(b) *Hot Steeping*.—This process has been largely superseded by hot-and-cold steeping, as the latter is more efficient, occupies less time and is more economical. As is implied, the method consists of soaking the timber in a tank of hot preservative for a varying period, depending upon a number of conditions, such as the species, proposed use, etc.

(c) *Cold Steeping*.—This is not now advocated, it being even less effective than hot steeping on account of the slow penetration of preservative which takes place. The rate of absorption varies, but an immersion of one week per inch thickness of timber may be regarded as an average approximation.

Kyanizing Process.—This is seldom adopted in this country, as the preservative, mercuric chloride (corrosive sublimate), used in the process is extremely poisonous and therefore dangerous to workmen handling it. The timber is steeped in a 1 per cent. solution of mercuric chloride which is contained in a wood trough, as the preservative has a corrosive action upon metal.

Powellizing or *Powell Wood-process*.—The preservative used in this patent open-tank system is a heated solution of which the chief ingredient is sugar. The timber may be either seasoned (if required for internal woodwork or furniture) or unseasoned (for fencing, sleepers, etc.). The apparatus consists of a long (up to 100-ft.), open tank or chamber with removable ends. The timber is piled on trolleys and run into the tank, the ends are clamped (which make the tank watertight), the solution of required strength is introduced and heated by steam pipes, and after several hours' application this liquid is removed, the unloading door is unclamped and the timber is withdrawn. Neither pressure nor vacuum is required as the saccharine solution is readily absorbed by the timber. The process is very efficient. It is adopted chiefly in those countries where creosote is unobtainable and especially where sugar is grown. It has not been employed extensively in this country.

3. Superficial Processes.—These include (*a*) dipping, (*b*) spraying and (*c*) brush application. None of these surface treatments is as effective as the pressure and open-tank systems, as the preservative only slightly penetrates the timber. The wood must be seasoned, and the surface should be dry before application. Greater penetration generally results if the preservative is applied hot, especially if creosote is used.

(a) *Dipping* is the best surface treatment, except for timber already fixed in position. The pieces of wood are simply dipped in a receptacle containing the preservative; the longer the immersion the better.

(b) *Spraying*.—The preservative is applied in the form of a fine spray as it is forced through the nozzle of the appliance by compressed air. It is an effective form of surface treatment, as a liberal amount of the solution can be applied and the pressure makes possible the penetration of any cracks and crevices.

(c) *Brush Application*.—This is the most common method of treating existing exposed woodwork with creosote or other preservative. The liquid should be applied liberally with the brush and any cracks in the timber should have special attention. At least two good coats should be given, the first coat being allowed to dry before the second is brushed on. Where accessible the treatment should be renewed every three years, especially if it is external work such as fencing, weather-boarding, timber outbuildings, etc.

Fire-retarding.—Whilst timber cannot be made fireproof, there are several chemical solutions and proprietary paints available for rendering it fire-resisting. One of the most effective fire-retardants is ammonium phosphate. The material is applied by any of the methods described for preservation. The timber should be well seasoned before treatment in order that maximum penetration may be effected.

DEFECTS

Defects due to seasoning are referred to on pp. 7 and 8. Other defects are described on p. 58, Vol. I. Defects caused by fungi and insects are described below.

It has been stated on p. 12 that fungi are the chief cause of decay, that the development of fungus is dependent upon food, moisture and oxygen, and that the absence of one of these prevents decay. A suitable temperature is also essential for fungoid growth. The principal decay of building timber is dry rot.

Dry Rot.—This disease, which is highly infectious, causes a tremendous amount of destruction in timber. The decay is caused by several fungi, that most frequently found in buildings being the *Merulius lacrymans*. Partially seasoned wood fixed in a warm, damp and badly ventilated position is very liable to attack by this fungus. The spores (germs or seeds) of the fungus develop under the above favourable conditions and minute silky hollow threads or tubes (called *hyphæ*) are thrown out. These rapidly spread over the surface of the wood as an open network or as a closely interlaced covering or sheet which is grey coloured, relieved with blue and/or yellow patches. Under very damp conditions especially, the hyphæ may be arranged in cotton-wool like masses; such a collection is known as a *mycelium*, and its colour is snowy-white with occasional bright yellow patches. In course of time the mycelium develops into a tough, fleshy substance called a *fruit body*. Each of these "mushroom" growths may exceed 1-ft. in diameter; it is of a brown or dark red colour with a white edge, and its surface resembles a sponge, it being corrugated and pitted with small holes. Countless numbers of spores are produced on the surface, and these can be readily conveyed by air currents, rats, mice and insects and thus infect timber far removed from the original site. The disease can also be spread by infected tools and clothing. The fungus produces drops of water which hang from its surface, hence the derivation of its specific name *lacrymans*, which means "weeping." Another property of this fungus is its ability to produce white or grey coloured strands which spread in all directions over timber, brickwork, plaster and steel, and may pass through mortar joints and actually penetrate thick walls consisting of soft bricks or stone. These strands, which may be up to $\frac{1}{4}$-in. thick, are capable of conveying water from the damp original site of the dry rot to comparatively dry timber, remotely situated, thereby providing suitable conditions for the extension of the disease. Dry rot is transmitted from one floor to another in this manner and so may spread to every part of a building if the attack is vigorous and the conditions suitable.

During the development of the fungus the hyphæ attack the fibres of the wood and feed upon the substance of the cell walls, which are gradually broken