that is the wood itself, can readily be controlled in that by efficient impregnation with a suitable preservative it can be made chemically impossible for the fungus to act upon it. In the particular mill with which we are now concerned, the conditions were so exacting that the timber should without doubt have received efficient preservative treatment.

Use of Preservatives

The selection of the preservative to be used for the treatment of timber for a mill or factory building should depend on the circumstances of the particular case. A material which has been employed in several cases in Canada and the United States is mercuric chloride (corrosive sublimate). This preservative has been in commercial use to a rather limited extent for many years for the treatment of timber for various purposes, both in Europe and on this continent, and has given excellent results.

Before the war, several concerns of which the writers have knowledge treated timber with mercuric chloride for use in their own mill buildings at a cost of about $3.00 per thousand feet B.M. The price of the preservative has since advanced so greatly, however, that it might in some cases prove prohibitive at the present time. Other less costly preservatives which might be used are zinc chloride and sodium fluoride. The laboratories would be glad to furnish, on request, further particulars regarding the use of these materials for the treatment of timber for mill buildings. Timber to be treated with preservatives should always be thoroughly air-dry. Treating green or very wet wood is time and money wasted, as little or no penetration of the preservative can be secured. In the case of large structural timbers, which frequently take years to become seasoned, the outer inch at least should be reasonably dry before treatment.

In mill or factory buildings, or parts of the same, where the operations carried on create very favorable conditions for the growth of fungi, the use of untreated timber, especially timber of low density, or timber containing much sapwood, is inviting disaster. If the timber be efficiently treated, however, there is no objection to the presence of a considerable proportion of sound sapwood or to the use of sound second quality or low density wood, provided that where necessary due allowance be made for the lower strength of the lighter material. The added cost of treatment could therefore in some cases be partially offset by using less costly timber.

It must not be inferred that treatment of timber for mill construction is always necessary. It is only requisite where the conditions are especially exacting. In other cases the use of timber of the proper quality and the observance of the following precautions will give reasonable assurance of immunity from decay:—

Precautions Against Decay

(1) Only dense material of the more durable species should be used, and the proportion of sapwood allowed should be small.

(2) The timber should be carefully inspected as to soundness, density and proportion of heartwood, and material not up to specifications should be rejected.

(3) Planking should be thoroughly seasoned in all cases. In large timbers the outer inch at least should be reasonably dry.

(4) Timber delivered on the work should be piled out of contact with the soil and with any unsound wood.

(5) All reasonable and practicable precautions should be taken to keep the wood as dry as possible before and during construction.

(6) Laminated floors should not be built while the wood is wet. If this is unavoidable, it is advisable to proceed as follows: As soon as the building is completed and the heating plant installed, close all doors and windows, raise the temperature inside the building to, say, 120° F. or as near this as possible, and maintain this condition for several days. If this can be done before building paper, pitch or hardwood flooring is applied over the laminated flooring, so much the better. (In the case of storage or other buildings not provided with heating plants, it is suggested that some temporary means of heating might be used. Where this is not feasible it would be safer to build with treated timber.)

(7) Wood should not be covered with plaster or other materials or painted until at least two years after the building has been occupied.

(8) Construction at joints, where beams enter walls, etc., should be such as to permit of ample ventilation.

(9) Special care should be taken in the construction of roofs when untreated timber is used. It is necessary to have the interior roof planking thoroughly insulated so as to prevent condensation of moisture on it in winter.

(10) An examination of the planking and timbers should be made periodically, say, half-yearly, during the first three or four years after the completion of the building.

That timber frequently becomes infected in the lumber yard and that trouble from decay in mill buildings often arises from the installation of such infected timber is beyond question. Whether infection occurs in the lumber

(Concluded on page 118)