or openings cannot reach beyond the treated zone, the spores will find their way in through the checks to the untreated portion and cause interior rot, which is frequently misnamed "dry rot." The depth of penetration of the creosote oil depends on the amount of oil that is forced into the wood, yet it is not necessary for the preservation of the timber to leave so much oil in the timber as must be put into it in order to obtain the required penetration. Therefore, many plants use the process whereby a large quantity of oil is forced into the timber, thus insuring thorough penetration, but whereby a considerable portion of this oil is afterwards drawn from the timber by the creation of a high vacuum. This leaves in the timber only the amount of oil that is needed, and the oil is evenly distributed throughout the timber (except impenetrable heart wood), instead of simply being distributed densely at the surface. By this method proper penetration can be secured without adding so greatly to the cost as would be done if all the oil were left in the timber that had been put in to obtain the penetration.

Following is the record of a treatment recently given an order of Norway pine paving blocks, three inches wide by four inches deep, for the City of Toronto:

Creosote oil in each cubic foot of timber at end of pressure.	Net gallons remaining in each cubic foot at end of vacuum.
34.35	22.41
25.20	19.61
26.60	19.57
26.50	20.61
27.03	21.53
25.74	20.64
24.80	19.01

The objective was a twenty-pound treatment. It will be seen that the net average was 20.48 pounds. These blocks were treated at the plant of the Canada Creosoting Company, Limited, at Trenton, Ont.

After the blocks, ties or timbers have been treated, the penetration is inspected by the representatives of any inspection company who may be present on behalf of the purchasers of the materials, by cutting the blocks in two by means of a hatchet, or extracting small borings from the ties and timbers. These borings are made with a Swedt, Swedish instrument which resembles a miniature core drill in its action. A perfect core several inches long and about 3/16ths of an inch in diameter is taken out of each timber that is bored. Examination of these cores shows the depth and uniformity of penetration.

The method of loading ties onto the railroad cars after treatment is shown at the right of Fig. C. The handling of large timbers, both before and after treatment, is all done mechanically.

Before ties and timbers are treated, or before lumber is cut into paving blocks, it is stacked on the seasoning yard for the seasoned. The yard for months, to become properly seasoned. lumber is stacked in open piles, so as to permit the free circulat: circulation of air, for three to five months. The ties are piled : piled in such a manner as will permit of good air circulation and at the same time not allow sufficient exposure to cause checking. It requires from 6 to 10 months to properly properly season ties. Fig. F shows the manner of Piling et piling ties.

Fig. A is a general view of the Trenton plant. The buildings, reading from the left to right, are the block mill make the second result of the second result of the second result. mill, machine shop, boiler house, office and retort house. The company also owns its own tie camp, north of Trenton, which it organized in order to get hard wood ties.

The trestlelike structure in Fig. D is the conveyer running out from the block mill. The sawn blocks are carried out on this conveyer. Chutes will be noticed run-ning from the conveyer to the cars, and when the cars are pulled into place under these chutes, trap doors are opened in the conveyer just over the chutes and the cars are filled. In the background of Fig. D can be seen large tanks for storing oil, holding 150,000 gallons each.

Creosote oil, the preservative used at the Trenton plant, is defined scientifically as any and all distillate oils boiling between 200° and 400° C. which are obtained by straight distillation from tars consisting principally of compounds belonging to the aromatic series and containing well-defined amounts of phenoloids. Or, to be less



Fig. F.—Tie stacking yard.

technical, creosote oil might be defined as a distillate from the tar which is produced as a by-product in the manufacture of coal gas from bituminous coal by the retort method; or a distillate from the tar which is produced as a by-product in the manufacture of coke from bituminous coal in by-product ovens; or a distillate obtained from a mixture of these two kinds of tar.

Creosote oil is highly antiseptic and thoroughly protects the timber against fungus growths. For ties, eight to twelve pounds per cubic foot (about 21/2 gallons per tie) is left in the timber, while for paving blocks from sixteen to twenty pounds per cubic foot is left in. Creosote oil may have a preservative value from physical properties as well as from its antiseptic or poisonous nature. This is especially true when applied to paving blocks. It may be capable of adhering to the cell walls and fibre of the wood with such permanency as to prevent conditions favorable for the development of elements destructive to timber. With the idea of obtaining the greatest prevention, both chemically and physically, pure coal-tar of low carbon content is frequently mixed with the creosote oil.

During the past few months there threatened to be a serious shortage of creosote oil on this continent owing to the war in Europe, but the release by the British government of a number of cargoes of creosote oil has helped the situation for the time being at least. England and Germany are the leading producers of creosote oil distilled from coke-oven coal-tar. When coke is manufactured in bee-hive ovens the coal-tar is burned in the process. On this continent most coke ovens are of the beehive type, while in Europe they are of the by-product type. Therefore we are largely dependent on Europe for our supply of coal-tar and creosote. The only by-product ovens in Canada are at Sydney, N.S., and Sault Ste. Marie, Ont. A bee-hive oven costs only about one-third