Recognised Preservative Agents.

There are several preservative agents used for this purpose, such as copper-vitriol, the chlorides of mercury and zinc, or, best of all, *heavy oil of tar.*

The ideal preservative is the one which not only destroys the putrefactive organisms, but renders even the conditions of their existence impossible, by preventing the access of air and water; and the only one that can effectively do this is *heavy oil of coal-tar*, also called "creosote."

Why Creosote takes Precedence.

The superiority of creosote as a preservative has long been recognised, its use in more or less crude form dating back over seven hundred years. This is instanced in a striking manner by the fact that many churches and similar buildings are standing to-day in Norway, thoroughly sound in condition after exposure to the wet and rigorous winters of seven hundred years, their marvellous preservation being due entirely to periodical applications of tar, as a surface dressing, to their outer walls. Within the last seventy to eighty years European engineers have continued to use creosoted timber, notwithstanding its comparatively high cost, in preference to timber treated with salt-solutions, &c., for railway timbers, bridges, wood paving, marine piles, &c.; but its universal use has now been made possible by the invention and adoption of the Rueping process.,

The preserving quality of creosote is further demonstrated by the many officially recorded successes achieved in England and France. On one railway-track in France, within a space of twenty-one years, only 6 per cent. out of all beechwood sleepers which had been treated with creosote had to be exchanged.

In the United States over ten millions of railway-sleepers, besides large quantities of other constructional timbers, are being creosoted annually for and by the great railroad companies, under the Rueping process, and it is needless to say this huge business has not grown within the last four or five years other than as the result of most exhaustive trials by the railroad companies themselves as well as by the Forest Service Branch of the United States Department of Agriculture, whose work in regard to timber and forestry is recognised as authoritative in the highest degree.

Professor C. Baron von Tubeuf, University Professor of Munich, a well-known European authority on matters pertaining to wood-preservation, in a report, dated December, 1906, on creosoting by the Rueping process, says, "Creosote oil is a superior preservation against wood-destroying fungi, which, for instance, cannot be said of creosole or copper-salts. I mention as important the fact that timber treated with creosote by the Rueping process does not absorb water, and that therefore the preservative cannot *leach* out, as is the case with timber treated with salts." It must be noted here that under the same category must be included all those chemicals which are injected into the timber-cells with water as the conveying agent.

The Rueping Process.

The distinctive feature of the Rueping process, and the economy and thorough impregnation effected thereby, will be noted from the following brief comparative description of this and the usual method:—

In the usual method impregnation is obtained by first submitting to a *vacuum*, the timber being treated, thereby removing the air from the cells of the wood, after which, whilst still in vacuum, the impregnating fluid is forced into the wood by a pressure of from 75 lb. to 100 lb. The unabsorbed creosote remaining in the cylinder is then removed, and the process is completed. Result: An unnecessarily large quantity of creosote—about 12 lb. per cubic foot—is left in the wood, while the condition of the wood for handling is the reverse of desirable, it being soggy, heavy, and dirty.

In the Rueping process the timber is first subjected to a *pressure* of 60 lb. to 65 lb., instead of to a vacuum as in the former case, the air being thus compressed into the interior cells of the wood. Whilst still under this pressure the warm impregnating fluid is admitted into the cylinder until the timber is quite immersed; the pressure is then increased to 105 lb. to 225 lb. according to the dimensions and qualities of the timber. Under this increased pressure the impregnating fluid will penetrate into the cells of the wood. Owing to the high pressure, the creosote, in consequence of the capillary nature of wood, and its adhesive properties, moves along the cell-walls into the innermost parts of the wood, soaking them entirely, by which the compressed air in the cells will be still more compressed, and at the same time entirely kept in suspension and enclosed by the advancing creosote. When the material is sufficiently impregnated, the pressure, with great energy, through its expansion, will force as much of the impregnating fluid out of the wood as does not adhere to the cell-walls, and this surplus is thus made to flow back into the creosote-tank. Result: A much more thorough impregnation; only as much creosote as is necessary for effective preservation left in the wood; and the timber treated left in such condition as to render it fit for handling, painting if desired, and practically any purpose except the inside of buildings, where treated timber is not required.

Cost of Creosoting by the Rueping Process.

Creosote, of approved quality, is at present quoted in Europe at 2¾d. to 3d. per gallon naked, the estimated outside cost landed in New Zealand in bulk or barrels being 5d. per gallon. At this price for creosote, based on extensive experience of treating timber by the Rueping process in America, the cost of treating a standard-size New Zealand railway-sleeper would be approximately as follows: 1 gallon of creosote, 5d.; mechanical part of impregnation, wages, &c., at most, 2d.: total, 7d. per sleeper —equal to about 3¼d. per cubic foot for material and labour. Based on the consumption of creosoted