PREVENTION OF DRY ROT IN TIMBER.

We recently published an article showing the course of dry rot in timber, and amongst other preservation we referred to a paper by Mr. Boulton on its antiseptic treatment. As the subject is an important one to wood workers, we now gives the following: "The can be but two opinions as to the growing importance of studying the question of timber preservation, having regard more particularly to the reckless manner in which our own forests have disappeared and the little care that is bestowed on those of our colonies and the United States forests, as yet of vast area, but, nevertheless, thinning so rapidly as to be palpable to the most casual observer. It is true that the substitution of iron and steel for wood in the navies of the world has largely diminished the call for timber in that direction, but this diminution is made up for by the enormous extension of the railway system and the demand for sleepers and telegraph poles, as also for the piles necessary for the great harbor and reclamation works that are so numerous at the present day." Any information concerning the practical preservation of wood is therefore of extreme value, and Mr. Boulton's phamphlet (the result of a paper read last autumn before the Institution of Civil Engineers) is one which deserves careful study.

The appearance on a large scale of the dry rot in the ships of the British navy, at a time when they really were the wooden walls of old England, was naturally a subject of considerable alarm, when we know that a single seventy-gun ship required for its construction the oaks of 40 acres of forests, and therefore it was not to be wondered at that as early as the beginning of this century various proposals were made to stem the evil by the use of various salts of metals. The inquiry assumed more definite proportions, however, when the railway era was fairly inaugurated, and it was found that stone sleepers were too rigid to be useful, and several materials were experimented upon for timber preservation with more or less success. The first system of treatment was called Kyanizing, after its inventor, Mr. Kyan, and consisted of the use of corrosive sublimate. It answers the purpose very fairly, especially when the timber was in a dry situation, though it failed when tried under water. Moreover, corrosive sublime was found to be rather too volatile at ordinary temperatures, and too injurious to those who had to handle it. Marganizing, the system adopted by Mr. Margary, was the employment of the sulphate of copper, which appears to be the most reliable of all the metallic salts, and is still in use in France. Burnetizing (after Sir William Burnett) was the adoption of chloride of zinc, a good timber antiseptic, but very soluble in water. It is still in favor in Germany and Holland. Finally came Mr. Bethell's celebrated patent for creosoting, a bad name for the existing process by coal tar, as in reality creosote is a product of the destructive distillation of wood, which has never been used for timber preservation; and the only excuse for the name was because somebody discovered carbolic acid or phenol in both coal tar and wood distillation, so that it must be understood that creosote, in popular application to wood preserving, is not creosote, but oil of tar.

The basis of the action of all these remedies was supposed to be that they coagulated the albumen of the sap, and formed insoluble compounds that arrested decay; but as it has been proved by experience that the salts of metals are not so efficacious or so permanent as the tar-oils, the so called creosoting process has now for a considerable period out-lived its competitors. Even in France, where the sulphate of copper has held its own longer than anywhere else, partly because Dr. Boucherie injected the sulphate in a peculiarly ingenious manner, and partly because it was noted that the salts of metals became washed out in damp situations, even there the creosoting process has met with great approbation, since Forestire observed how thoroughly the timber was protected against the most troublesome pest, the teredo navalis. The oil used in creosoting is thus prepared. When coal is carbonized for gas making, the products given off are four, viz.: illuminating gas, ammoniacal or gas-liquor, coal tar and coke, all of them, in their several ways, of extraordinary commercial value, though, in the present case, the coal tar, a black, treacly looking substance, is all that we have to deal with. It may be mentioned, however, incidentally, that the waste or gas liquor is the parent whence the ammonia group is manufactured on a large scale. By distilling the coal tar, three separate groups of products are obtained: first, the oils which are lighter than water, such as napthas, which are of incalculable importance to the country, as from them are ultimately procured the aniline dyes; secondly, the oils which are heavier than water; and, thirdly, the pitch which is the residum of the distillation. The lighter oils form a category of themselves, quite distinct from the heavier ones, and have never been used for creosoting purposes; but they are extremely rich in their own particular constituents, yielding, amongst other results, the benzoles from which the aniline is obtained, the toluols, the solvent and burning napthas, and carbolic acid, whence is derived the picric acid used for fulminating purposes. The heavy or dead oils form the creosote of the timber-yard, and they were formerly treated *en masse*, though now each constituent can be separately removed according to its volubility. These dead oils are divided by the trade into two kinds, "London" and "country," the former being the bestillation from the best Newcastle coals, which are usually supplied to the south of England, and are much richer than other coals in semi solid substances, such anthracite, naphthalene, etc. The country oils, on the other hand, are distilled from the Midland coals, and are more volatile, besides containing a larger proportion of tar acids. In the earlier days of Bethell's patent, the heavy or dead oils were alone used, it being considered that the crude napthas were useless as antiseptics, and that the pitch from its solidity, would form an impediment to the injection; but the fashion gradually came into use of mixing a small percentage of country with London oils, as dilutents of the more solid material, and, in point of fact, the country oils became popular and mentioned in specifications.

The inspectors liked them because they were thinner and injected with less trouble, and also because the timber thus treated looked cleaner and less muddy. The late Dr. Letheby, too, gave a great impetus to the growing use of country oils, as he considered that the carbolic acid (which had been discovered in coal tar by Runge, in 1834) was the key of the whole position, and that the efficacy of the treatment consisted in the percentage of carbolic acid. It was his object, therefore, to exclude the naphthalene and para-naphthalene as of no value, but to exclude the lighter portions of the oils, viz., those which distilled between 360 deg. and 490 deg. F., as containing the tar acids in the greatest abundance. Here, again, incidentally, we may mention that this para-naphthalene, useless in timber preserving, has been found to ultimately yield anthracene, the parent of alizarine, that beautiful red dye that has so completely superseded madder in textile operations.

Dr. Letheby, however, did not have all his own way, for the investigations of De Gemini and Rottier, in France, and of M. Coisne, in Belgium, seemed to entirely disprove his conclusions. The latter gentleman, an engineer in the service of the Belgian Government, placed shavings in putrefying pit for four years, saturated with creosote containing respectively 15 per cent., 8 per cent. and 7 per cent. of tar acid, while one sample was of heavy specific gravity and held no tar acid whatever. This last experiment, however, was the most successful of all, and throughout the whole series it was evident that the results were in favor of the heavy oils, and that the tar acids were of no use at all. The Belgian government accepted Mr. Coisne's statement, and does not stipulate in its railway specifications for any tar acids, though it allows 30 per cent. of naphthalene, one of the very substances discarded by Dr. Letheby. Following an inverse method of examination, M. Coisne procured and analized some creosoted sleepers that had resisted decay for 20 years, and found no tar acids, but, on the contrary, plenty of naphthalene. Similar experiments were undertaken by Mr. Boulton, in 1882, on sleepers from various railroads which had been in use from 16 to 32 years, and his analysis, says the *Builder*, proved four things: 1. That no tar acids were detected by ordinary methods. 2. In the majority of cases the semi-solid constituents, such as naphthalene, were present. 3. Only small percentages remained of oils distilling below 450 deg. F.; all these facts proving that it was through the action of the heaviest and most solid portions of the oils that the preservation was effected. 4. He detected an alkaloid called acridine, which he thought played an important part in the action, it being undoubtedly a powerful germicide and solidifying within the pores of the timber, without evaporating or being washed out. Groville Williams also came to the conclusion that the antiseptic results of creosote were due more to the basis of alkaloids than to the tar acids, the former remaining while the latter seem to disappear. It is therefore most probable that it is this unfortunate quality of evaporation that disqualifies the tar acids, seeing that, taken per se, there is no doubt but the acids are powerful antiseptics, and that their presence arrests decay. Mr. Boulton's experiment shows that if tar acids and naphthalene be separately exposed at the same temperatures, the former will evaporate much more quickly than the latter; indeed, by repeated washings with cold water, both carbolic acid and cresylic acid (its near relation and a constituent of tar oil) can be completely disposed of, a most important fact in connection with the exposure of timber to sea water.

Viewing all these fact in their bearing upon specifications, it would seem as if the London oils, as they come from the still, are not sufficiently volatile, nor do they comply with the requirements as regards the percentage of tar acids. A pressure is, therefore, put upon the manufacturers to meet the case by taking out some of the heavier portion by which the bulk is rendered lighter and the proportion of the tar acids to the diminished bulk is increased. But Mr. Boulton considers that this is a mistake and would rather relegate the lighter portions of the tar acids, and especially carbolic acid, to their proper position as sanitary antiseptic, for which they are unrivalled, and would encourage the use of the heavier portions. He also with the joint creosoting specification of Sir Fredric Abel and Dr. Tidy, who resolved to exclude no semi-solid bodies which completely melt at 100 deg. F., and further changed the standard of volatility for 90 per cent. at 600 deg. F. to 75 per cent.

Without going into the vexed regions as to the exact relations of putrefaction and the germ theory, the conclusions drawn are, that the best antiseptics for timber are to be found amongst oils and bitumens, which fill up the pores of the wood. Of such bodies, those that contain germicides are to be preferred, and other properties being equal, those which either solidify in the pores of the wood, or which require an extremely high temperature to volatize them, and which are insoluble in water, are the best of all. With regard to the creosoting process Mr. Boulton lays great strength on the hygrometic condition of the timber at the time of injection, neglect of which has been the cause of failure. The power of absorption of moisture in woody fibres is so great, fir timber being able to keep up as much as from 60 gallons to 150 gallons of water to the load of 50 cubic feet, that it has always proved a great difficulty in the way of treatment, as the subjecting of the timber to a dry heat invariably results in injury to it. Mr. Boulton has, however, successfully met the difficulty by a most ingenious combination of air pump action with the use of creosote heated up to 212 deg. F. With charges of very wet sleepers, he has withdrawn water equal in volume of 50 gallons per load of timber, the water being replaced with an equal volume of creosote by the action the air pump alone.—*Woods and Forests.*

JOHN MCCOSHEN, a lumberman, of Ottawa, and a member of the firm of Fraser & McCoshen, fell dead in Lawlor's hotel, Levis, immediately after taking his breakfast on August 17th.

LEAKAGE AT TUBE ENDS.

Leakage at tube ends is one of the most frequent and annoying defects to which the ordinary horizontal and upright tubular boilers are subject, and while it is not necessarily on its first appearance dangerous, it indicates that something is wrong either in the construction or management of the boiler, and it should be attended to at once, for if neglected, the resulting corrosion of the head and tube ends will speedily induce a dangerous condition. Many explosions of upright tubular boilers have resulted solely from this cause.

Faults of construction may consist of insufficient rolling, or too severe rolling or expanding of the tubes, by which the ends may be split or cracked, so that it is impossible to keep them tight. The second defect is, perhaps, more frequent than the first. The feedpipe is also very frequently wrongly located in the head close to the tubes, and when it is, and cold feed water is used, the tubes in the immediate vicinity are almost sure to show a chronic leak.

A heavy coating of scale on the heads between the tubes is sure to set them leaking severely, as the water is thus kept away from the head and tube ends, and they become overheated. In this case the only thing that will do any permanent good is to remove the cause, that is the scale, when generally, if the defect has not existed for too long a time, the tubes may be rolled and made tight again. But a comparatively short time of severe leakage in this case is pretty sure to so severely corrode the ends that new tubes are required.

This collection of scale is also a fruitful source of burning and cracking of the back tube sheet. The front end of the boiler is not so much subject to this action, as the heat to which it is subject is not so intense.

The removal of a heavy coating of incrustation from between the tubes of a boiler is sometimes a matter of some difficulty unless due intelligence is used. With "staggered" tubes, very bad water, and where the boiler is worked hard, the case is much complicated, and the almost sole reliance is a judicious use of solvents, coupled with proper cleaning, as often as the boiler can be spared for the purpose. With properly arranged tubes, much help can be obtained by the use of proper chisels and scraping tools. Still no rule of procedure can be given that will apply to all cases. A thorough examination of each case is always necessary to determine the best method of procedure, and it is always easier to keep a boiler clean, than it is to clean it after it is badly fouled.—*Locomotive.*

DARKENING OAK.

To render new oak wainscoting and oak furniture dark, and give it an antique appearance, we have it from good authority that ammonia is the cleanest, best and cheapest material that can be used, says *Timber*. The liquid stains commonly used are apt to rise the grain of the wood, make it rough, and it is with difficulty evenly applied, whereas in the use of ammonia it is simply the fumes that color the wood, and do it so completely that it is difficult to tell whether the wood is really new or old A correspondent states that the following process of treatment is the best: "Oak is fumigated by liquid ammonia, strength 800°, which may be bought at any wholesale chemist's at 5s. a gallon. The wood should be put in a dark and air tight compartment, and half a pint or so of ammonia poured into a plate, and placed upon the ground in the centre. This done, shut the entrance, and secure any cracks, if any, by pasted slips of paper. Remember that the ammonia does not touch the oak, but the gas that comes from it acts in a wondrous manner upon the tanic acid in that wood, and browns it so deeply that a shaving or two may actually be taken off without removing the color. The depth of shade will entirely depend upon the quantity of ammonia used and the time the wood is exposed. Try an odd bit first experimentally, and then use your own judgment."

THE big mill at Deseronto during July cut 3,787,320 feet of lumber. This included two weeks cutting on hemlock, black ash and basswood, which are not so easily or expeditiously handled.