to the specifications of the nation's scientific experts. But it was not permissible for the government to do more than prove the value of the process, and as the government does not carry on commercial enterprises, they sought private parties to carry on the enterprise, and the plant was sold to the Denver firm, of which I am a member, and now with certain additions to the equipment and enlargement in capacity it is prepared to turn out approximately 53,000 poles and six million feet b.m. of structural timbers per annum.

The Process.

The process used at our Norrie plant is what is known as the "open tank" process. The apparatus consists of three storage tanks, supported upon a platform high enough to allow the creosote to run by gravity into two treating tanks, one circular 10-ft. in diameter and 9-ft. high, and a rectangular tank 12-ft. long, 4-ft. wide and 8-ft. deep. By the use of a derrick the treating tanks are loaded, oil is allowed to enter to a height in the tank sufficient to creosote the pole to the height stated in the specifications, which is about 6-ft. of the butt on a 25-ft. pole, treating all the buried end of the pole and about 1-ft. above ground. The creosote around the pole is now heated to a temperature sufficient to open the pores in the wood, expel most of the air by expansion, thus forming a partial vacuum. This condition is now relieved by turning off the steam, and thereby stopping the hot bath. The hot oil is replaced by cool oil, which penetrates the pole while cooling is taking place. The duration of this cool bath is made sufficient to give the desired penetration for about a 20-year service.

The theory of the above process may be given in few words: The heat of the preservative expands and expels a portion of the air and water contained in the cellular and inter-cellular spaces of the wood tissue, and when the cool creosote replaces the hot there is a contraction and condensation of the air and water which remains. To destroy the partial vacuum thus formed the liquid is forced by atmospheric pressure into the cellular and inter-cellular spaces, a process aided, of course, by capillary attraction.

The ease and effectiveness with which timber can be treated by this process depend upon the kind of wood, and whether seasoned or unseasoned. Air is easier expelled than water, and in our native lodgepole pine timber there is very little moisture; it being fire-killed timber, therefore absorbs the preservatives more readily than green timber.

There is probably no reason for discussing the value of the creosoting process in this report, for it is believed that there is no longer any question at this time as to its positive value, provided it is well done.

Life of Creosoted Poles.

It is not merely the expense of the new pole which has to be taken into consideration, but also all the extra expense connected with it, such as the employment of skilled men to erect them.

The prices of the best grades of wood, such as cedar and oak, are becoming so high that the cost of an untreated pole laid down in Colorado is as much as a creosoted native lodgepole pine pole.

At many points in Colorado a creosoted native pole can be laid down for a less price than the imported pole, and the life of this treated pole is estimated at from five to ten years longer than any untreated pole which can be laid down in Colorado. The following is a table of data compiled by the United States government showing the comparative life of untreated and treated poles:

Species—	Average Number of Years Untreated Life	Average Number of Years Treated Life Est. by F.S.
Cedar	12 to 15	25
Chestnut	8 to 10	20
Lodgepole Pine	5	20
Western Yellow Pine	6	25
Cypress	12	25
Juniper	10 to 13	25
Redwood	12 to 15	30
White Oak	8	20
Douglas Fir	8	20

Some of the above data is estimated from test lines put in by the United States government in co-operation with the American Telephone & Telegraph Company in November, 1906. I do not mean to say that these figures are conclusive, but they go toward showing the benefit of the creosote treatment.

At the meeting of the Dublin Section of the British Institute of Electrical Engineers, held in December, 1902, A. T. Kinsey gave some interesting figures regarding the life of creosoted telegraph poles, of which the following is an extract:

The author has traced the erection of creosoted poles in Ireland as early as 1858, and again in 1861, but a systematic branding of the date of creosoting was not begun until 1873. It is impossible to identify with certainty the poles creosoted before that time. The result of an examination by percussion showed that the poles thus branded are apparently quite as sound as when first erected. Poles dated 1877 were being taken down, but were apparently as good as new, and would pay for re-erection.

The best available figures on the life of creosoted poles are from the German Postal and Telegraph Department, which after 52 years of observation gives a life of 21 years for creosoted Baltic pine. The use of creosote for preserving timber has been shown by the experience of the English and French lines to be beyond question a method which protects those parts injected with it absolutely. Creosote prevents that effect shown by intermittent wet and dry, and makes the timber waterproof.

Advantages.

One of the greatest advantages of creosote treatment for timber is that not only does it lengthen the life of timbers, but it makes the life of all kinds of timber practically the same, so far as decay is concerned. It will readily be seen that if our native pole which, without the preservative treatment, will last but from three to five years, can be made by treatment to last 20 or 25 years, it is much more profitable to use the native pole, which can almost always be obtained at a much cheaper price, than to use an imported pole lasting about 15 years untreated, and for that reason commanding a higher price. The use which preservative treatment makes possible of timber which without that treatment would not be usable at all, is at once a great economy to the individual and a considerable aid toward the conservation of the timber supply. The financial saving is one of the advantages, but being such an important question I have placed it under a separate heading.

The financial saving that would result each year in the United States were a uniform policy of treating timber adopted, is about $72,000,000. It should be remembered that this includes the cost of labor as well as that of the timber itself, and thus represents the amount of money that could be turned each year into other channels, if wood preservation were uniformly adopted throughout the United States.