Open Tank Creosoting Plants for Treating Chestnut Poles

By T. C. SMITH

Introduction

FOR a number of years chestnut timber, because of its many desirable characteristics, has served a broad field of usefulness in telephone line construction work, not only in its native territory, the eastern and southeastern part of the United States, but also in neighboring states. In fact, as an average, about 200,000 chestnut poles are set annually in the Bell System plant as replacements and in new lines.

In areas which are gradually being extended from the northern part of the chestnut growing territory into the southern sections, blight is rapidly making serious inroads into this class of pole timber. North of the Potomac River practically all chestnut territories have been visited by the blight and it has in a major sense crossed into areas south and southwest of this river, where it is developing from scattered spots. While many poles are yet secured in the blighted areas, they must be cut within a very few years after becoming affected, in order to save them from the decay which destroys blighted poles after they are killed.

A chestnut pole lasts satisfactorily above the ground line but decays at and within a few inches below the ground, thus weakening it at a critical location. In order to protect the poles from decay at this location, the open tank creosote treatment seems to be the most satisfactory, where the facilities for applying the treatment are available. In general this treatment consists of standing the poles in an open tank and treating them in a creosote bath which covers them from the butt ends to a point about one foot above what will be the ground line when the poles are set. The method of applying the treatment will be explained in more detail further along in the paper.

Due to the scattered locations of the chestnut timber and also to the fact that in many places this timber is rapidly being depleted by the blight, it has required considerable study to establish locations for open tank treating plants which would be convenient for applying the treatments and would also have a sufficient available pole supply to permit the operation of the plants long enough to warrant the necessary investment in them. However, suitable locations have been established and plants have been constructed which will, when operating to their planned capacities, treat about 139,000 chestnut poles per year, and these plants may easily be enlarged to treat additional quantities as the demand for treated poles develops.

These plants have been designed by our engineers and are being operated for applying preservative treatments to poles used by the Bell System.

Locating the Treating Plants

It might be interesting to bring out the governing considerations in locating the chestnut open tank treating plants, as compared with commercial plants for treating cedar poles, which are operating in the north central and northwest portions of the Uhited States. Due to the geographical locations in which the cedar poles grow, in relation to the centers of distribution en route to the locations where they will be used, treating plants of large capacities can be supplied for many years with poles which pass them in the normal course of transporting the poles from the timber to their destinations. Commercial pole treating companies seem to have had no difficulty in establishing locations for handling 100,000 or more cedar poles per year through a single plant; whereas the scattered locations of the chestnut poles, as outlined above, make it more economical to build the chestnut treating plants in units varying between 10,000 and 36,000 poles per year capacity.

Several factors were considered in determining the proper locations for the seven Bell System treating plants which have been built. It was often possible to select a location which was admirably adapted to the purpose when considered from two or three viewpoints but which was found undesirable when considered from all of the necessary angles. The principal points considered were:

1. Quantity of poles of the desired sizes available locally which could be delivered to a proposed plant by wagons, motor vehicles, etc.

2. Quantity of poles which could be conveniently routed past the plant during the rail shipments from the timber to their destinations.

3. Quality of the available timber.

4. The length of time during which a plant of the desired size could be supplied with timber for treatment. This estimated figure would, of course, determine the length of life of the proposed plant.

5. Railroad facilities and freight distances from the proposed plant to points where the poles would be used.

6. Availability of labor for operating the plant.

7. Locating a suitable site for the plant.

Experience of the Western Electric Company's Purchasing Department and the local Associated Telephone Company representatives, together with information from Government reports, provided the

Fig. 1—Land upon which Sylva Plant was Built

answers to the first five items. Studies upon the ground were made to settle the remaining two items after a preliminary survey of the situation had indicated what locations seemed to warrant consideration.

The unevenness of the land as shown by Fig. 1, which is typical of the many available locations studied, made it difficult to secure a comparatively level tract of the proper area and dimensions adjoining a railroad siding or at a location where a siding could conveniently be established. In fact it soon became evident in making the preliminary studies, that it would be necessary to design the various treating plants to fit the best of the available tracts.

As a result of these studies, seven plants were established and placed in operation in five states as outlined below:

Location	Date when Plant Was Placed in Operation	Annual Pole Capacity Now	Total Annual Pole Capacity When Additions Now Planned Are Completed
Shipman, Va.	Oct. 1922	10,000	15,000
Danbury, Conn.	Dec. 1922	10,000	10,000
Natural Bridge, Va.	Apr. 1923	10,000	18,000
Willimantic, Conn.	Aug. 1923	10,000	10,000
Sylva, N. C.	May 1924	18,000	25,000
Nashville, Tenn.	July 1924	18,000	25,000
Ceredo, W. Va.	Sept. 1924	23,000	36,000
Totals		99,000	139,000

It will be noted from the above table that several of the plants are not yet working to their capacities as now planned. In designing the plants, the plans were made to provide for the total annual capacities shown above. However, when they were built the initial capacities were made somewhat lower as indicated by the table, by omitting in some cases tanks and in other cases pole handling equipment which could readily be added in conformity with the plans, later when the additional capacities would be required.

Yard Sizes

It might not seem necessary to occupy a very great area in the operation of a pole treating plant. However, experience with some of the earlier plants indicated that a reasonably large yard was very desirable because of the number of poles necessarily carried in piles on skids in the yard both in the untreated stock and in the treated stock. In so far as practicable the poles in the various treating plants are arranged in such a manner that each length and class is piled separately. This greatly facilitates handling the poles, but requires considerable space. Ordinarily about 80 pole piles are necessary in a yard.

From four to ten acres of land has been used for each of the various pole treating yards. Fig. 2, which includes about half of a comparatively small capacity yard, shows the necessity for plenty of room for the pole piles.

Yard Layouts

Since the pole treating yard layouts are necessarily built around the railroad sidings which handle the poles in and out of the yards and transfer them from one location to another inside the yards, it is desirable to build the yards long and narrow.

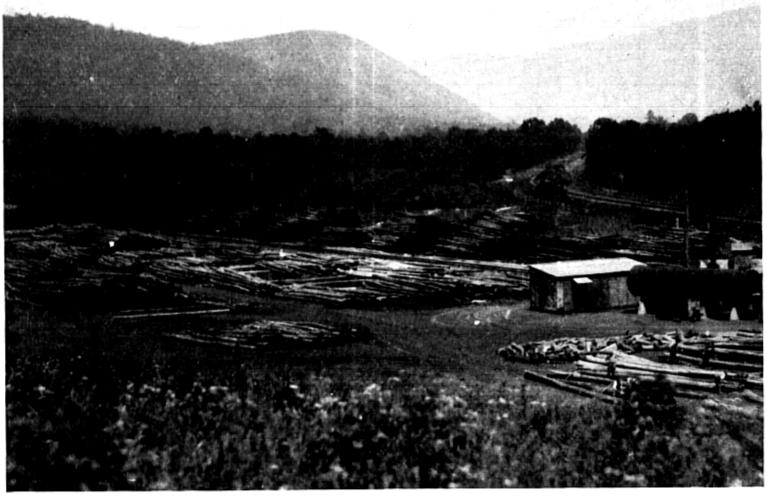

Fig. 2—Portion of Pole Yard at One of the Smaller Plants. (Tool House and Creosote Storage Tank at Right)

Of course, the sharper the railroad curves can be made in laying out a siding from the railroad into the pole treating yard, the easier it is to accommodate the siding to cramped yard conditions or to spread out the tracks over a short, wide yard. However, due to the use of heavy locomotives on the main lines and the desirability of having switch curves suitable for the locomotives ordinarily used, it has been necessary to use 12 degree railroad curves in planning most of the yard entrances, and in no case has a curve been used which is sharper than 18 degrees.

It will be noted from Fig. 3 that the pole treating apparatus is so located that the work of handling poles to and from the treating tanks will not interfere in any way with loading outgoing cars of treated poles from the skids. It will also be noted that the poles which are received from the river are treated during the natural course of their passage to the "treated" skids.

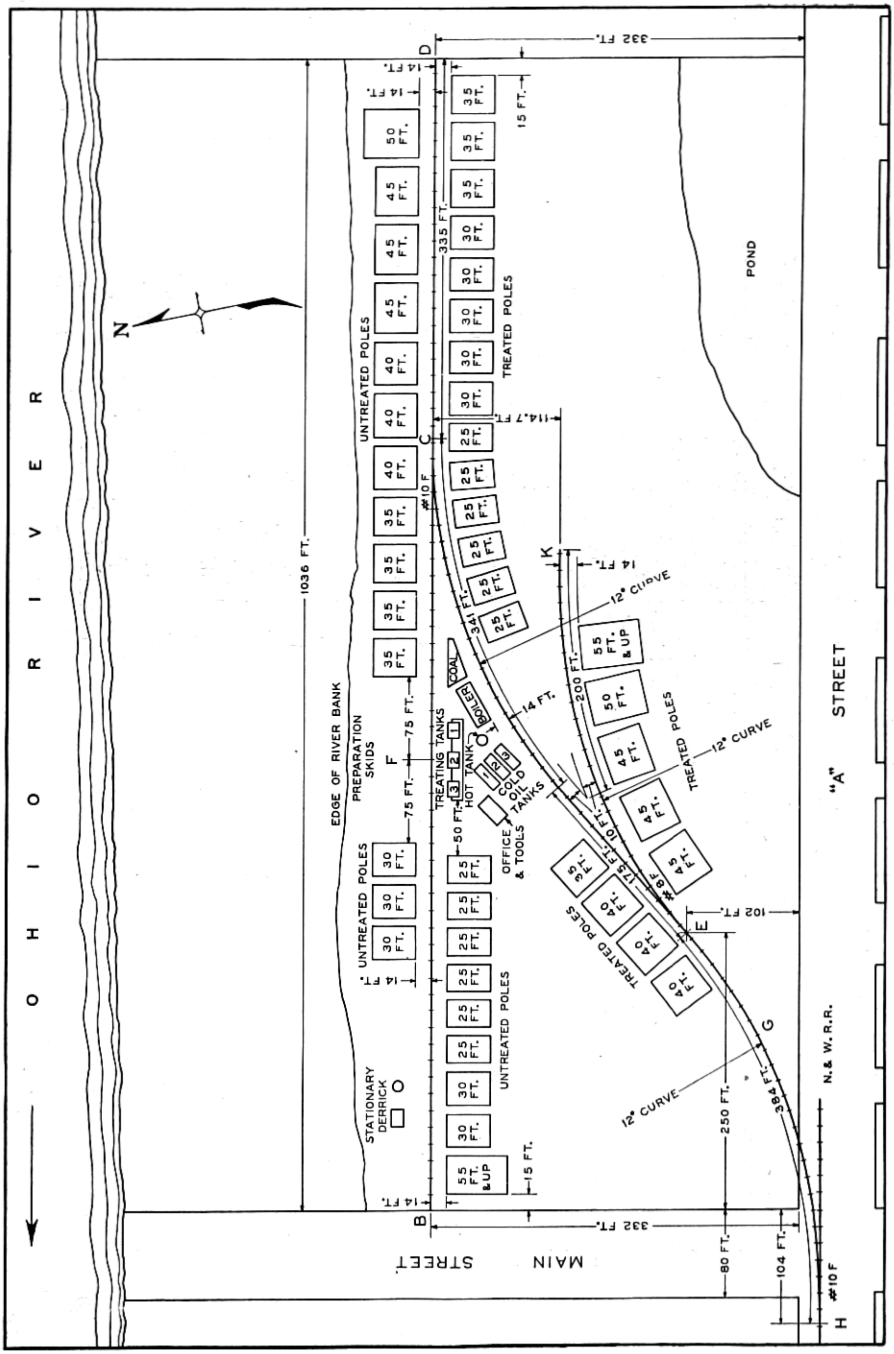

Fig. 3—Plan of Yard Layout for Ceredo. (Each Skid Shown is Separated into Two Pole Piles)

Car loads of poles which are received by rail may be backed into the track leading to the pole treating plant for treatment or may be unloaded upon the "untreated" skids if desired. In any event, there should be a minimum of confusion in the pole moving operations.

Fig. 4 shows the skids at one end of the Sylva yard before poles had been piled upon them. It illustrates the desirability of having a

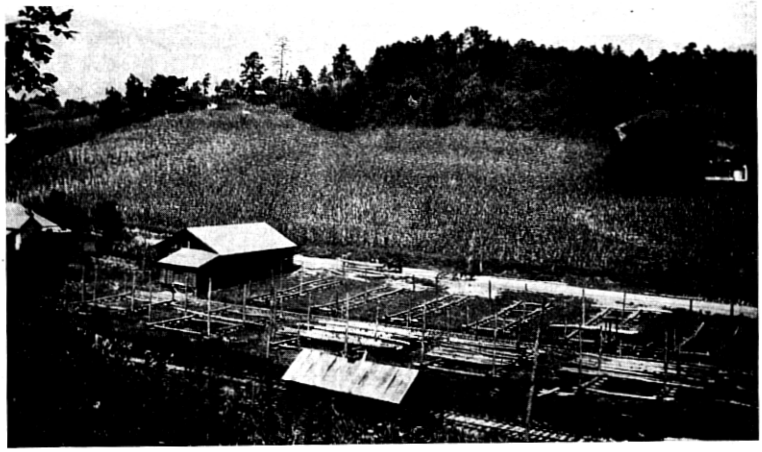

Fig. 4—Skid Layout at One End of Sylva Yard

long, narrow yard and also shows that the switch track is the backbone of the pole yard.

It will also be noted from Fig. 4 that in the Sylva yard the ends of the skids are brought up close to the track. This is because the pole handling in the Sylva yard is done by means of a locomotive crane which runs on the track and works from the ends of the cars.

In the Natural Bridge yard, which is shown in Fig. 5, a tractor crane is used for pole handling. This unit has crawlers and wheels which operate on the narrow roadways at either side of the spur tracks. The tractor crane runs up to the side of a car to unload it. By operating at the sides of the cars a much shorter boom is required by the tractor crane than for the locomotive crane working at the ends of the cars handling the same lengths of poles.

Delivery of Poles to Plants

Various methods are used for delivering poles to the treating plants, from the locations where they are cut. In addition to the use of automobile trucks with their trailers, and to the use of horse-drawn wagons which may be seen along the road in Fig. 4, poles are delivered by railroad cars, river rafts and ox-teams.

In the timber the poles are ordinarily loaded on cars for shipment to the treating plants by means of a logging loader shown in Fig. 6.

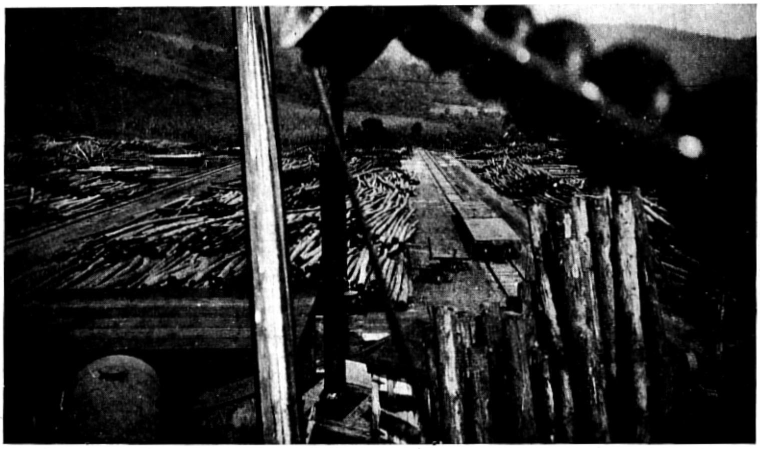

Fig. 5—Yard Layout at One End of Natural Bridge Yard, Viewed from Mast of Derrick

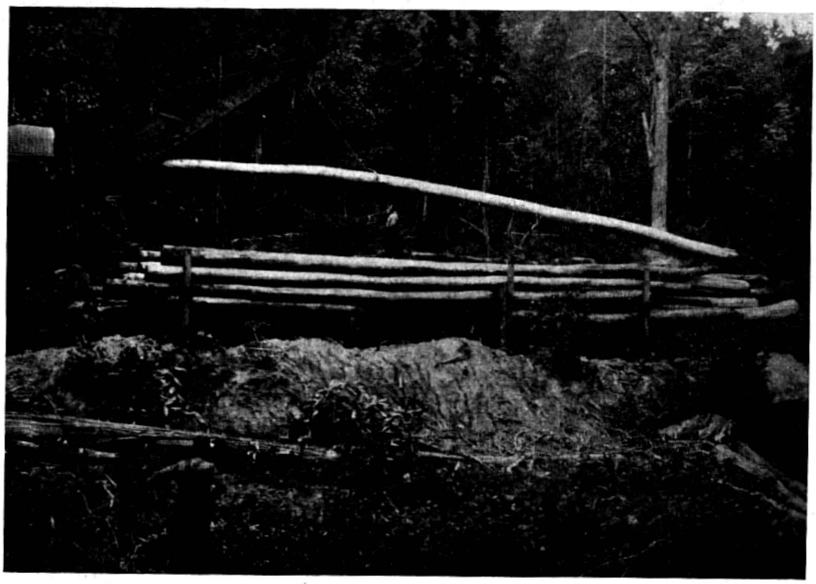

Fig. 6—Placing Poles on Logging Car by Means of Logging Loader

Although it has a short boom, it is able to handle very long poles because of the method in which it lifts them. One end of the pole, either top or butt, is rested against the middle point of the boom and the pole lifted by the winch line which may be attached only one-third or one-fourth of the distance from the loader end to the

Fig. 7—Geared Locomotive in Use on Logging Road Which Supplies Poles to Treating Plant

free end of the pole. In lifting long poles by this method, they spring considerably, and brash timber usually breaks under this treatment. Thus in handling poles by this method, they are given a test before they leave the timber.

The winch line is attached to the pole by means of hooks which resemble ice tongs. From long experience in handling these tongs, the pole men are able to throw them several feet and catch a pole at any point they desire, to pull it from the pole pile. This operation is very fast. In fact, under favorable conditions, 35 foot chestnut poles have been loaded on a car at the rate of two per minute.

The pole piles along the logging road are usually disorderly, resembling a lot of giant tooth-picks which might have been carelessly dropped in a heap.

Steep grades on the logging roads make it very desirable to use locomotives which have a maximum amount of traction. For this reason, a geared type locomotive is used which permits a big reduction between the engine and drive wheels, and also transmits the driving torque to all wheels of the engine and coal tender which is shown, and also to the wheels of the water tender which is not shown in Fig. 7.

From one to ten car loads of poles in a group arrive at the treating plants. A car load varies between 40 and 65 poles depending upon

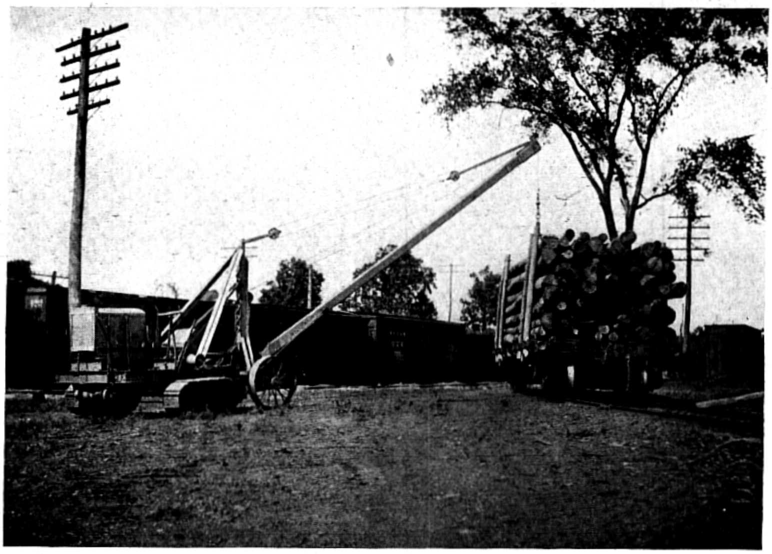

Fig. 8—Car Load of Poles Arriving at the Danbury Treating Plant

the sizes of the poles. They may be unloaded by a locomotive crane or a tractor crane or by the method shown in Fig. 9.

At the Shipman Yard the poles are unloaded by cutting the stakes and permitting the poles to roll down an embankment into piles from which they are drawn to the treating plant by means of a steel rope from a tractor winch.

Utilization of the cheapest method of delivering poles to the treating plants is possible at Ceredo and Nashville where the plants are located on the river banks. These poles are securely tied in rafts of about 100 poles each and either floated down the rivers or handled by stern wheel, river steamboats.

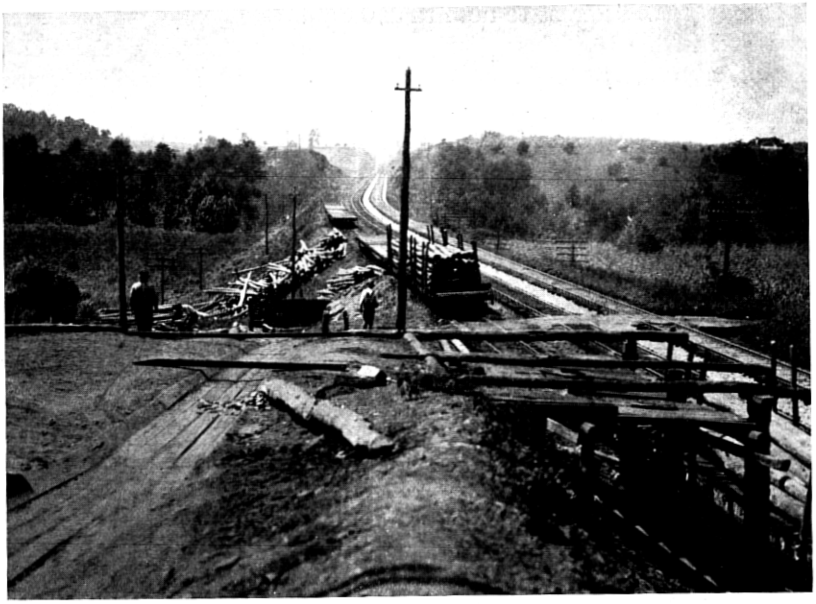

Fig. 9—Unloading Poles at the Shipman Yard

Fig. 10—Four Rafts of Poles at Ceredo Plant

It may be of interest to note that the photograph shown in Fig. 10 was taken from the West Virginia bank of the river, while the Ohio bank is seen across the river and the Kentucky hills are visible beyond the bridge.

Particularly in the Carolinas, ox-teams are used to draw pole loads down from the mountains.

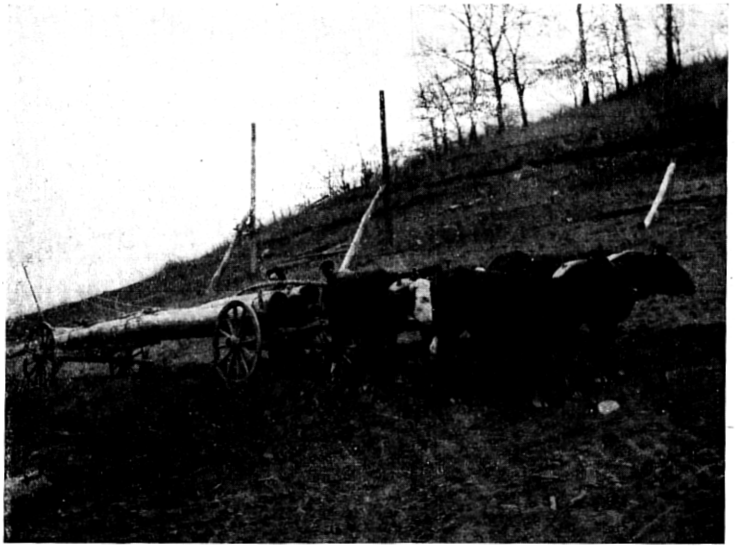

Fig. 11—Pole Delivery by Ox-Teams

Fig. 12—Derrick for Handling Poles from River Rafts to Piles or Pole Cars in the Yard

Handling Poles in the Yard

Where the derrick is used for lifting poles out of the river it is necessary to set it at a distance from the water's edge which, of course, approaches and recedes depending upon the height of the river. Because of this distance, the poles are dragged as well as lifted up the sloping side of the bank.

Fig. 13—Handling Poles by Man Power

Fig. 14—Tractor Crane Handling Poles from Rail Dollies in Danbury Yard

It has been found that wherever it is possible to eliminate the handling of poles by man-power, a considerable economy can be realized. Less men are required for crane or derrick operation, and the cranes and derricks do the work much more rapidly.

In order to move the poles about the yard it is not necessary to retain a freight car to carry them, since small rail dollies have been provided for this purpose. The two dollies shown in Fig. 14 are separate and can be located under the poles at any distance apart depending upon the lengths of the poles.

The tractor crane which is used for pole handling in the smaller plants is operated by a heavy duty gasoline engine and it is able

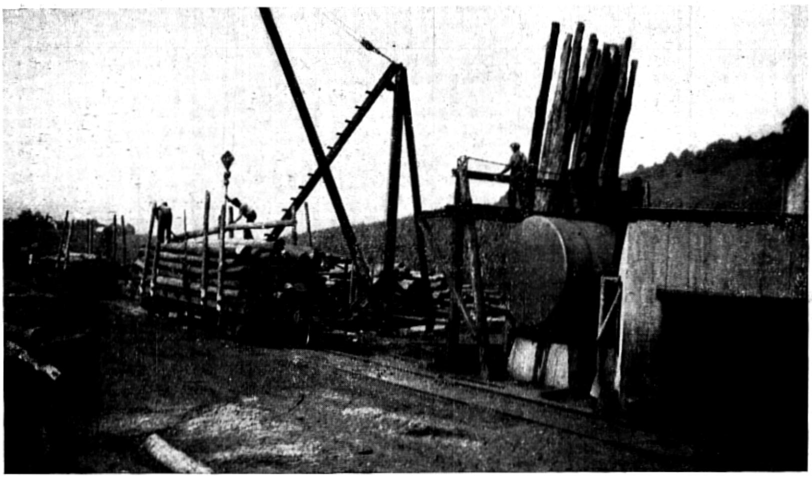

Fig. 15—Stiff Leg Derrick Removing Poles from Treating Tank and Loading Them on Flat Car

to handle a 4,000 lb. load at a 15 foot radius through an arc of about 270 degrees. It has a 30 foot boom. Since a very large percentage of the chestnut poles handled, weigh less than one ton each, this tractor crane has sufficient capacity for the service.

In the smaller plants where it has been found desirable to increase the pole treating capacities above what could be handled by means of the tractor cranes, stiff leg derricks have been installed. These derricks are of 6-tons capacity, having 45-foot booms. They are operated by steam from the treating plant boiler, which feeds the 8 H.P. hoisting engines. In these installations the swingers are operated by the hoisting engines.

Where the treating plant is of large enough capacity to warrant the investment in a locomotive crane, this type of unit has proven to be the most satisfactory in operation. The cranes which are suitable for this type of work have a 50 foot boom and are rated at 17½ tons capacity. Actually they can safely handle a 3-ton load at 50 feet radius from the king pin of the crane, perpendicular to the

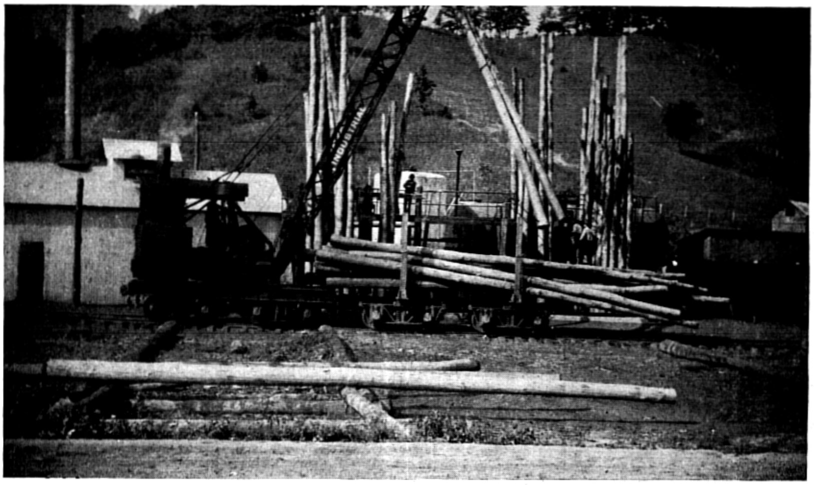

Fig. 16—Unloading Poles from the Treating Tanks to the Dollies, with Locomotive Crane

track, without tipping the car body of the crane. Of course, with the boom in a position above the track the maximum safe load is considerably greater.

The method of handling poles most commonly used is illustrated in Fig. 17 where the poles are lifted in a balanced condition, swung to one side of the track and piled parallel to it.

Another method which is applicable, particularly to handling a 40-foot and longer pole, consists of butting the pole end against the boom of the locomotive crane and swinging it to a pile which lies perpendicular to the track. This method of handling poles is similar to that shown in use with the logging outfit in Fig. 6.

When the poles are piled either parallel or perpendicular to the track as shown by Figs. 17 and 18, respectively, there should be frequent breaks in the piles in order to permit the air to circulate around the poles and keep them dry, and to reduce the fire hazard.

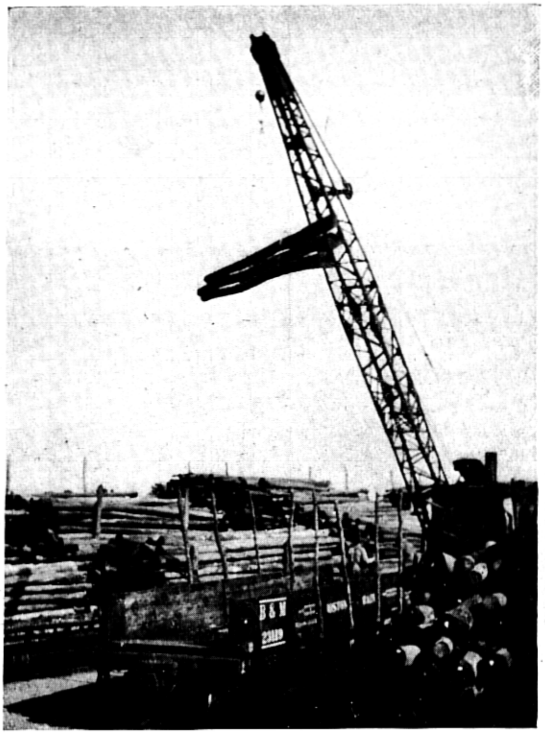

Fig. 17—Handling Poles by Balanced Method with Locomotive Crane

Fig. 18—Handling Pole with End Butted Against Boom of Locomotive Crane

Preparing Poles for Treatment

Although efforts were originally made to clean and prepare the poles on the cars at the time they were received at the plant, in order to be able to unload them from the cars directly into the treating tanks, it was found to be more satisfactory to first unload them upon skids where they would be more accessible for the removal

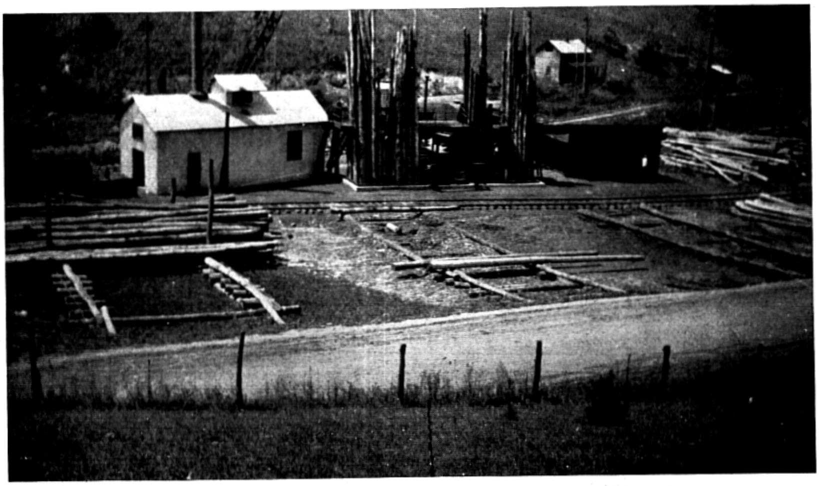

Fig. 19—Preparation Skids Opposite Treating Tanks at Sylva Plant

of all bark and foreign matter from the area to be treated and where any defective poles could be culled out before treatment.

The preparation skids are ordinarily not used for storage purposes. When a load of poles is placed upon them it can be spread in such a manner that every pole will be accessible.

In Fig. 20 the load of poles from the dollies has just been laid on the preparation skids where they will be cleaned for treatment in the far tank which is shown empty. Due to the desirability of having a continuous supply of poles for treatment, also of having the poles seasoned for several months before treatment, it is not practicable in a very large percentage of cases to ship the poles direct from the timber to the yard and unload them on the preparation skids for immediate treatment. For this reason it is necessary first to pile them in the untreated section of the pole yard and later to bring them to the preparation skids on dollies as illustrated in Fig. 20.

Treatment

The following is a very brief outline of the method pursued in treating the poles and also of the results obtained.

In so far as practicable the poles are seasoned 6 months or more before being treated. The method of treatment consists of immersing the butts to a level of about 1 foot above what will be the

Fig. 20—Preparation Skids Opposite Treating Tanks in Nashville Yard

ground line of the poles, for not less than 7 hours in creosote at a temperature between 212° and 230° Fahrenheit. At the end of the hot treatment, the hot oil is quickly removed from the tank and cold oil at a temperature of from 100° to 110° Fahrenheit is permitted to flow quickly into the treating tank to the level previously reached by the hot oil. The cold oil treatment lasts for at least 4 hours.

Heat is absorbed by the pole butts in the hot oil bath until the moisture contained in the sapwood is either expanded into steam or entirely driven out. During the short interval while the oil is being changed, the surfaces to be treated remain covered by oil from the hot treatment. The oil change is made so quickly that the pole butts cool very little before it is completed. Then, as soon as the cold oil is admitted, these surfaces are covered by the creosote which remains until the pole butts become cool. In the sapwood, from which the moisture has been driven by the hot treatment, the cooling process condenses the steam, thus forming a partial vacuum in the

GENERAL INSTALLATION LAYOUT

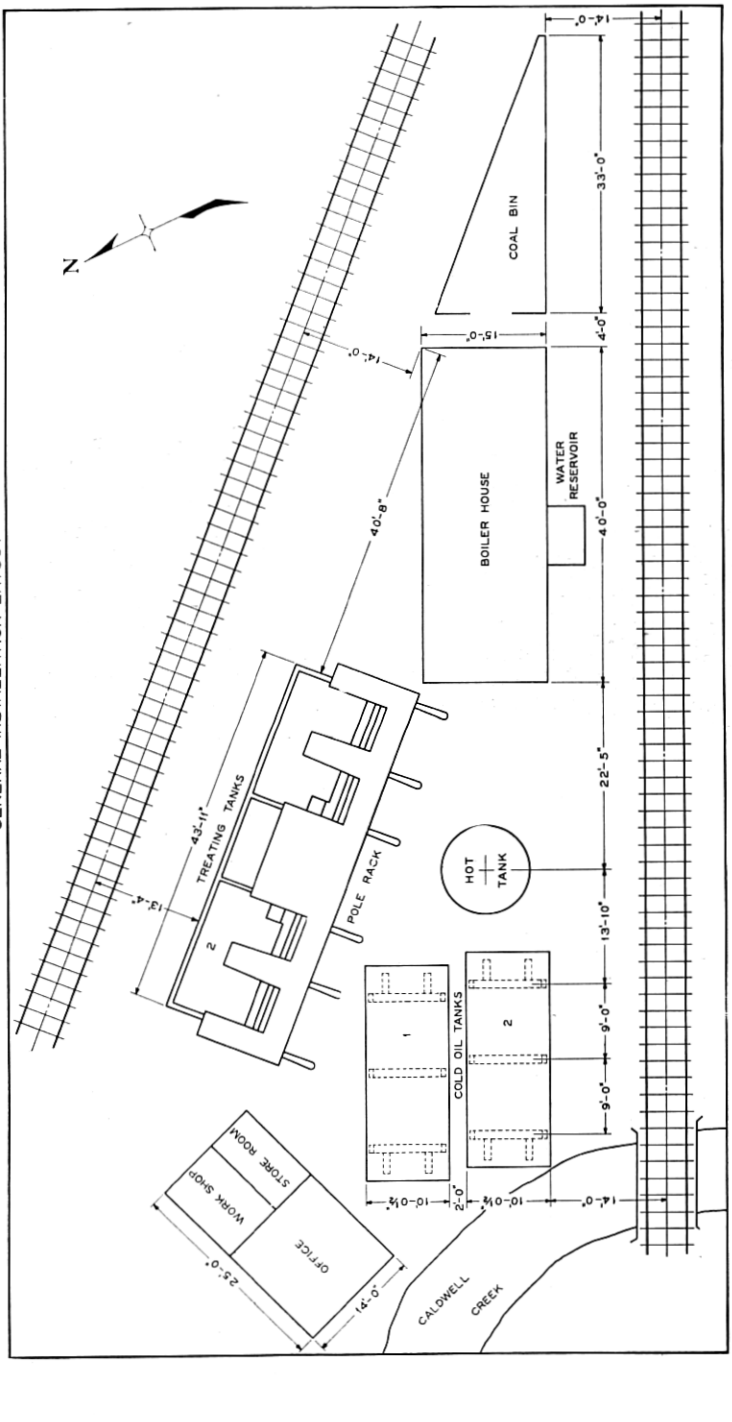

Fig. 21—Plan of Sylva Plant Layout

wood. This causes the oil, in which these surfaces are immersed, to be forced into the wood by atmospheric pressure.

During the treatment, the creosote is absorbed by the pole to such an extent that as an average, about 95 per cent. of the sapwood in the treated section of the pole is saturated. This requires from 2 to 4 gallons of oil per pole, depending upon the size and condition of the pole being treated.

Assembly Layout

The same general features of design were followed in all the pole treating plant layouts in so far as practicable. However, the number

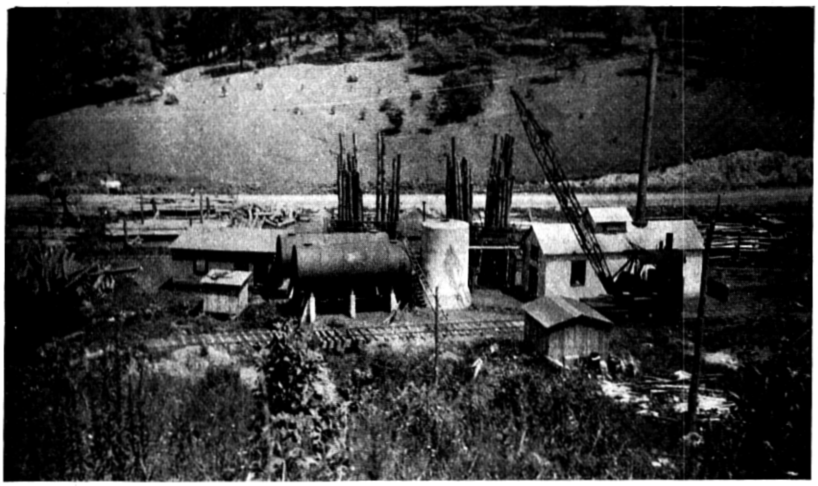

Fig. 22—View of Treating Equipment at Sylva Plant

of the different units used was varied to provide the plant capacities required.

In designing the plants it was found desirable to separate the poles into two or three treating tanks in order that the treating gang could be continuously employed in either preparing or handling poles from or to one of the tanks while the treatment would be in progress in other tanks. By dividing the tanks it was also possible to use a smaller quantity of hot creosote, since the hot oil could be used in one tank and when that treatment was finished, pumped to another tank containing fresh poles ready for treatment. Cutting down the hot oil capacity, of course, reduced the amount of radiation in the heating tank and also the amount of radiation in use at any particular time in the treating tanks, thus resulting in considerably less steam boiler capacity than would be necessary with a very large single treating tank unit.

Handling poles at smaller tanks is much easier because less boom action of the derrick is required and the men at the tanks can reach all poles more easily for attaching and removing the derrick winch line.

It was found that a vertical cylindrical tank served better than a horizontal one for the storage of hot oil, while the horizontal cylindrical

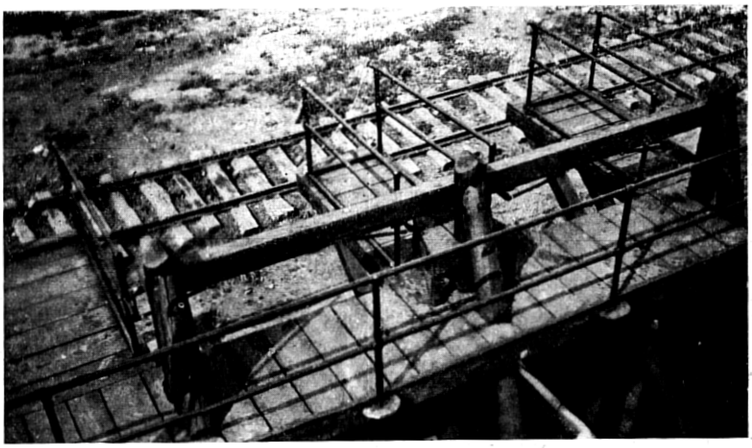

Fig. 23—Plan View of Pole Rack

tanks were preferable for cold oil storage. The radiation from a vertical hot tank is considerably reduced by the jacket of hot air rising along its side.

Particularly during the summer months care must be taken to keep down the temperature of the cold oil. It has been found that the long cylindrical steel tanks when lying horizontally radiate heat from the oil to the atmosphere satisfactorily and thus keep the oil cool.

Care has been taken in the design, to locate the various units so that all hot oil leads would be as short as possible in order to minimize radiation. Wherever possible, both the hot and cold oil are handled by gravity. The steam boiler is located as near as practicable to the heavy banks of steam radiators.

In all cases, careful study has been given to facilitating the handling of poles, since a considerable part of the cost of the pole treating process is due to pole handling.

Pole Racks

For supporting the poles standing in the treating tanks, it is necessary to have a very strong rack surrounding each of the tanks. Fig. 20 shows a view at one end and the front side of the two-tank rack in the Nashville plant. The poles shown, stand 8½ feet below the ground level. They are supported at the ends and middle of the rack by timbers under the rack platform at a height of 12 feet above

Fig. 24—Excavation for Treating Tanks

the ground. At the back, the poles are supported by a timber which is 16 feet above the ground. This arrangement permits the treatment of any size of pole up to and including 65 feet in length.

It will be noted in Fig. 23, which shows the rack above one tank, that the poles in each tank are divided at the middle by the platform of the pole rack. This feature of the rack has proved to be very desirable in that it permits the platform man to reach any pole in the rack during the loading and unloading process, so that there is no delay and no hazard in attaching the winch line sling to, or detaching it from the poles. The taper of the poles is such that ample space is provided for holding the sections of the poles at the platform level even though the area of the opening at this level is somewhat smaller than the area of the bottom of the treating tank.

Suitable railings have been provided around all parts of the platform to protect the platform man. They are substantial enough to protect the operator and yet flexible enough to compensate for the irregular sections of poles which may lie against them.

Tanks

As was mentioned above, in so far as practicable the tanks for the various plants are made in multiples of standard units. The treating

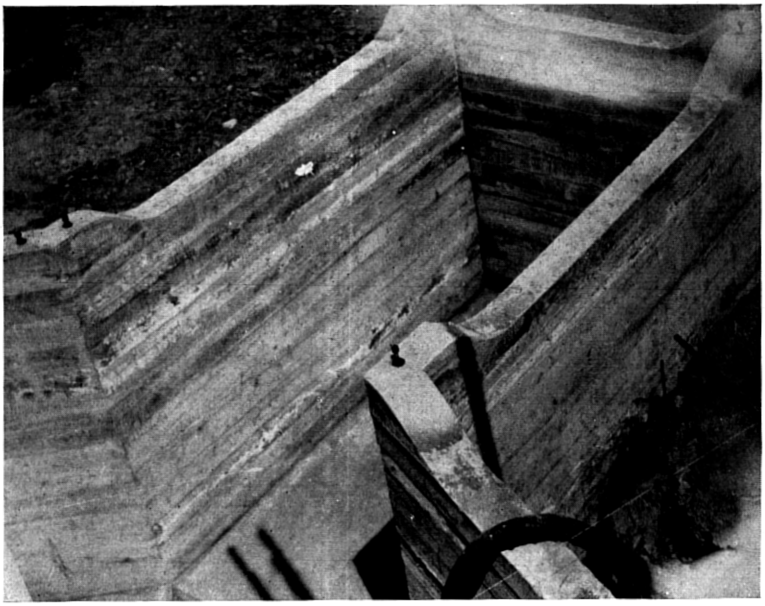

Fig. 25—Concrete Foundation and Protecting Walls for Treating Tanks

tanks for the smaller plants are 11 feet long and 5 feet 6 inches wide with 6 inches in each end of the tanks taken up by the vertical radiators. These tanks are of proper size to treat ½ carload of poles each.

The larger plants are provided with treating tanks, each of which will easily handle one carload of poles. These tanks are 15 feet long, 8 feet wide and 9 feet 8 inches deep in the clear.

Some idea of the sizes and arrangement of the treating tanks can be had from the excavation for them shown in Fig. 24. Each of the raised levels shown, will support the bottom of a tank while the pits between will contain the steam and oil piping, oil handling machinery, etc. This is a three-tank pit with space for two tanks shown.

In order to provide dry pits for the equipment below the treating tank bottoms and also to facilitate removal of a tank from the ground in case it might need repair, it has been found desirable to build concrete foundations and walls around the treating tanks.

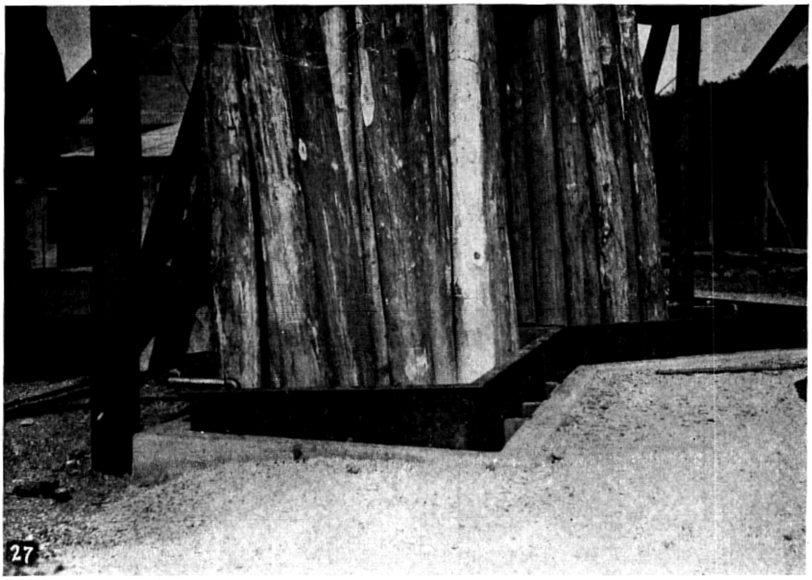

Fig. 26—Treating Tanks in Place

A few inches of space is left between the concrete retaining walls and the sides of the treating tanks. This space serves two purposes: it permits placing or removing the tanks with ease and it also provides air spaces around the sides of the tanks, which tend to insulate them from the ground. As has been mentioned, it is necessary to change the temperature of the oil in the tanks quickly from about 220° to about 105° Fahrenheit. There is very little lag in making the temperature change due to heat retained by the tank walls. However, if the ground around the tanks were wet and in contact with them, considerable lag would be experienced in making the temperature change of the oil because of heat which would be retained by the ground.

The poles in the tanks as shown by Fig. 26 rest in a position inclined slightly back toward the racks so that they remain in this position without being tied. Inclining the tank bottoms toward the rear facilitates the drainage of oil from them.

The bottom of the tank is practically perpendicular to the poles as they stand on it, which minimizes the tendency for the butts to slip on the tank bottom. In order to further prevent any danger from this happening, the bottom of each tank is covered by extra heavy Irving grids similar to those used at subway ventilating openings. These grids are supported by a suitable I-beam framework in

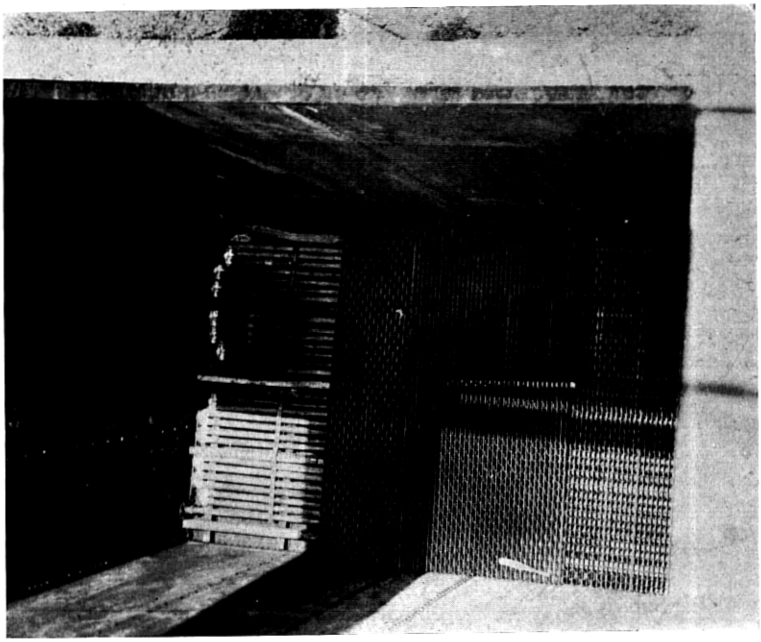

Fig. 27—Bottom of Treating Tank Showing Horizontal Radiators and Grids Covering Them

which the steel pipe radiators are placed. The grids do not interfere with the circulation of the hot oil and form a good protection for the radiators.

Each of the horizontal cold oil tanks has a capacity of about 14,000 gallons. Tanks of this size will easily take a tank-car load of creosote each, leaving some reserve capacity for residual oil which may be in the tanks at the time the additional cars of oil are received. The tank cars ordinarily carry from 8,000 to 12,000 gallons of oil.

The hot oil tanks vary in capacity between 3,000 and 13,000 gallons each, depending upon the sizes of the plants. One hot oil tank suffices for each installation. In order to conserve the heat, these tanks are covered by a 1½ inch coat of magnesia block heat insulating material, the outside of which is covered by ¼ inch of asbestos cement and ¼ inch of half and half asbestos and Portland cement.

Boilers, Radiators, Pressure Regulators and Other Steam Equipment

For these installations, a self-contained type of steam boiler was used because of its comparatively high efficiency in the sizes required and also because of the ease of installation. The boilers used vary

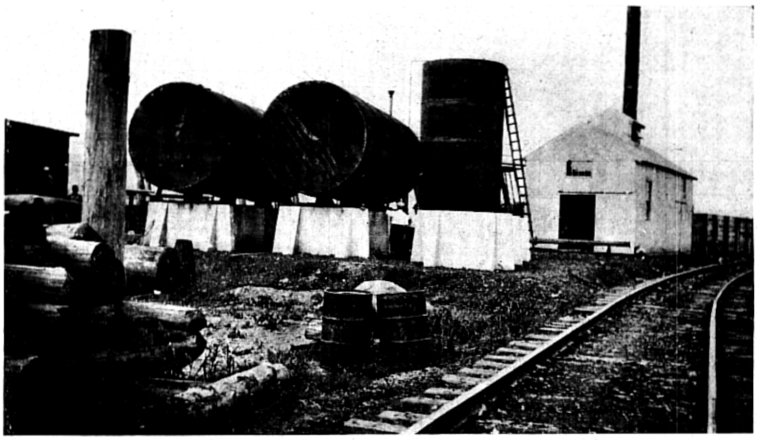

Fig. 28—Horizontal Cold Oil Tanks and Vertical Hot Oil Tank

from 30 to 80 horsepower capacity depending upon the sizes of the plants. These boilers are of the return tubular type with the fire boxes and smoke boxes lined with keyed-in fire brick.

The boilers are operated at a pressure of about 100 lbs. which is a suitable pressure for the steam turbine and for the steam hoisting engines in the plants where these are used. This boiler steam pressure is too high for the cast iron radiators which are used to heat oil in the hot and cold tanks and, for the smaller plants, in the treating tanks. Steam for these radiators should be supplied at a pressure of about 40 pounds. In order to meet this requirement a pressure reducer is used to convert the steam from the boiler pressure, whatever it may be, to a pressure of about 40 pounds, before it enters the radiators.

The water condensed from the various radiators is returned to the boiler in order to conserve its heat. Small automatic steam traps pass the water condensed in the radiators as fast as it is made, but do not permit the steam to pass. On the water side of these small steam traps, the piping from the various radiators is brought together and led to a point above the steam boiler where it is connected to a large tilting trap. The traps automatically raise the water to a

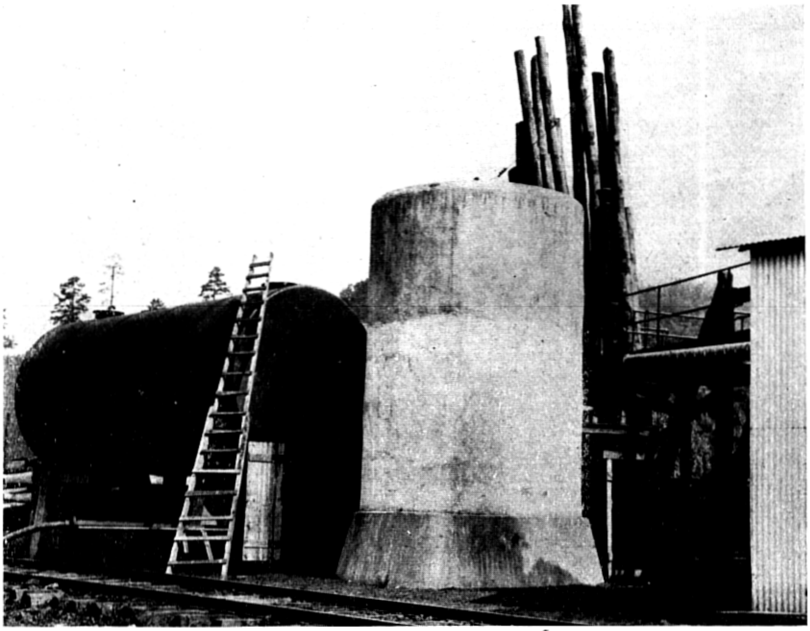

Fig. 29—Vertical Hot Oil Tank with Insulated Covering

receiver above the boiler and the tilting trap injects it into the boiler as fast as it is delivered to the water pipe lines by the small traps.

It is very desirable in the operation of the steam turbines that they be supplied with dry steam in order that slugs of water cannot enter the turbine chambers at high velocities and injure the vanes. A large water trap is located above the treating tank pit at each plant to insure dry steam for the turbine which is mounted in the pit directly below it.

Temperature Control

A continuous record is kept of the temperature of the oil in the treating tanks by means of recording thermometers mounted in the boiler room and connected by flexible thermometer tubes to the bulbs which are immersed in oil along the inside of the tanks after the poles are in place. In the cold and hot tanks the temperature does not change rapidly, so their temperatures can be read by means of stationary indicating thermometers mounted on the sides of the tanks and having bulbs which project into the insides of the tanks through suitable fittings. The oil temperatures, of course, are controlled by the steam valves to the radiators in the various tanks.

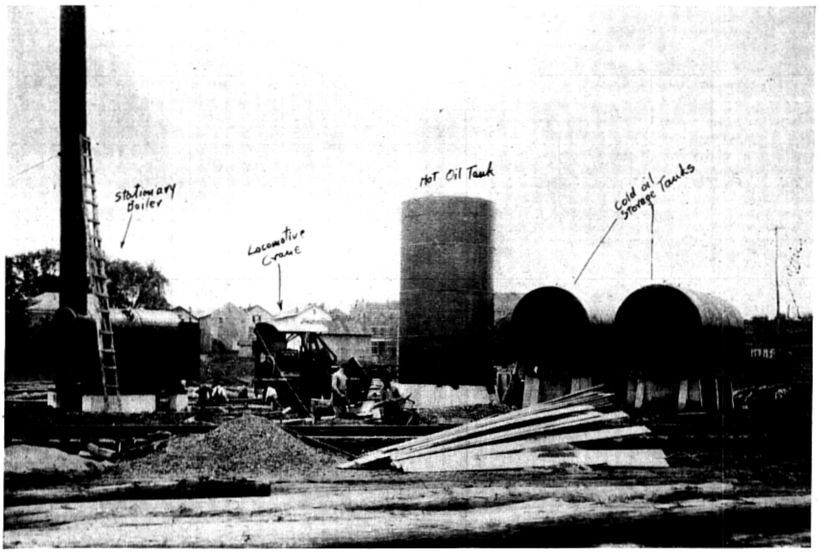

Fig. 30—Steam Boiler During Installation

Oil Handling

The heart of the oil handling apparatus, of course, is the centrifugal pump which has been mentioned and which is direct connected to the 20 H.P. steam turbine. In some of the smaller plants the centrifugal pumps are operated by 5 H.P. gasoline engines.

Both cold oil and hot oil are fed from the storage tanks to the treating tanks by gravity. The centrifugal pump is used for returning the oil from the treating tanks to the proper storage tank, for moving it from one storage tank to another or for delivering oil from the tank cars to the storage tanks.

Since the creosote which is used in pole treating may solidify at any temperature below 100° Fahrenheit, even in comparatively warm weather it is sometimes necessary to provide a steam connection to the radiators inside the tank car in order to make the oil fluid enough to flow through the flexible hose and pipes to the centrifugal pump. The solidifying of the creosote at comparatively high temperatures also requires a small bank of radiators in each cold tank.

The steam pipe runs, between the steam boiler and the various tanks, and the oil pipe lines between the various tanks and the pump,

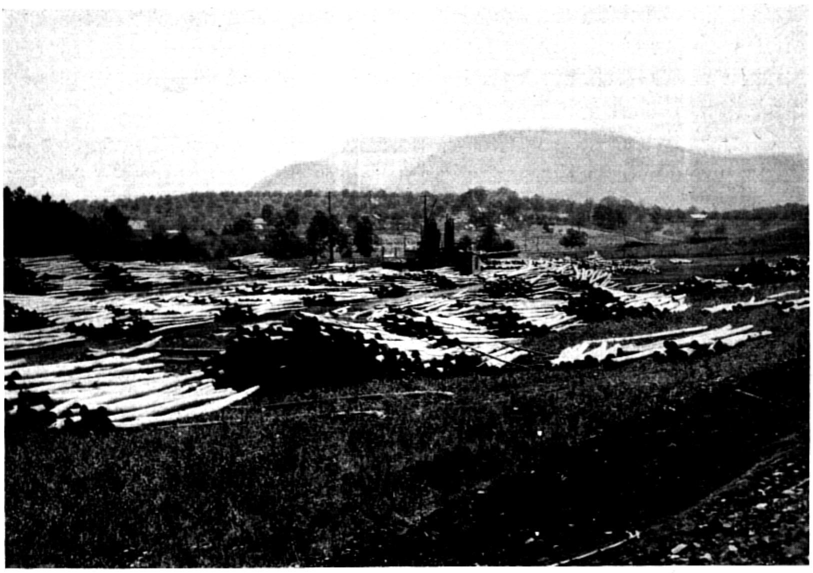

Fig. 31—General View of Natural Bridge Plant in Operation

are grouped so that both the steam lines and oil lines can be enclosed in boxes. The heat radiated from the steam lines warms the air in the boxes to such an extent that the oil remains liquid.

The valve controls for the oil and steam lines which are led through the boxes, are grouped so that several can be reached by opening the door of each of the boxes.

In the smaller plants which have the one-half-car pole capacity of treating tanks, the centrifugal pump handles the oil at a rate of about 200 gallons per minute. In the larger plants, however, where the treating tanks have one-car capacity of poles, the oil is handled through the centrifugal pump at the rate of about 600 gallons per minute. As mentioned in the above section describing the treatment, the high rate of oil movement is necessary in order to accomplish the change from hot to cold oil in the treating tanks in such a short time that the heated pole butts will not be permitted to cool when not immersed in oil. The oil change ordinarily is made in from 7 to 12 minutes from the time the pump starts to remove the hot oil until the cold oil is up to the proper level.

Experience indicates that no material loss in penetration of the creosote into the poles is experienced by having the treated section uncovered for this short length of time. Practically the same penetration is obtained as would be secured by keeping the poles in hot oil for the same length of time and then permitting the hot oil to remain around them until its temperature had gradually fallen by radiation to that specified for the cold oil bath.

Changing the oil instead of permitting it to cool in the treating tanks greatly expedites the treatments and consequently increases the plant capacity, which, of course, results in a corresponding economy in the cost of treating the poles.

Conclusion

In this paper an endeavor has been made to cover in a general way, the principal engineering and operating features involved in building creosoting plants designed specially for applying open tank treatment to chestnut poles. It has, of course, been necessary to omit practically all of the details of construction, which were followed in building the various plants.

These treating plants are valuable assets to the Bell System in providing concentration points where preservative treatment can be economically applied to the chestnut poles, thus becoming an important factor in the general program for the conservation of natural resources, by making possible the utilization of this valuable and rapidly diminishing type of timber over a considerably longer period.