

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

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Provisional Standard

TREE PRUNING METHODS

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1. GENERAL

1.01 This practice outlines the principles which should govern employees engaged in pruning trees, so that the work will be done in an efficient manner, the amount of pruning will be reduced to a minimum consistent with good service, and the life and beauty of the tree will be conserved as well as improved.

1.02 The general effect of tree interference on a telephone line is to cause a leakage of current from wire to ground or from wire to wire, through the branches or trunk of the tree. This results in noise, crosstalk, switching of signals, repeater sings, loss of power and numerous other things which cause poor service or complete interruptions of the working circuits. Where power circuits are in contact with the tree it is also possible to have a leakage of current from power wire to telephone wire, which is an unsatisfactory condition from a safety standpoint on account of the likelihood of a shock. Even though the wire is insulated, the ultimate effect is the same as with bare wire, because the insulation becomes worn off by contact with the limbs. Contact between the wires and the branches of trees should therefore be prevented whenever possible. If it becomes necessary to work in a tree in contact with power wires, preventive measures such as the wearing of rubber gloves should be followed to avoid the possibility of an electric shock.

1.03 When pruning is done to clear telephone wires, it is necessary that the appearance and welfare of the tree be considered, not only from the standpoint of maintaining the natural beauty of the tree, but also from the standpoints of successfully maintaining plant and improving public relations. Experience has shown that, where tree pruning has been properly performed, it is later possible to readily obtain permission to do similar work, but if the work is improperly performed, it may be impossible to obtain permission to prune when it is again needed.

1.04 The fundamental of tree life and growth as well as the care of trees have only been briefly covered in this practice. Although information of this nature is not necessarily essential to the performance of the work in pruning trees, it furnishes a background for the workmen in the application of the principles covered herein and may be of assistance in dealing with public officials and property owners on matters relating to the care of trees. Bulletins covering these subjects in greater detail have been prepared by the United States Department of Agriculture and copies may be obtained from your supervisor, if desired, for use in studying this phase of the matter with a view toward assisting property owners along the line with their tree problems and thus establishing better relations.

2. TREES

2.01 Trees may be divided into two groups on the basis of their physical makeup and habits. They are:

(a) **Deciduous Trees.** Those that annually lose their leaves, such as maples, willows, etc.

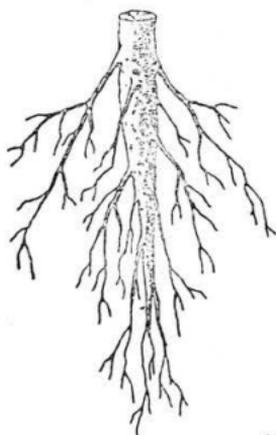
(b) **Evergreen Trees.** Those that retain their foliage the year around, such as pines, spruces and cedars.

2.02 Evergreen trees do not produce sprouts and, therefore, if located on the side of the line, one cutting is, in general, sufficient to obtain permanent clearance. The deciduous trees, however, present a different problem because of sprouting and therefore require more detailed methods of pruning.

2.03 On the basis of function and structure, a tree can be divided into three parts as follows:

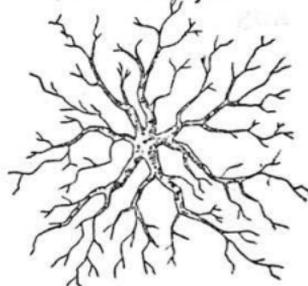
(a) **Roots** are the underground extension of the stem, spreading and branching in a manner quite similar to the section above the ground. Species of trees differ considerably in their form of roots, some of which are illustrated below. Roots serve two purposes, one of which is the absorption of water solutions containing mineral and other material and the other anchorage.

Deep Root System



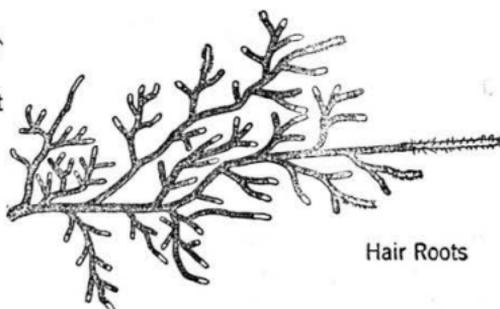
Tap Root

Shallow Root System



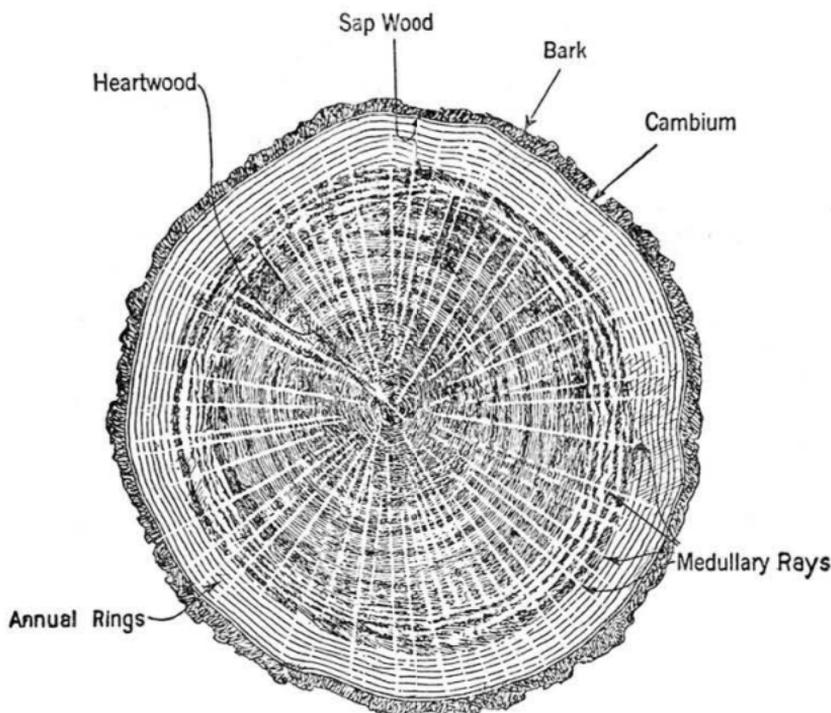
Fibrous Root
(Lateral Root)

Root Tips



Hair Roots

(b) **Stem** is the trunk and the branches of a tree popularly known as the bones because of their support of the leaf system. The structure of these sections is identical and consists of the following as illustrated below.



The age of the tree can be estimated quite accurately by counting the annual rings.

- (1) **Heartwood** is the dark colored area in the center which is inactive and serves only as a mechanical support of the tree. It represents the earlier years of growth.
- (2) **Sapwood** is the lighter colored band of wood which extends to the cambium and serves as mechanical support, medium for transporting sap from the roots to the leaves and as a storage container for reserve food.
- (3) **Cambium** is an extremely thin layer of cells on the outside edge of the sapwood which can be identified by its moist and slippery appearance. Wood cells are formed on the inside and bark cells on the outer side of the cambium and each year a new layer of wood is laid over the entire surface of the tree.

producing what is known as an annual ring. In addition to the growth that takes place in the cambium it also brings about the healing of wounds.

(4) Bark is the outer covering of the trunk and branches and serves as a shield to temperature changes and mechanical injuries and as a conveyor of the food supply. The food from the cells of the bark is transferred to the inner cells of the sapwood by means of ray cells, a group of which makes up a medullary ray.

(c) **Leaves** are lateral appendages of the limbs. The leaves have a green color in spring and summer and serve as the digestive and breathing organs of the tree as well as performing the transpiring for the tree.

2.04 The coordinated operation of these parts produces not only a living tree but a growing tree. The retardation or acceleration of tree growth is influenced by conditions such as age of tree, quality and moisture content of soil, sunlight, wind, temperature, lightning, fungi and insects.

3. TIME TO PRUNE

3.01 Moderate pruning may be done at any time of the year without serious injury to trees. It is poor policy, however, to do heavy pruning on certain trees such as beeches, birches, and maples during the period the sap is running freely, because these trees have a tendency to bleed excessively. Probably the best time to do pruning, from the workman's viewpoint, is during the dormant period (fall and winter) for the following reasons:

(a) The branches to be removed and the most advantageous point at which to make the cut can be located readily. The time required to perform the work will be a minimum if the weather is not too severe and the pruning to be performed the following year will be substantially reduced.

(b) Sawed off limbs and branches (hangers) can be shaken down easily.

(c) Trees that must be heavily topped or "headed in" will not bleed excessively during the dormant period. Such trees are often revived to new health after being heavily pruned during the winter as the remaining buds are provided with the full benefit of all the stored food in the tree.

(d) The property owner is generally more willing to cooperate.

3.02 The weather during the dormant period (fall and winter) is the factor most likely to impede the pruning work. Although the dormant period is the most favorable, the summer may be more desirable for pruning trees, under certain conditions. Summer pruning has the following advantages:

- (a) Cuts made during this period start to heal as soon as made and for this reason there is less chance for agents injurious to the tree to become established.
- (b) Certain trees which might suffer from drought are benefited by pruning because the removal of the leaf surfaces reduces the amount of water transpired or evaporated by the tree.
- (c) Some insect and fungus diseases are retarded by opening up the inner part of the tree to sunlight.
- (d) Fruit growth is stimulated to some extent.
- (e) Clearance obtained by pruning during this period is generally more lasting than pruning performed in the dormant period and therefore desirable from this standpoint in cases when only scant clearance can be obtained.

4. CORRECT CUTS

4.01 The average person observing a tree that has been pruned regards its shape as most important. It is therefore necessary that an appearance as pleasing as possible be secured. Shade trees should be pruned to a symmetrical form, avoiding sharp holes or valleys in the sides or tops.

4.02 It is not possible to prune all trees as desired, due to conditions, such as a low line or narrow right-of-way. It should be remembered, however, that well shaped trees are good advertisements of workmanship and if a little extra time is required in order to produce good results it is well spent.

4.03 Probably the most important single item in tree pruning is the "flush cut" which when properly made will tend to reduce the development of small sprouts where a limb has been cut off, thereby reducing the pruning which must be done from year to year. The mechanical details of making flush cuts, as well as the steps taken in selecting the points at which to make cuts, are explained in the following paragraphs.

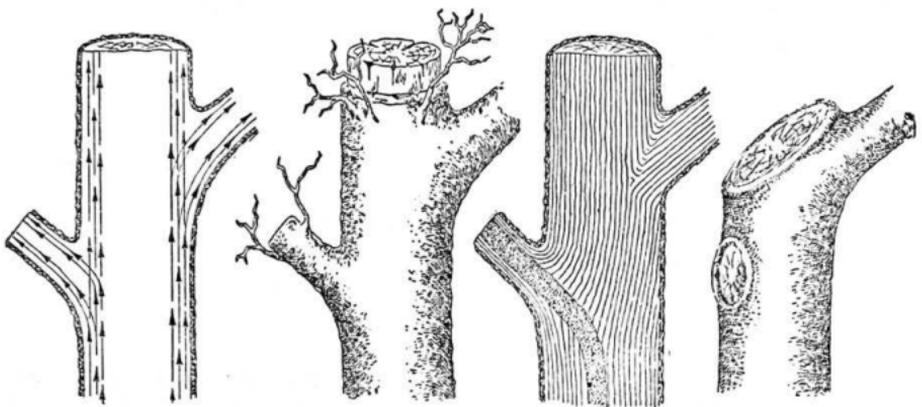
4.04 A flush cut is the cutting of a limb at the point of its intersection with the trunk of the tree or with another limb, having the final cut surface parallel to the trunk or remaining limb, so that no stub remains. Such cuts, particularly when painted or treated, will prevent, or at least retard,

sprout growth, thus reducing the probability of another limb growing at the point where the old one was removed.

4.05 So far as the health of the tree is concerned, the position and manner of making cuts are of the greatest importance. As a rule, the removal of a large limb involves three distinct operations, namely: "Roping," "Preliminary Cut" and "Flush Cut." A smaller limb that can be firmly held in place by the hand without the aid of ropes may, however, be removed with a single flush cut. The surface of the final cut should always be parallel with the part of the tree that is being left, except when an upright limb is being removed; then the surface should be on a slant to provide a watershed. When the flush cut is properly made there should be no part of the limb left beyond the trunk or supporting branch. This makes the wound inconspicuous and enables it to heal more rapidly.

4.06 When a flush cut is made with a saw the limb is always sawed completely off from one side, usually from the top, because the work is more easily performed in this manner. No attempt should be made to make an undercut meet a top cut, as this rarely ever is accomplished without a rough surface resulting. Flush cuts will heal quite rapidly because the sap flow is directed evenly over the sides, which produces a uniform callous growth. The callous formed the first year, by growth of the cambium, advances farther toward the center each succeeding year until the wound is completely sealed over. When stubs are left, this process is seldom completed and if started, decay usually interrupts it. Sprout growth will be reduced when "flush cuts" are made because small sprouts do not develop so easily on the older trunk, and in addition, the sap passes around the cut to other branches.

4.07 When a stub is left, the sap continues to flow to the cut, causing buds to grow at or near the end of the stub. These buds soon develop into small sprouts as shown in the following illustration.



Arrows indicate Flow of Sap in Sap Wood

Sprout Growth Developing on Stubs as a result of improper Pruning

Decay Following improper Pruning which extends into the heartwood thus weakening the main structure

Cuts Made Properly Permit the Cambium to grow until the wound is completely Sealed over

4.08 These sprouts cause additional pruning and the exposed stub decays to the extent of affecting the health of the whole tree, because the decay travels back into the heartwood of the main trunk, thus reducing the strength of the tree considerably. Trees weakened in this manner show no outward sign to indicate their condition and are therefore hazardous in that they are susceptible to wind breakage.

4.09 The time spent in making flush cuts is little, if any, longer than that required for cutting in a haphazard manner, and the results, measured in the health of the tree and reduction of future work, are of considerable advantage.

4.10 **Small Limbs** are removed either with the pruner or saw, usually with a single cut which should always be flush as described above. More than ordinary care will be required in a number of cases in getting into position with the pole pruner saw or the tree pruner in order to have the cut close to the surface of the supporting limb.

4.11 **Large Limbs.** As mentioned above, the final cut is always flush, but it often is necessary to make preliminary cuts to prevent separating the wood fibres or peeling the bark on the lower side of the limb. It is easy to underestimate the weight of some limbs and by doing so improper saw cuts may be used which might result in serious injury to the tree.

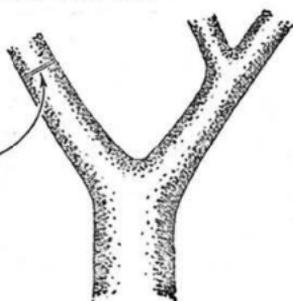
4.12 Most large limbs can be removed in sections with greater safety and ease of handling as well as with less help than that required for removing the limb as a whole.

Furthermore, only a little extra time is required to remove a large limb in sections and this is preferable to using block and tackle for removal of the limb as a whole. The conditions affecting the removal of large limbs vary with different trees, depending upon the height of the tree, size, position and location of limbs, relative position of wires, condition of space below, etc. All these factors should be considered in determining the method and saw cuts to be used in removing the limb. The various saw cuts required for removing side or lateral limbs and upright or terminal limbs are:

- (a) **Side Saw Cut** is intended to be used when the limb is to be swung sidewise. It should be made on the side of the limb opposite the direction in which the limb is to be swung. Sawing the limb in this manner permits the bark and remaining wood to serve as a hinge when the limb is swung around to the side. This permits selecting a location for lowering the limb without interfering with the wires, or other obstructions below the normal

SIDE SAW CUT

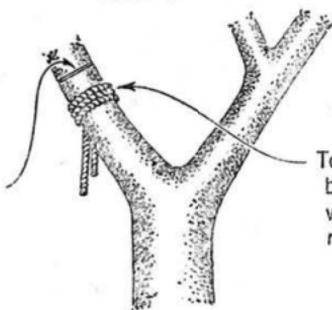
A preliminary cut made on side to swing limb over an object below. No opposite side cut required.



position of the limb. If there is a possibility of the limb splitting so that the break will travel below the point of the final cut, wrap a couple of turns of manila rope beneath the cut in order to prevent peeling the bark and splitting beyond that point.

SIDE SAW CUT

A preliminary cut made on side to swing limb over an object below. No opposite side cut required.

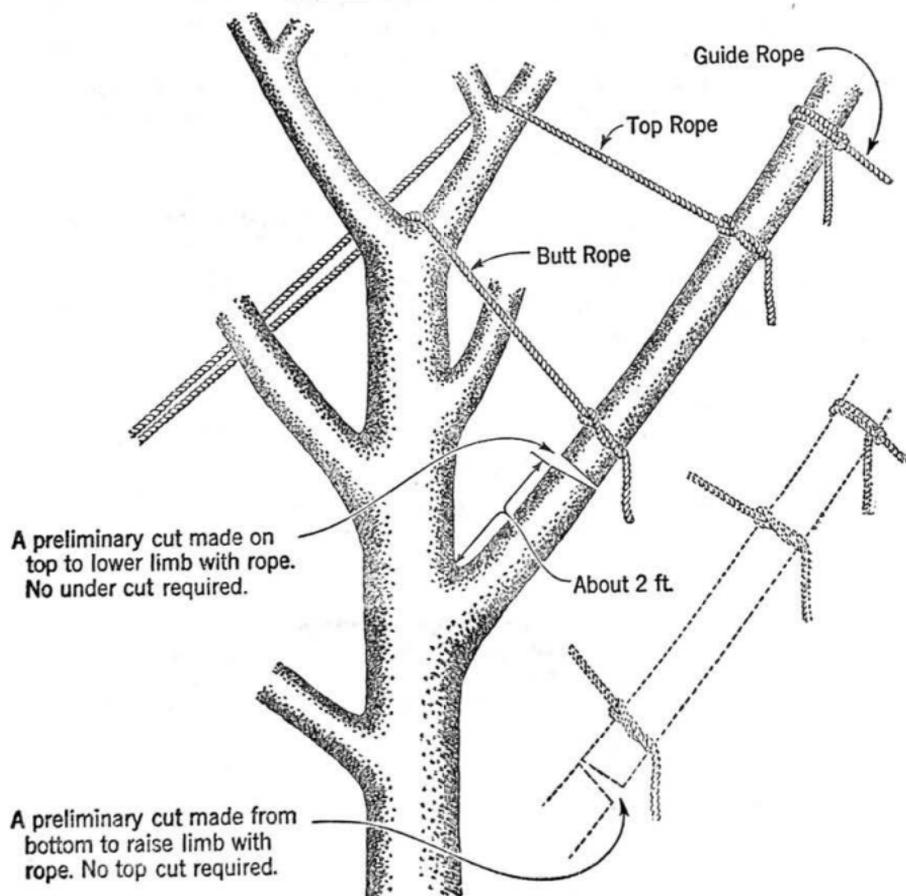


To prevent peeling of bark beyond this point, wrap with couple turns of manila rope.

(b) **Top Saw Cut** is intended to be used wherever conditions permit because it is, in general, the easiest cut to make. Furthermore, the gradual breaking of the wood which occurs with this cut causes less strain on the butt and top ropes and is therefore considered the safer practice.

(c) **Bottom Saw Cut** is intended to be used where obstructions below make it desirable to raise the limb during the sawing operation, as, for example, wires that may be very close to the limb.

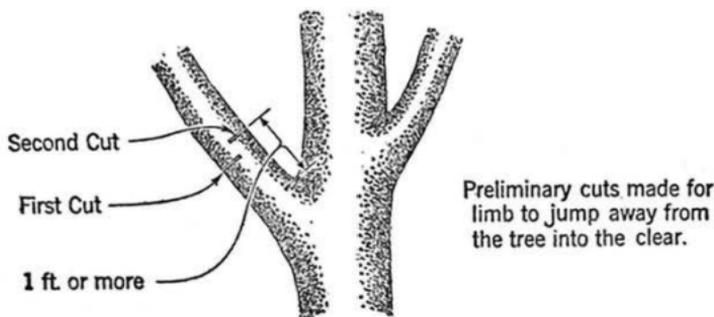
TOP OR BOTTOM SAW CUT



(d) **Jump Cut** is intended for use where the space below is clear and where there is no likelihood of the falling limb damaging property or obstructing traffic. It consists of two cuts, one made by sawing on the under side of the

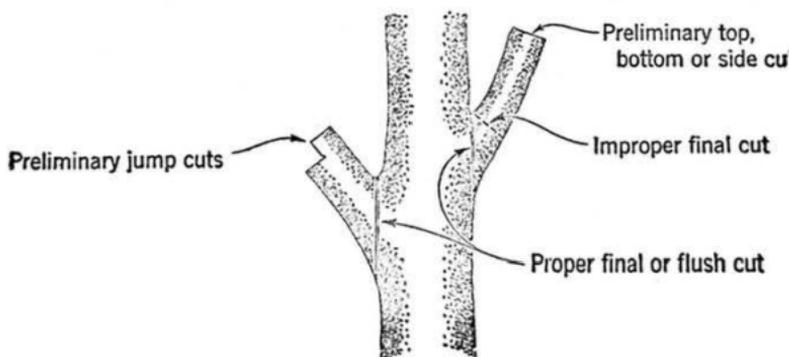
limb until the saw is pinched and then making the second cut either directly above or an inch or so farther out on the limb. This type of cut prevents the limb, when breaking, from peeling down the trunk. Such a cut should always be made a foot or more from the junction of a large limb and trunk. Limbs cut in this manner fall to the ground in approximately the same position as they were before being cut, and may even jump away from the tree for quite a distance. This cut is satisfactory for use when it is desirable to remove a limb overhanging beyond the wires.

JUMP SAW CUT



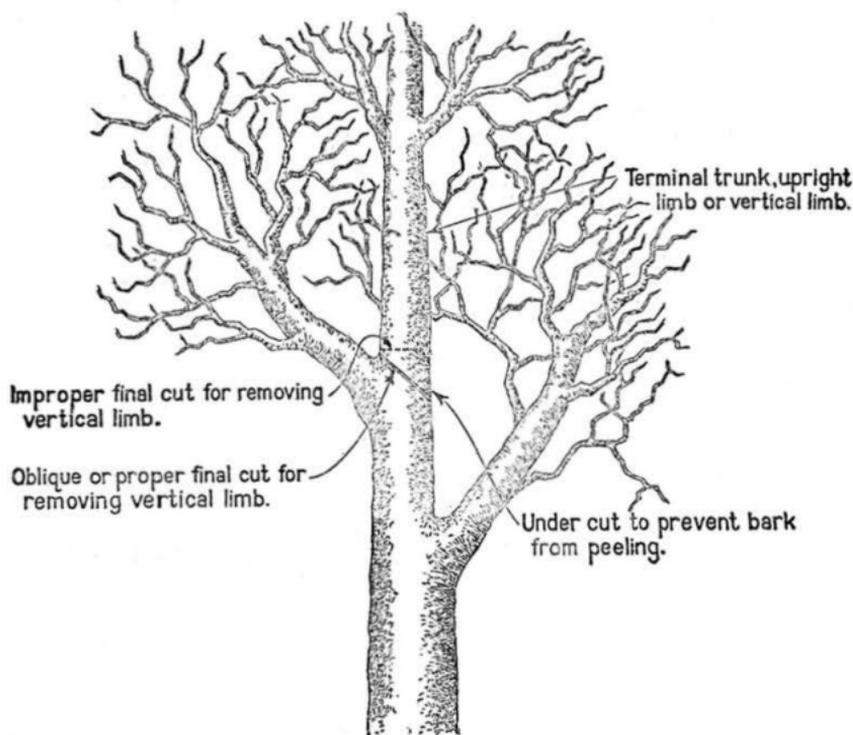
(c) **Final or flush cut**, as explained hereinbefore, should always be parallel with the limb that is being left. This cut is, in general, made from the top.

FLUSH SAW CUT



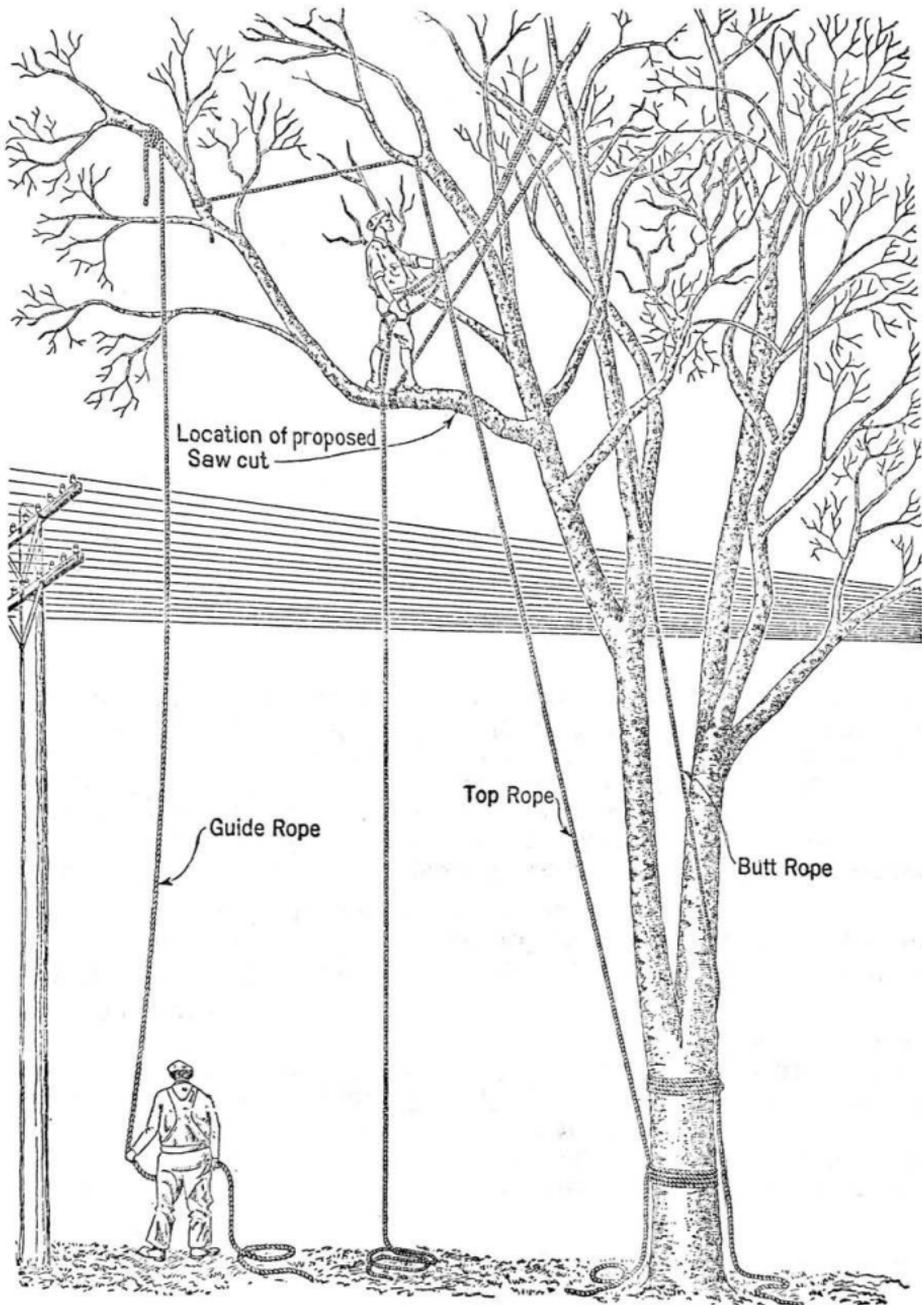
- (f) **Oblique Cut** is intended for cutting off upright limbs. Before making this cut the upright limb should be undercut through the bark at the base of the oblique cut to prevent peeling. As an additional precaution, it often is advisable to wrap the vertical limb with a few turns of rope just below the undercut. After this is completed make an oblique cut on the vertical limb at an angle of 45° just above a side limb. The angle permits water to run off and lessens the possibility of decay setting in.

OBLIQUE SAW CUT



6. ROPING LIMBS

5.01 The removal of large lateral limbs will, in general require roping to prevent the possibility of damage to telephone plant or property as well as to prevent the possibility of injury to employees or the public. The method of roping a limb is identical for limbs that are to be lowered, raised or swung to the side. Three ropes are, in general, required to rope a very heavy limb. They are known as "Butt Rope," "Top Rope" and "Guide Rope."



Location of proposed
Saw cut

Guide Rope

Top Rope

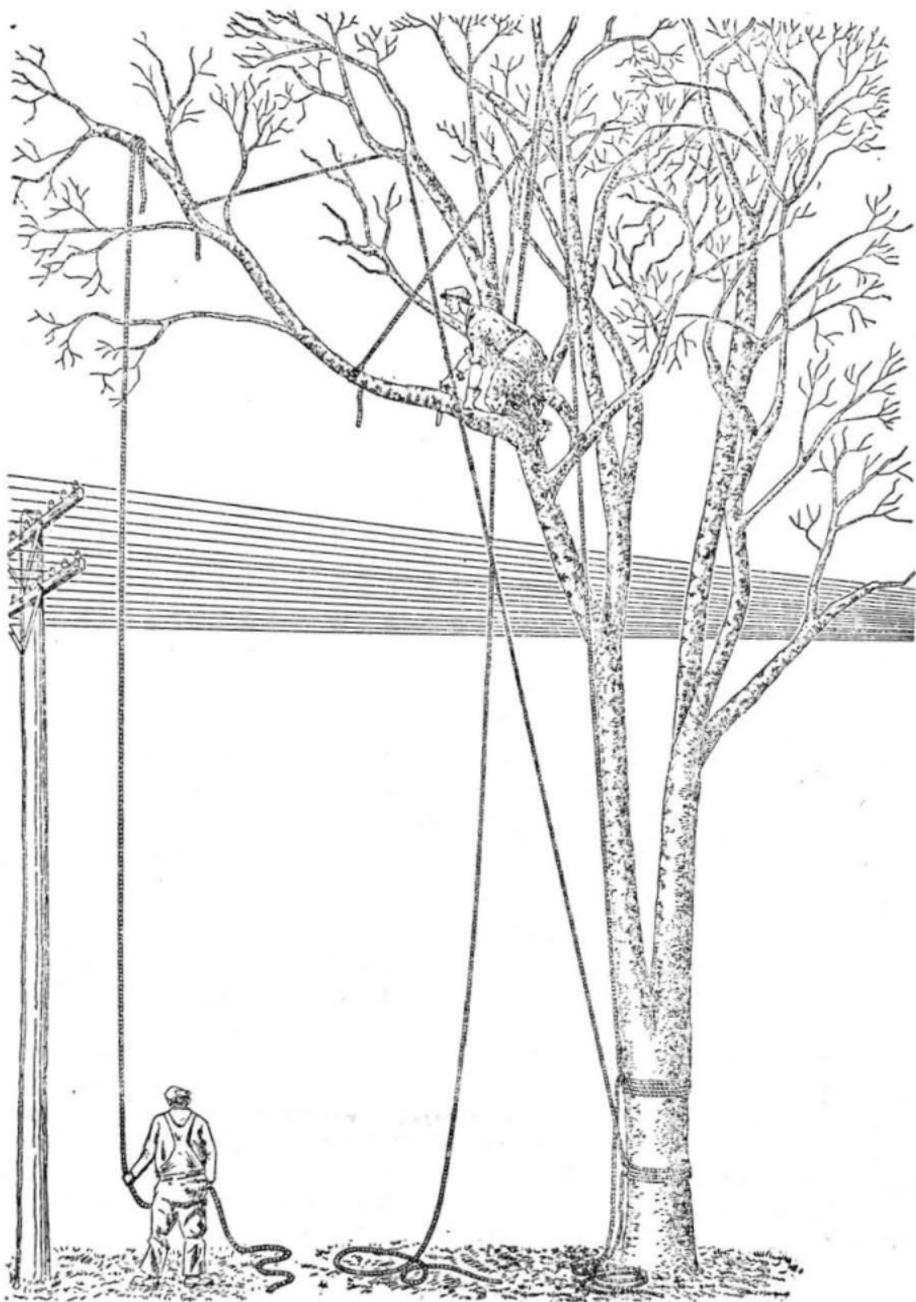
Butt Rope

5.02 A butt rope of sufficient strength shall be passed through a crotch above the limb to be removed and one end secured to the limb or section of limb near the point where the saw cut is to be made. The other end of the rope shall be tied to a tree or pole to hold the limb until it is ready to be lowered.

5.03 A top rope shall be passed through a different crotch, whenever possible, this crotch being also above the limb to be removed and one end of the rope secured near the outer end of the limb. The other end of the rope should be tied to a tree or pole until the limb is ready to be lowered. If the limb is light and conditions below are clear, this rope may be omitted.

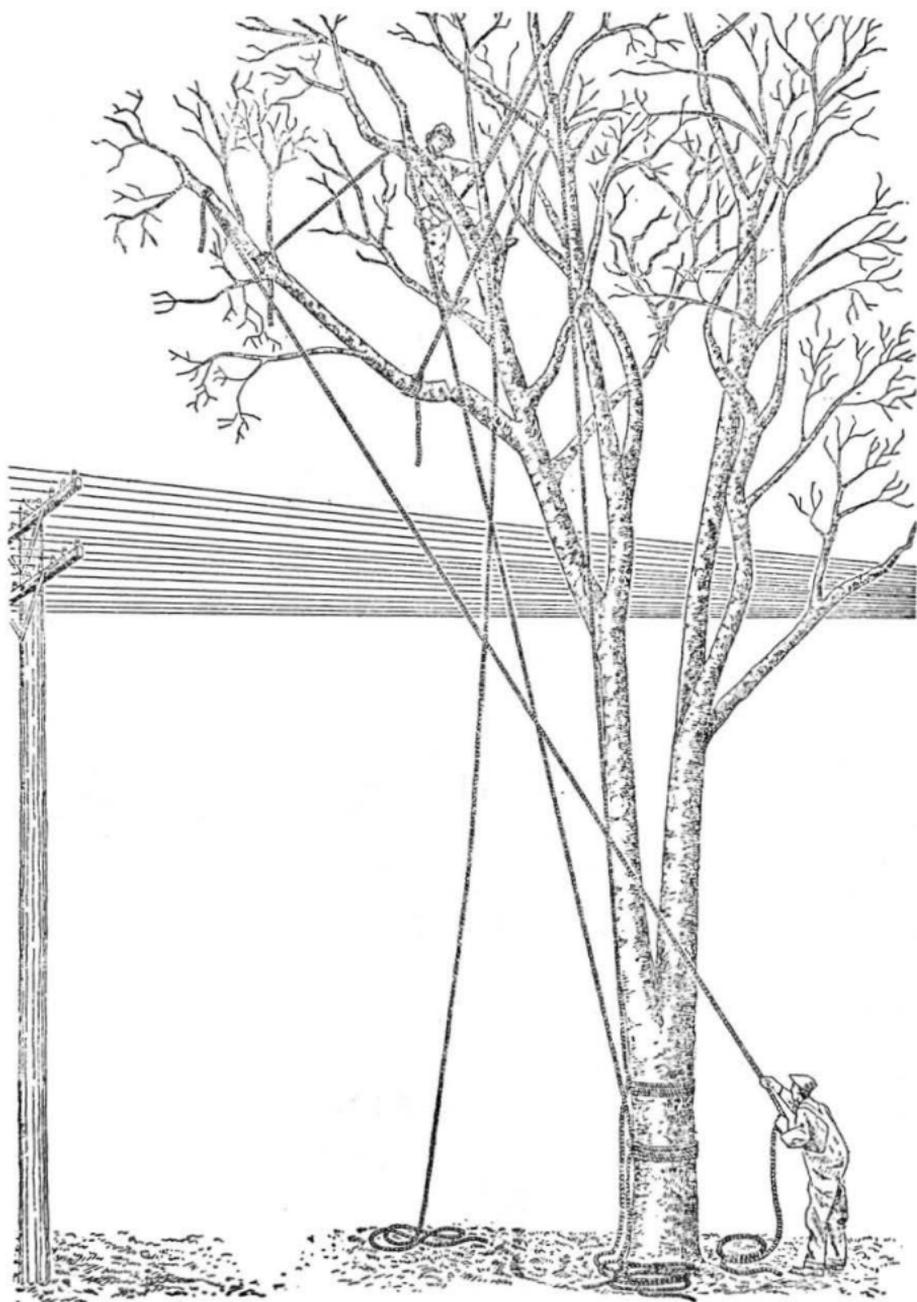
5.04 The guide rope should be fastened near the end of the limb to serve as an aid in pulling the limb around and in guiding it during the lowering operation.

5.05 With the ropes placed and secured the employee should make one of the preliminary saw cuts mentioned. For the conditions illustrated a side saw cut is required. This cut should be made at least two feet from the junction. It is not necessary, however, to make an undercut because the ropes hold the limb from falling and it is probable the peeling of the bark will not extend back to the crotch.

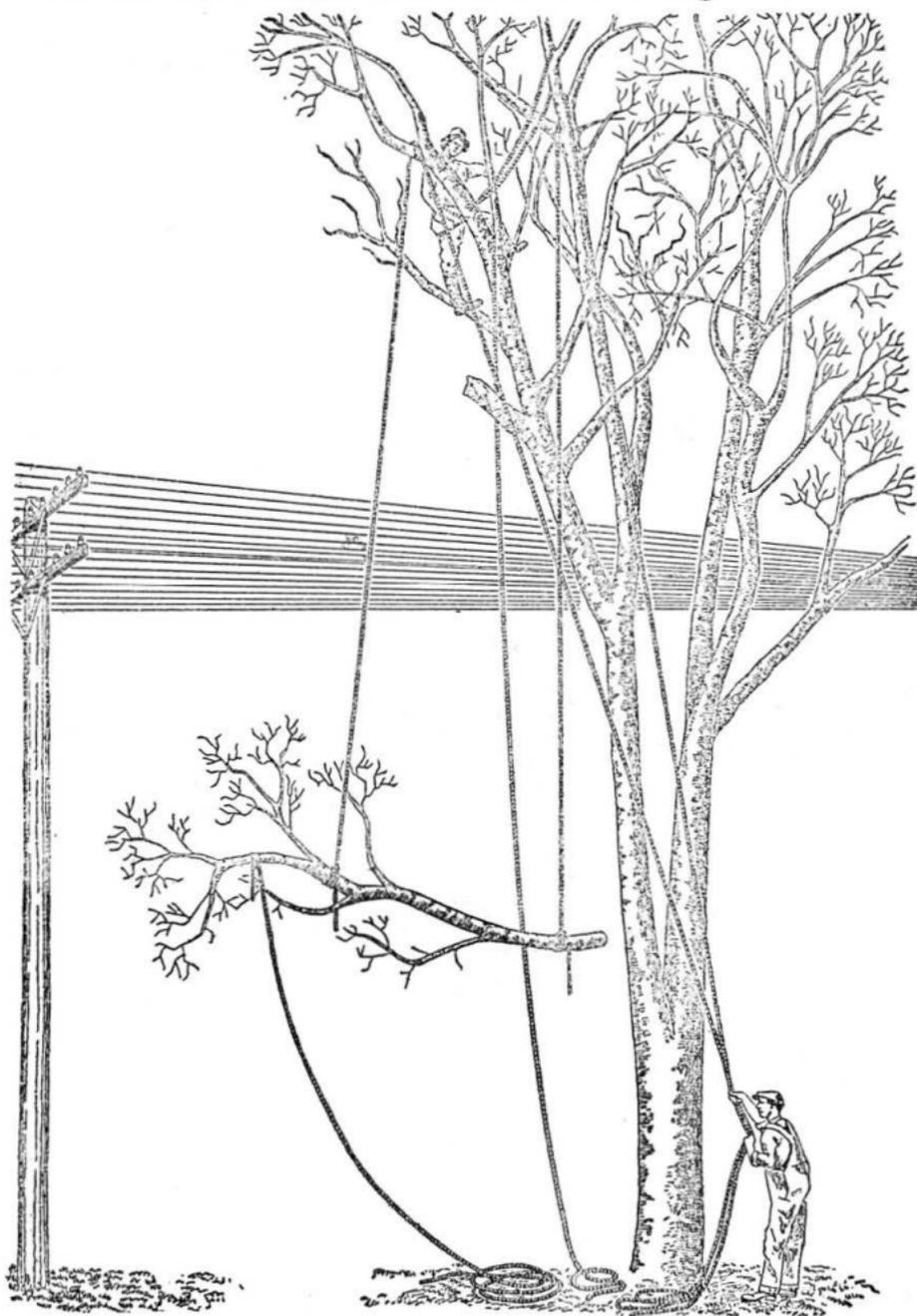


5.06 Dead limbs or brittle wood, such as Carolina poplar, will not break off gradually and care must be exercised by the employee to prevent an accident before the ropes take the weight of the limb being removed.

5.07 After the cut has been made sufficiently deep to permit the man on the ground to break the limb, the employee in the tree should retire to a position in the tree where the limb being removed cannot kick back and strike him. This position should never be under the point where the ropes are crotched. When the employee has reached a safe position, the man on the ground should swing the limb by means of the guide rope to the desired position for lowering.



5.00 The limb should then be lowered by means of the top and butt ropes as shown below. If the limb is heavy the ropes should be snubbed for lowering.



5.09 The remaining stub is then removed by a final flush cut. During the end of the sawing operation hold the stub in place so that it cannot drop down and peel the bark.

5.10 Large upright limbs are more hazardous to remove than are side limbs unless there is another tree or limb nearby in which to crotch ropes above the point of sawing. Under this condition the upright limb to be removed should be roped similar to the method illustrated for side limbs.

5.11 If there is no limb or other tree available in which to crotch the ropes, the butt rope may be wrapped around a lower stub or passed through a snatch block lashed to the trunk at a point below the cut. A strong rope should be used with either the snatch block or stub method and one end of the rope tied securely to the lower end of the limb section which is to be removed (see paragraph 17.09). After this is completed make a final cut on the vertical limb, holding the limb with the hand to permit dropping slowly. Large stubs that are too heavy to hold with the hand shall be held with a rope.

6. TREATMENT OF CUTS

6.01 All cuts, particularly those 1-1/2 inches in diameter or larger, should be painted with standard tree pruning compound. If other work is being performed in this vicinity the following year, the large cuts should be examined and repainted, if necessary.

6.02 The tree pruning compound covers the wound, lessens evaporation of water from surface and checks the entrance of wood destroying agents, thereby preventing unnecessary damage to the tree and preserving its health. A wound covered with tree pruning compound is also less conspicuous and results in a neater appearing finished job.

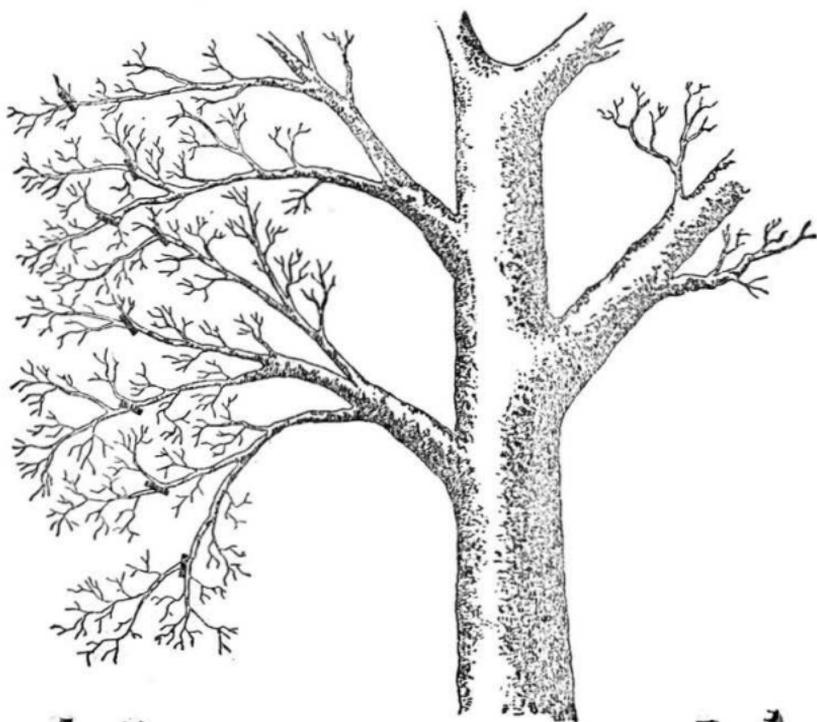
7. TRAINING GROWTH

7.01 The position of cuts is the determining factor in pruning a tree to a desired shape. It is possible to train the growth of a tree to a certain extent so that each year the amount of necessary pruning is gradually reduced. This is accomplished by leaving those branches the direction of which is away from the line, and cutting those branches which point toward the line. When trees under the line are to be trained to grow away from the line, the vertical growth should be removed and the horizontal growth permitted to

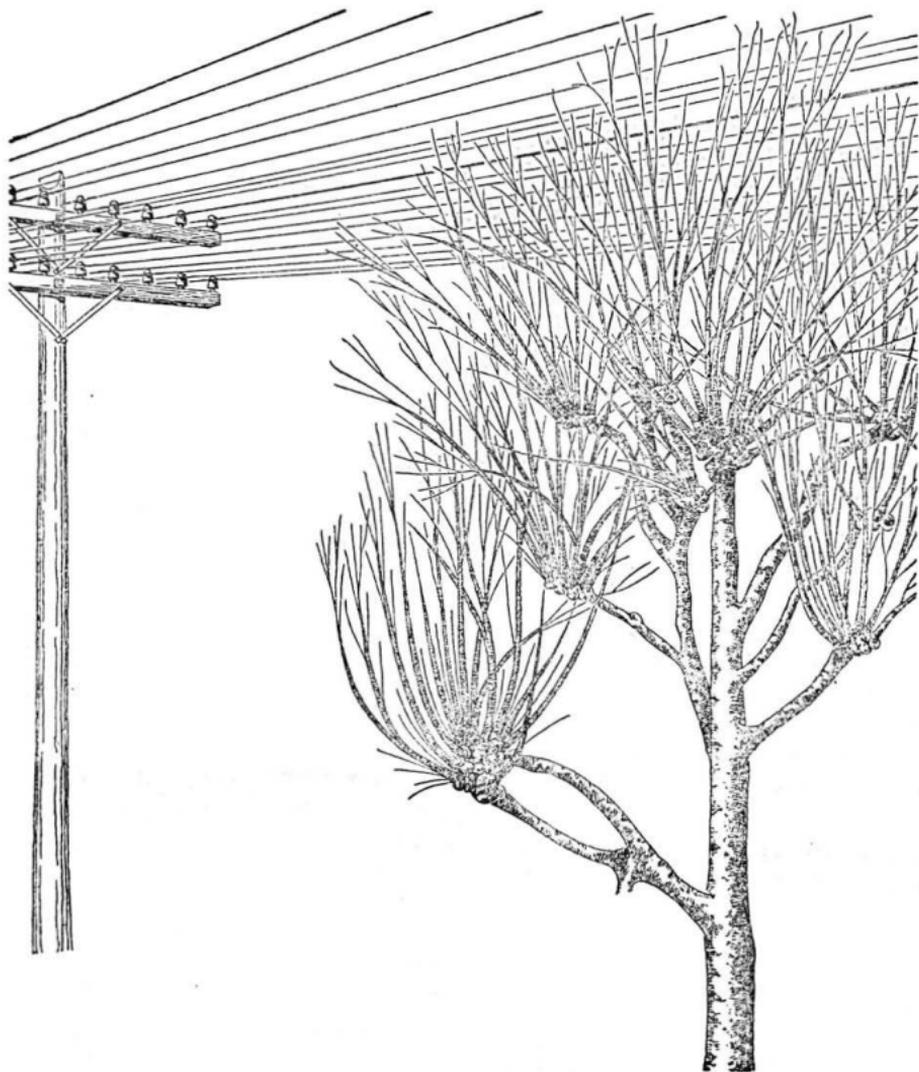
remain. The dashes in the illustration below show the vertical branches to be removed.



7.02 Trees growing at the side of the line should have their horizontal growth removed as illustrated by the dashes and the vertical growth left.



7.03 Flush cuts shall be made at crotches or joints in order to reduce to a minimum the possibility of sprouting. If sprouts do form they should be cut out from year to year until they fail to develop and the whole growth of the tree has been directed into the branches selected to remain. The following illustrates growth which was not trained and poor pruning which resulted in sprout clusters.



7.04 The training of growth and the making of "flush cuts" are the most important features of good tree pruning.

4. SCALE OF GROWTH

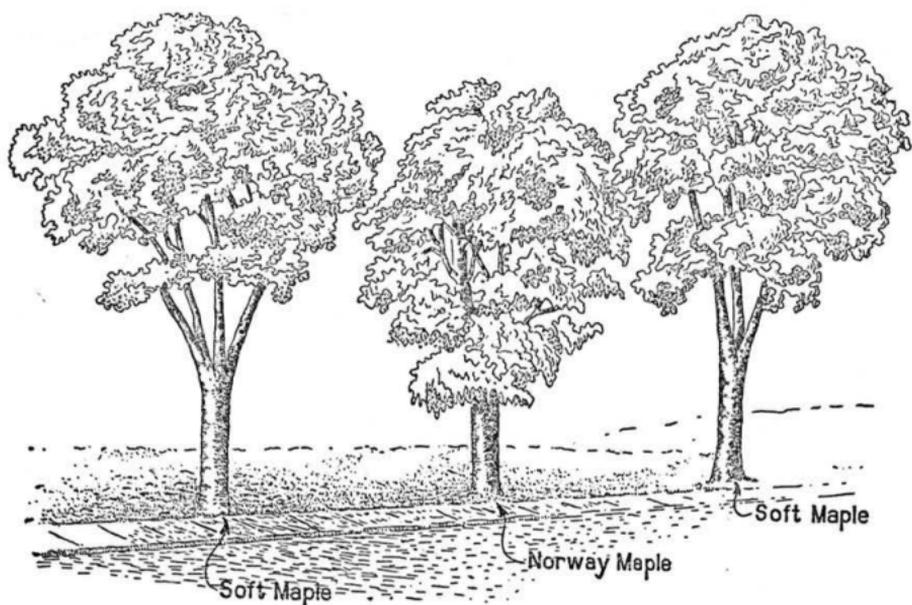
8.01 The following table of tree growth is only general, because conditions vary considerably with soil conditions and climate, and, since very little scientific data are available, the table is based primarily on experience.

8.02 Under normal conditions the fast growing trees mentioned below are able to extend new growth at least two feet a year. Most of these fast growers will extend their growth considerably more than two feet a year, some as much as eight feet. This amount will vary, however, in different parts of the country, so that it is difficult to make an accurate table that would apply generally.

8.03 The following table gives an approximate idea of the rate of growth of the trees generally encountered and should be used in judging the proper clearance to be obtained. This information will also be helpful in explaining to property owners that in order to obtain a definite amount of clearance for a reasonable length of time, it is necessary to remove long limbs on fast growing trees.

Fast Growing Trees		Slow Growing Trees
Chestnut	Carolina Poplar	Butternut
Water-Oak in South	Lombardy Poplar	Hackberry in North
Tulip	Cottonwood	Oaks except Water in South
Sweet Gum	Elm	Sugar Maple
Apple	Willow	Norway Maple
Sycamore	Box-Elder	Hickory
Soft Maple	Catalpa	Walnut
Basswood	Ailanthus	Cedar
Hackberry in South	Locust	Beech
		Birch
		Ash

8.04 The comparison of a year's growth between Norway and Soft Maples is illustrated below

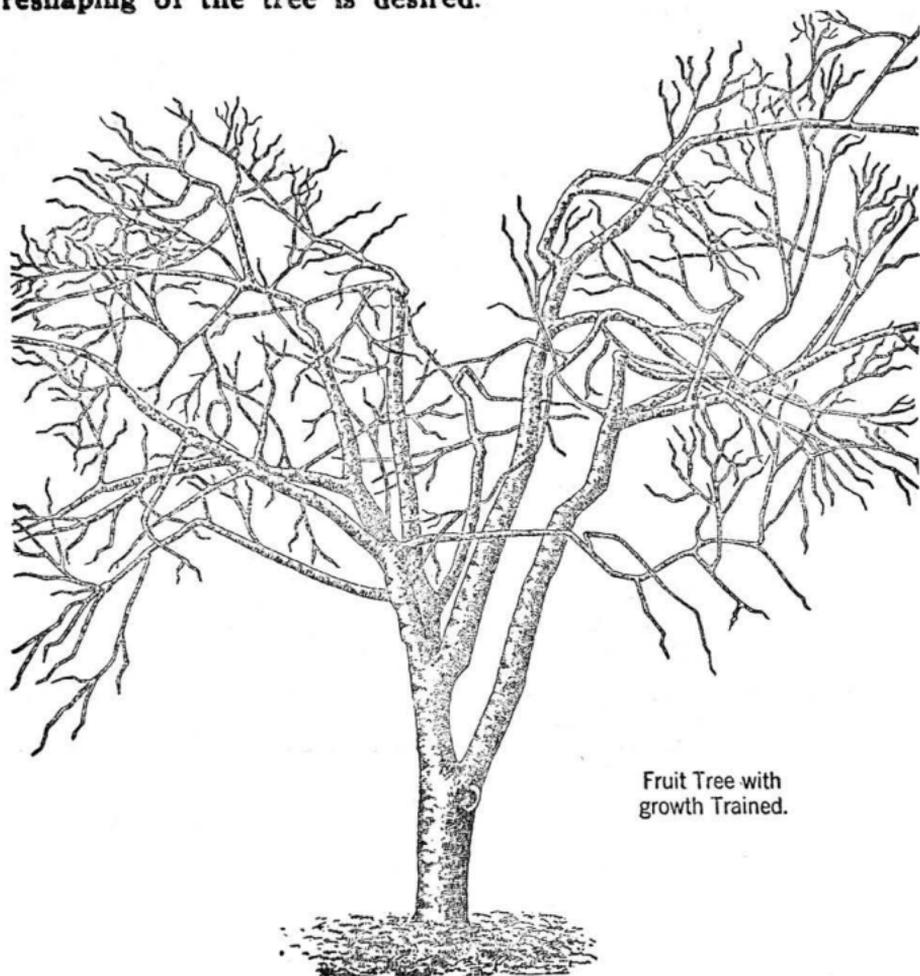


• PRUNING

9.01 Shade trees should be pruned so that not less than a year's clearance is obtained. Trees pruned more frequently than this are, in general, weakened as a result of the repeated loss of foliage. If it is difficult to secure permission to prune during the dormant season so as to obtain one year's clearance it may be advisable to wait and do the pruning in the summer season, because the growth is then slower and the clearance obtained is more lasting. On the other hand, trees should never be neglected to the point where the original shape has been lost or the limbs have grown so large that the property owner might object to their removal. All trees should be kept free of broken or dead limbs which are hazardous. If a tree is to be reshaped or a great number of sprout clusters are to be removed, it is best to top the tree back for two or three years' clearance and then train the new growth to the desired shape.

9.02 Since the pruning of shade trees is primarily intended to improve them from an appearance and shading standpoint, all other uses of the tree can be more or less disregarded. When a fruit or forest tree is pruned its shade possibilities are of no value and primary consideration must be given to improving its productivity. The fruit tree must be pruned so that it will bear better or more fruit, and the forest tree pruned so that the yield of lumber will be improved.

9.03 The fruit tree should be well opened up so that light can reach all its branches. A fruit tree bears most of its fruit on the smaller outside branches of the tree and consequently as few of these branches as possible should be removed. When pruning fruit trees to clear telephone lines the owner of the trees should be consulted as to whether any general reshaping of the tree is desired.



Fruit Tree with growth Trained.

9.04 Trees whose only value lies in the lumber they may produce should have the lower limbs removed so as to produce, so far as it is practicable, lumber free of knots.

9.05 Forest and fruit trees when pruned properly should not require yearly pruning to keep them clear of the wires, because the growth of these trees should be directed into fruit or lumber rather than into water sprouts.

9.06 In general, trees along the line can be pruned without interruptions in a working circuit. Although the possibility of interrupting service is remote, the wire chief should be advised of all major tree pruning work so that should any trouble arise the cause can be readily detected.

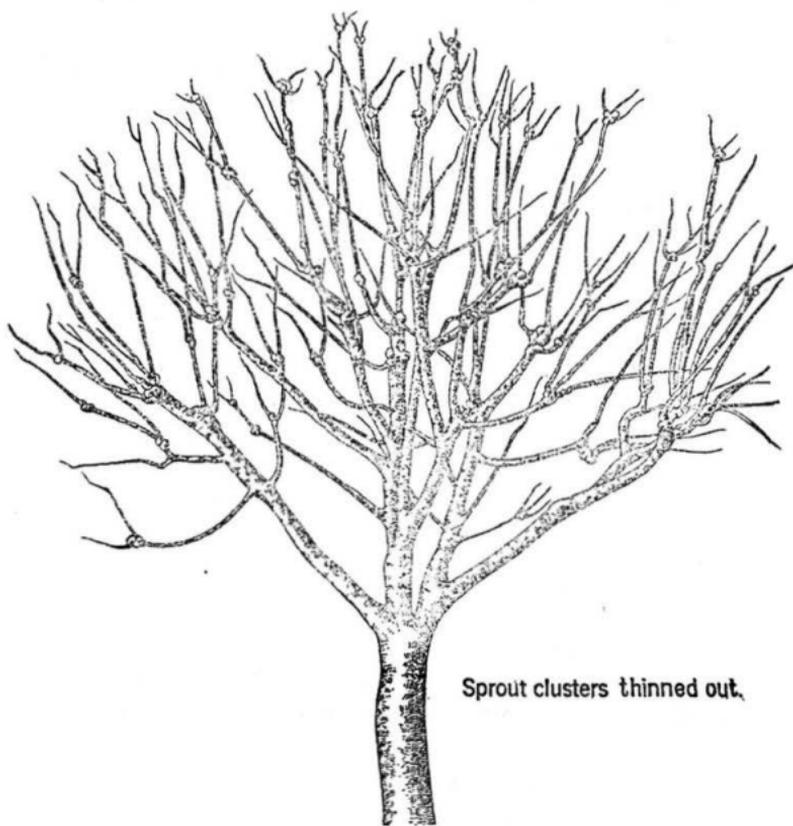
9.07 Any unsatisfactory plant conditions encountered in connection with the tree pruning operations should either be corrected or immediately reported to the wire chief or supervisor.

10. PRUNING SHADE TREES UNDER THE LINE

10.01 Shade trees growing under the line should, whenever possible, be kept rounded off symmetrically so that there are no holes through the middle to detract from the trees' beauty. Such trees will seldom present a perfectly even surface when pruned, because some irregularities result from cutting the vertical growth at lateral branches. When the leaves come out, however, a more even appearance will result as shown in the following illustration:



10.02 An uneven or irregular surface is much more natural than a perfect ball-life surface, and the results are far better for the health of the tree. Sprout clusters may tend to develop, but should be kept cut out as much as possible. If clusters are already present, they should be cut out to lower lateral limbs, either all at once or a few each year as shown.



Sprout clusters thinned out.

10.03 If there are a large number of clusters to be removed and the tree is not to be "headed in," that is, all branches and foliage removed, it is advisable to cut only a few clusters each year so that the balance of the tree is not disturbed to the extent that it would be if all the clusters were cut at one time.

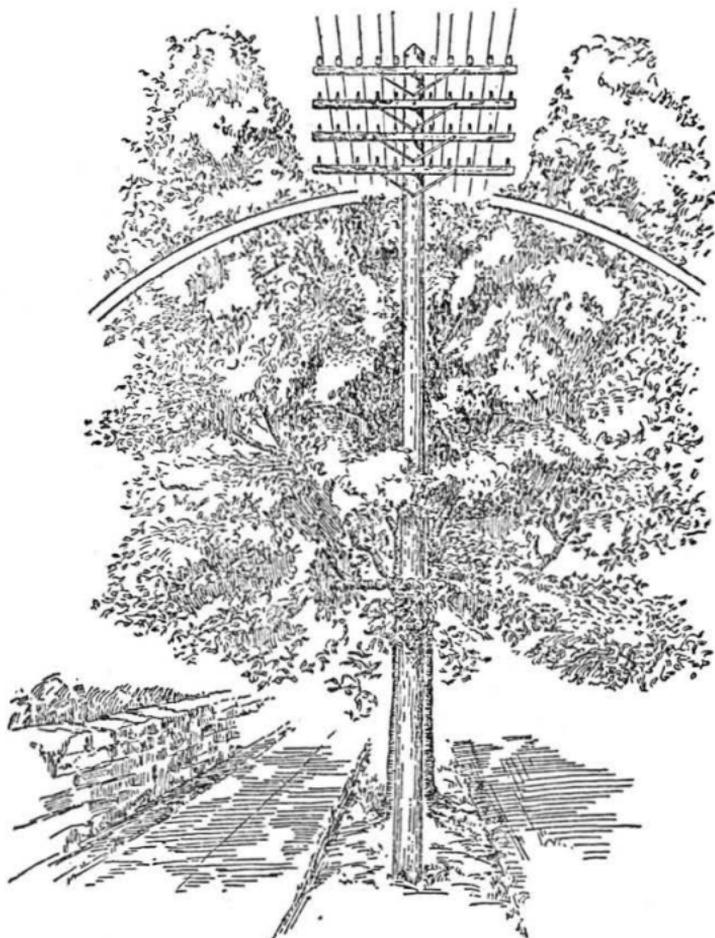
10.04 If there are but a few or no lateral branches (horizontal) present to which the vertical growth may be cut, there are four possible methods for reducing crowded growth one of which usually will be found suitable in any individual case:

- (a) The tree may be headed back for two or three years' clearance and the new growth trained as desired.
- (b) A few clusters may be taken out and the rest left to be removed the next year.
- (c) The individual clusters may be thinned out and the remaining growth trained horizontally.
- (d) If there are sprouts in the cluster which point in a horizontal direction a slanting cut may be made so that they are left and the other sprouts are removed.

10.05 The method to be used depends upon factors such as species of tree, locality and desire of property owner. There is one method, however, that should never be used, that is, to clip each sprout with a pruner about six to eight inches above the swollen area, for while this will make a well rounded tree when the leaves are present, the work is increased each year as the growth becomes denser, and the winter appearance is far from pleasing.

10.06 After the limbs which point horizontally have been selected, they should be kept clear of vertical sprouts. Each year there should be fewer branches to cut, as the roots are in a more normal balance with the spread of limbs.

10.07 Special effort should be made to prevent the development of valley cuts in the tops of trees. Trees with valley cuts not only present an unnatural appearance, but sooner or later become a hazard to the line as the side branches become long and flexible and the wind whips them into the wires. If already present, valley cuts may be rounded off as illustrated below, provided, of course, that the size of the crown will look well.



Improved appearance by cutting along the lines indicated

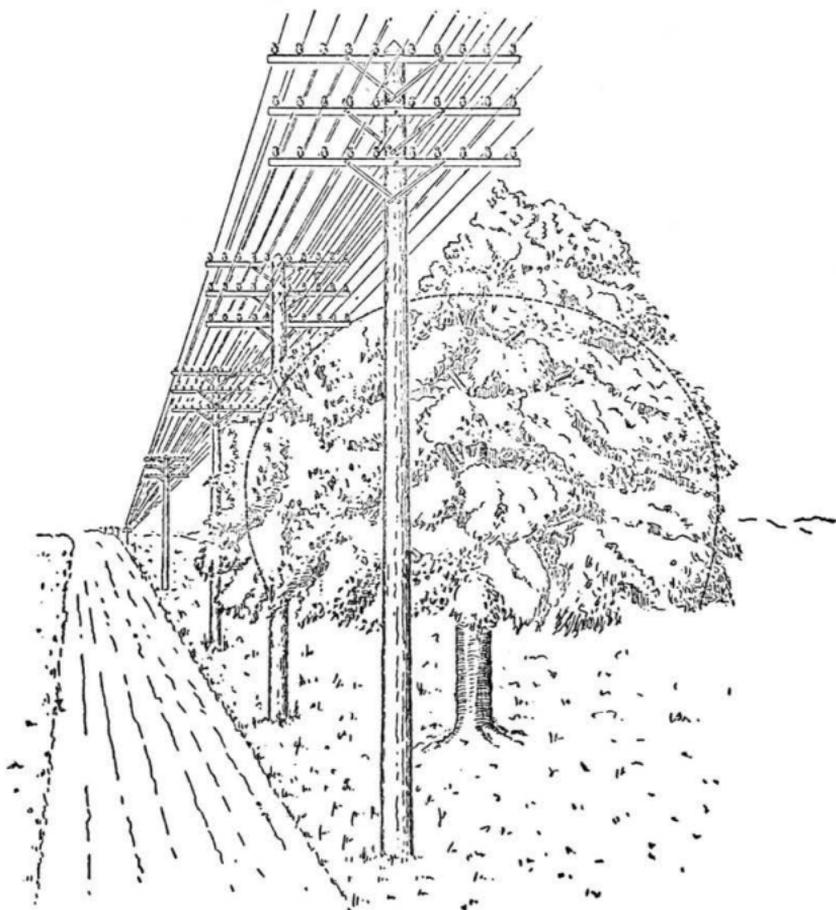
10.08 All trees with valley cuts in their tops cannot be pruned in this manner because some of them would present an unpleasing appearance. Whenever permission cannot be obtained to remedy existing conditions of this nature, or if the tree, when rounded off, would not look well, the best must be made of the situation as it is and the tree pruned with the thought that all cuts made should be in accordance with the plan of retarding sprout growth.

10.09 A point that should always be kept in mind in regard to trees under the line is that small trees which may be 8 or 10 feet below the wires can be trained best when young, and these trees should receive some attention before they begin to interfere with the line.

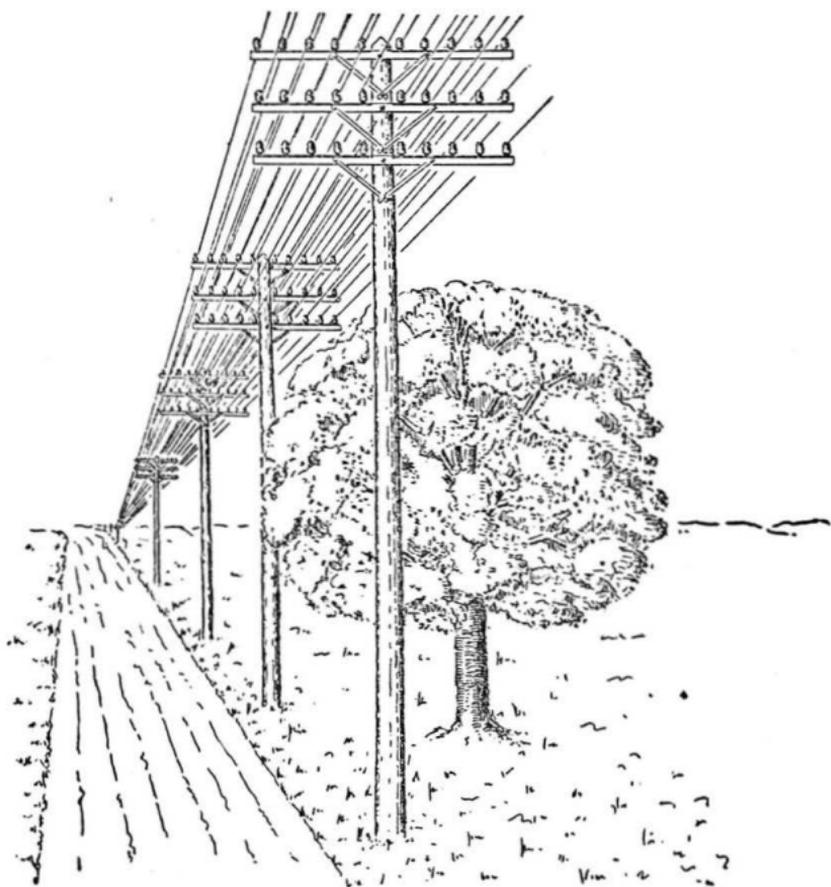
11. PRUNING SHADE TREES AT THE SIDE OF THE LINE

11.01 Trees with holes or channels cut in their sides growing beside the line present a serious problem from a maintenance standpoint. There are four possible ways to improve the appearance of trees that have been pruned in this manner, the choice of method depending upon the position of the wires in relation to the crown, the depth of the foliage and the possibility of raising or lowering the line. They are as follows:

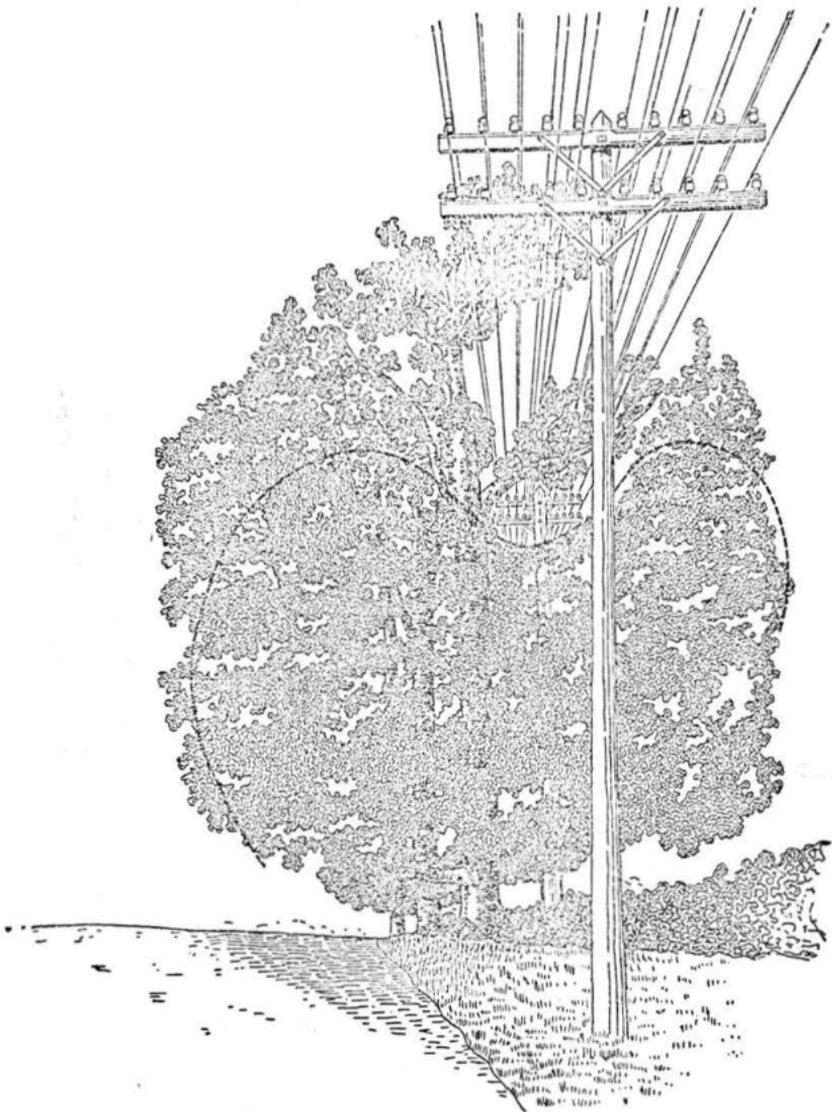
- (a) Line passes through side of tree near the top and an "L" shape cut has been made.



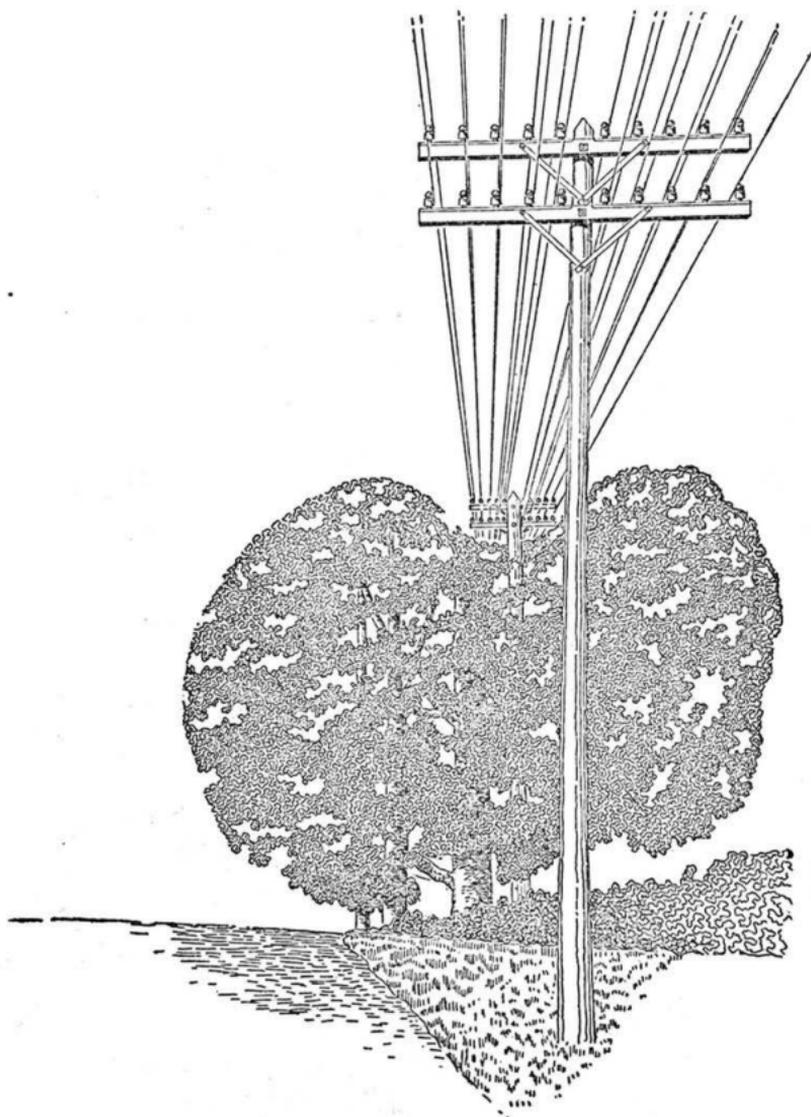
The long side can be cut down even with the short side and the whole tree kept symmetrical thereafter.



(b) Line passes through side near center of crown.



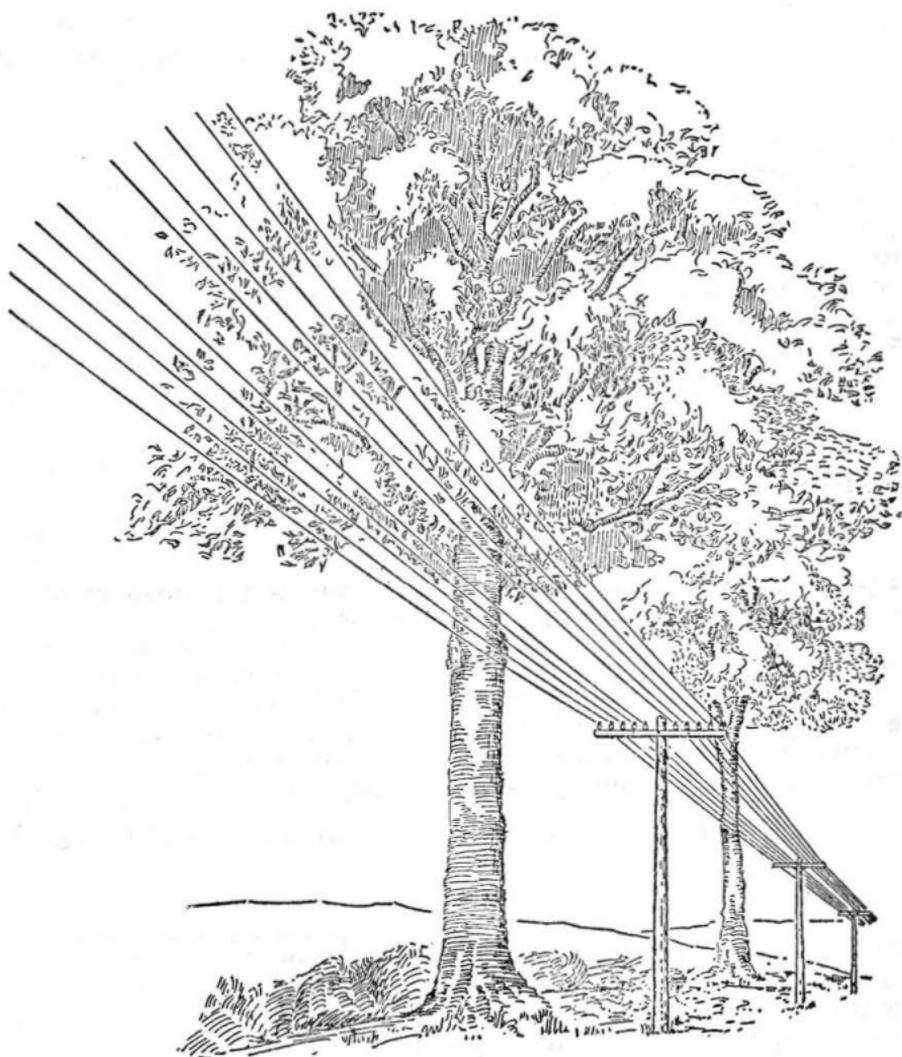
In some cases the top may be cut back and rounded off.



(c) Line is in the lower portion of the tree with relatively few limbs below it.



The lower limbs may be cut off to provide the clearance required.



(d) Trees standing a short distance from the line with the ends of the branches on one side interfering with the wires. The ends of these branches should be removed so as to clear the wires for a sufficient period of time and, where necessary, the other side of the tree shaped in proportion

11.02 The ultimate object in pruning trees beside the line should be to train their growth so that the limbs eventually will be either below or above the line. It usually is better to leave the leader or main upright limb in trees of this class when they are a sufficient distance from the line. The tree then develops a well balanced appearance at maturity.

11.03 There are some cases where the line passes through the center of the tree and is encircled by the branches. Such a condition cannot be changed, as a general rule, without some change in the height or position of the line, and if permission cannot be obtained to do this work it is necessary to clear the wires by reenforcing split crotches and removing all dead limbs and interfering branches.

12. PRUNING SHADE TREES OVER THE LINE

12.01 Trees overhanging the line should have more than normal clearance above the wires to prevent interference when snow or sleet weighs down the limbs. Where a large limb does not permit obtaining the desired clearance by the usual pruning methods, the weight of the limb should be reduced by removing some end branches, thus permitting the limb to rise. All dead or decayed limbs should be removed in order to protect the line as well as to prevent damage to the tree.

12.02 The tree that is above the line should not require frequent pruning if proper attention is given to training of growth and making of cuts.

13. PRUNING TREES FOR DROP WIRE LOOPS

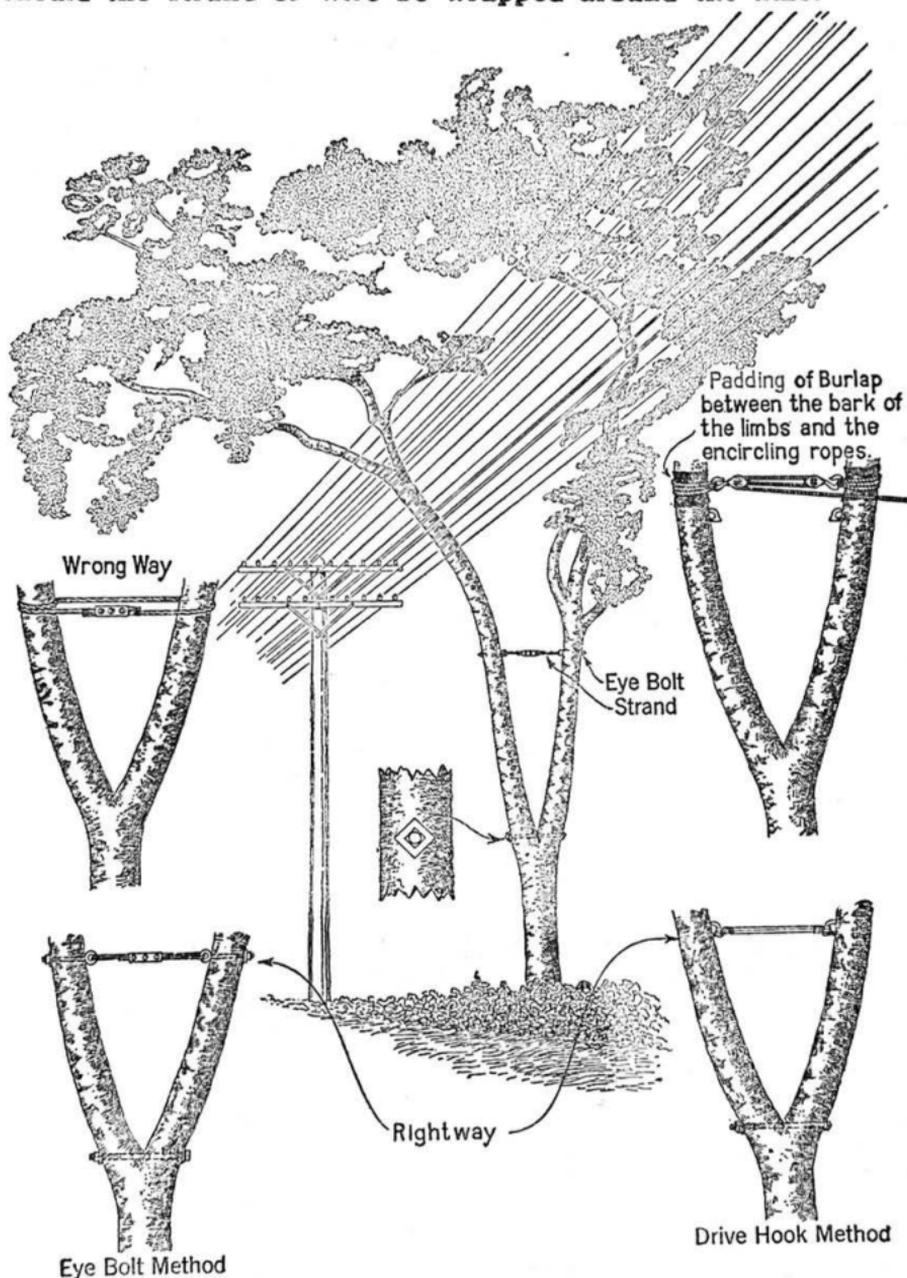
13.01 In general, the extent of pruning as outlined for a line is not warranted for a drop wire loop. In view of this, only those limbs that are likely to interfere with the drop shall be removed. All dead wood in the proximity of the loop shall also be removed. If the removal of a few extra limbs will materially improve the appearance of the tree, and at the same time such work will establish better public relations, the matter should be brought to the attention of the supervisor for disposition.

14. CROTCH REENFORCEMENTS

14.01 Trees having large, widespreading limbs or weak crotches often are encountered near telephone lines and present a serious hazard in times of unfavorable weather conditions.

14.02 Such limbs should be removed when possible. However, if this cannot be done, it will be advisable to reinforce the limbs with wire or strand and to bolt the crotch. Either strand or wire, depending on the size of the limbs, may be used to relieve the strain at the crotch. This reinforcement is generally placed well above the crotch and when drawn tight should prevent splitting. While it will prevent splitting at the crotch it will not hold a limb, that has already been partly split, sufficiently steady to permit healing of the wound. Such limbs should be bolted at the crotch with one or more bolts through the split section. This will generally hold the split portion sufficiently rigid to permit it to heal over.

14.03 Standard drive hooks should be used to hold the wire to small limbs and standard eye bolts should be used to hold the strand to the large limbs. Under no circumstances should the strand or wire be wrapped around the limb.

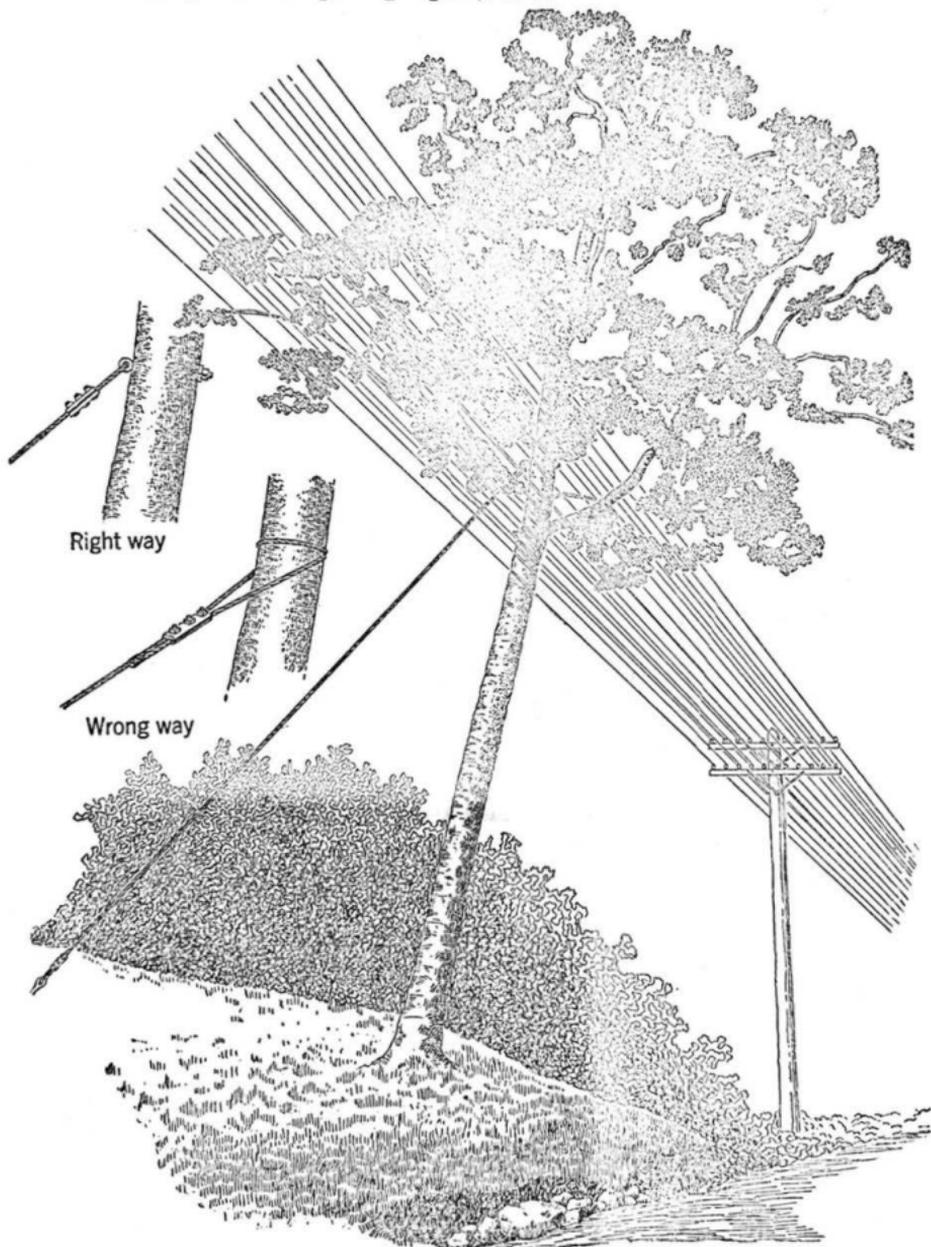


14.04 If limbs to be reenforced are pulled tightly together with block and tackle located well above the crotch, the strand or wire may be readily installed with sufficient tension to remain tight without the use of a turnbuckle. This is to be desired, as it provides a neater finished job.

14.05 Whenever an eye bolt is used for securing strand to a limb, a washer should be placed under the nut, and when a crossarm bolt is used for reenforcing a split crotch, a washer should be placed under the nut and head. The washer should be placed in such a position that two of the points are in the direction of the limb of the tree. After the hole for the bolt has been bored, remove the bark around the hole to conform to the shape of the washer so that the washer will bear against the wood. Treat the wounded area with tree pruning compound and then install the bolt.

12. GUYING TREES

15.01 Trees that lean over the line and for which permission to remove cannot be obtained shall be guyed as illustrated. The eye bolt shall be installed in accordance with the instructions given in paragraph 14.05.



16. TAKING DOWN A WHOLE TREE

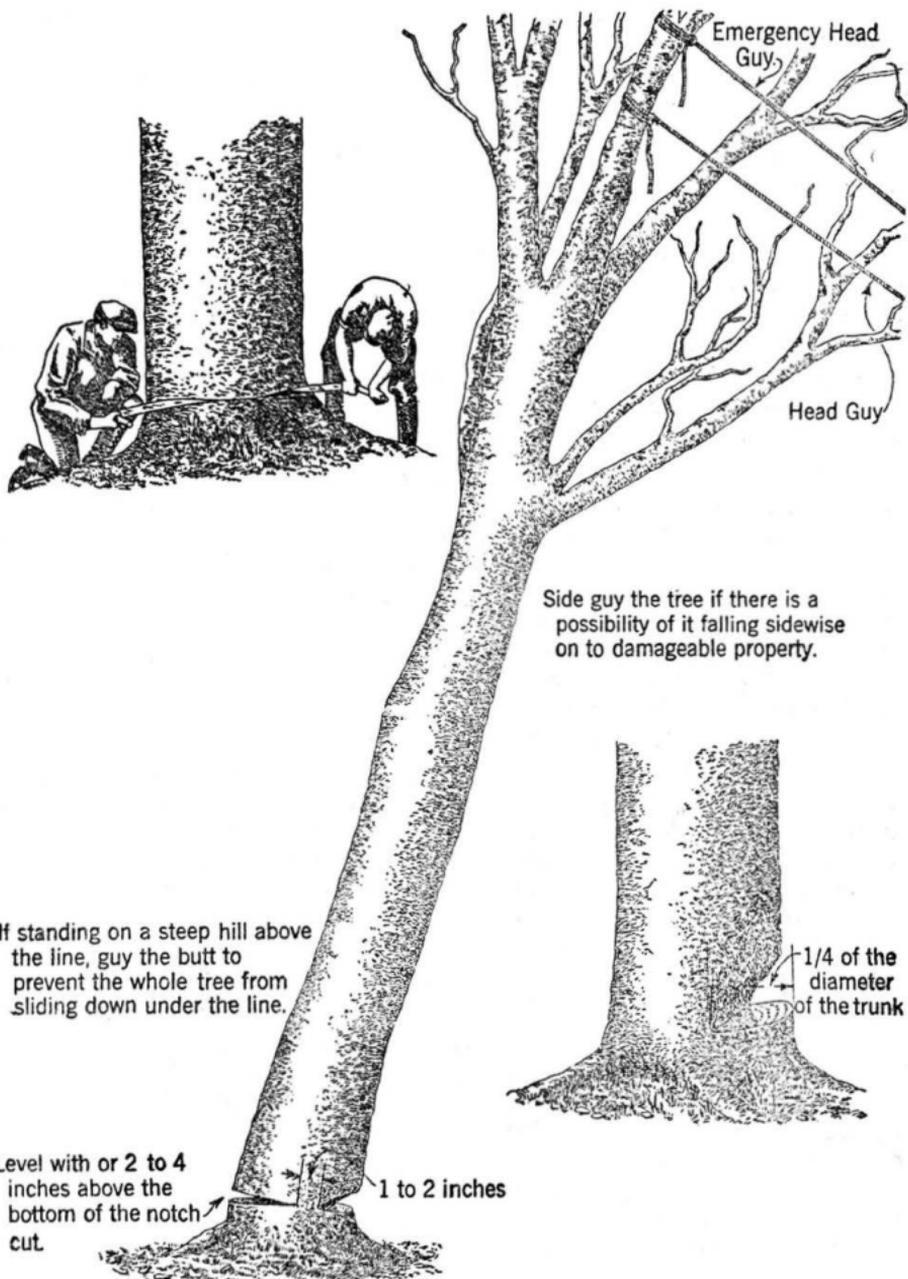
16.01 Wherever practicable, the whole tree shall be felled.

Before cutting be certain that the tree is properly guyed so that it cannot fall toward the line, slide under the line or roll off another tree and damage the line or adjacent property. All large trees shall be well head-guyed and if there is a possibility that the tree may fall sidewise it should be side guyed in both directions. A tree standing on a steep hill above the line should be butt-guyed to prevent the whole tree from sliding down under the line after it falls. All large trees and trees that lean heavily toward the line may require the use of strand for the head guy.

16.02 When head guying, it is well to have two ropes, one for pulling and the other an emergency line for use in case the head guy starts to break. The head guy should be pulled tight before sawing is started so that if it is going to break, it will do so before the tree starts to fall. As the sawing proceeds, the head guy will require tightening to keep it taut. Slack should also be kept out of the emergency head guy in order to have control over the fall of the tree in the event the head guy fails.

16.03 One of the reasons why strand has been specified is that, in the past, instead of completing the saw cut, efforts have been made to break off wood which should have been sawed. This practice has resulted in breaking the rope and if the practice is continued, strand should be used as a safety measure. In general, the use of rope head guys is not a hazardous practice and may be followed if sawing is completed up to within one inch to two inches of the undercut. This area of uncut wood is sufficient to prevent the trunk from kicking back on the stump and also provides the wood necessary to control the direction of the fall.

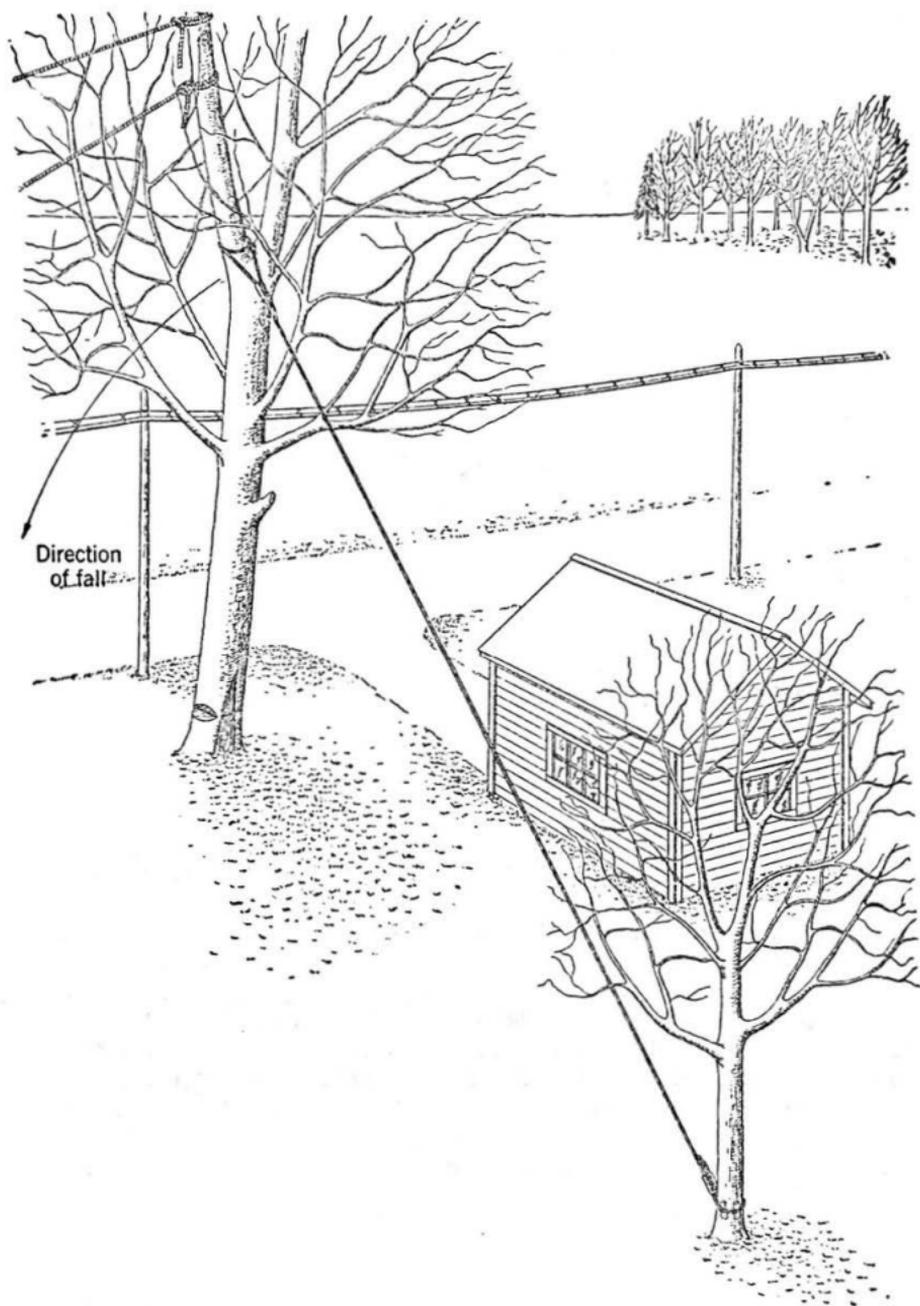
16.04 The cuts necessary in felling a tree are—first, an undercut made with the saw to a depth of 1/4 of the diameter of the trunk on the side toward which it is desired to have the tree fall. A notch is then chopped out to the back of this new cut.



16.05 The final saw cut is made on the opposite side from the notch and may be level with the bottom or two to four inches above it. When the saw cut is a little above, it is easier to fell the tree in the direction desired.

16.06 A set of wedges is a great aid in controlling the direction in which a tree falls and should be used on large trees to help relieve the pull on the head guy.

16.07 It sometimes will be necessary to fell a tree so that it will swing in a head guy, as, for example, when cutting a tree so that it falls along the line. This is a hazardous operation with large trees, and from a safety standpoint is not recommended. In general, it can be avoided by taking the tree down in sections. If, however, it is necessary to swing the tree in a head guy, the important things to check are first, the head guy, which should have sufficient strength and should be secured so as to be perpendicular to the line; second, the possibility of the head guy catching on a tree or rock, and last, that the notch be made in the direction toward which the tree is to fall.



16.08 After a tree has been felled, it may be desirable to prevent new growth arising from the stump. This may be accomplished by burning the stump in place (see paragraph 20.07) or the stump may be removed entirely with digging and stump pulling apparatus or dynamiting. Stumps that are removed shall be carted away or burned. Consideration should be given to having this work done by local contractors, particularly if there is a large number of stumps to be removed. Experience has proved that local contracting frequently will be an economical procedure.

17. TAKING DOWN A TREE IN SECTIONS

17.01 When the wires, buildings, or other property would be endangered by felling a tree as a whole, the tree should be removed in sections. Because the removal of a tree in sections often was regarded as hazardous and consuming considerable time, it has been avoided in the past, and the tree felled as a whole. This practice frequently incurs the possibility of interruptions to service, damage to roofs, personal injury to both the public and employees, etc., and therefore whenever there is doubt that the space available is not sufficiently large to fell a whole tree safely or traffic conditions are such as to create a potential hazard, it is advisable to remove a sufficient number of limbs to permit felling the tree trunk with its remaining branches without the possibility of damage to the line or other property, or personal injury to the public or employees. Using the rope seat not only increases the safety, but speeds up this type of work in that it permits the workman to move out on the limbs more readily where small pieces can be cut quickly and ropes tied securely.

17.02 Two general classes of trees which should be considered separately are encountered when doing this type of work. They are:

- (a) Trees having one central stem with small side branches such as the spruce. This type of tree usually is the most difficult to take down in sections unless there is another tree nearby in which to crotch the top and butt ropes so that the larger pieces of the central trunk can be swung clear of the workmen and lowered to the ground.
- (b) Trees having two or more central stems, such as the elm. This type of tree is less hazardous to cut down, although more time usually is required because the number of limbs to be removed is greater.

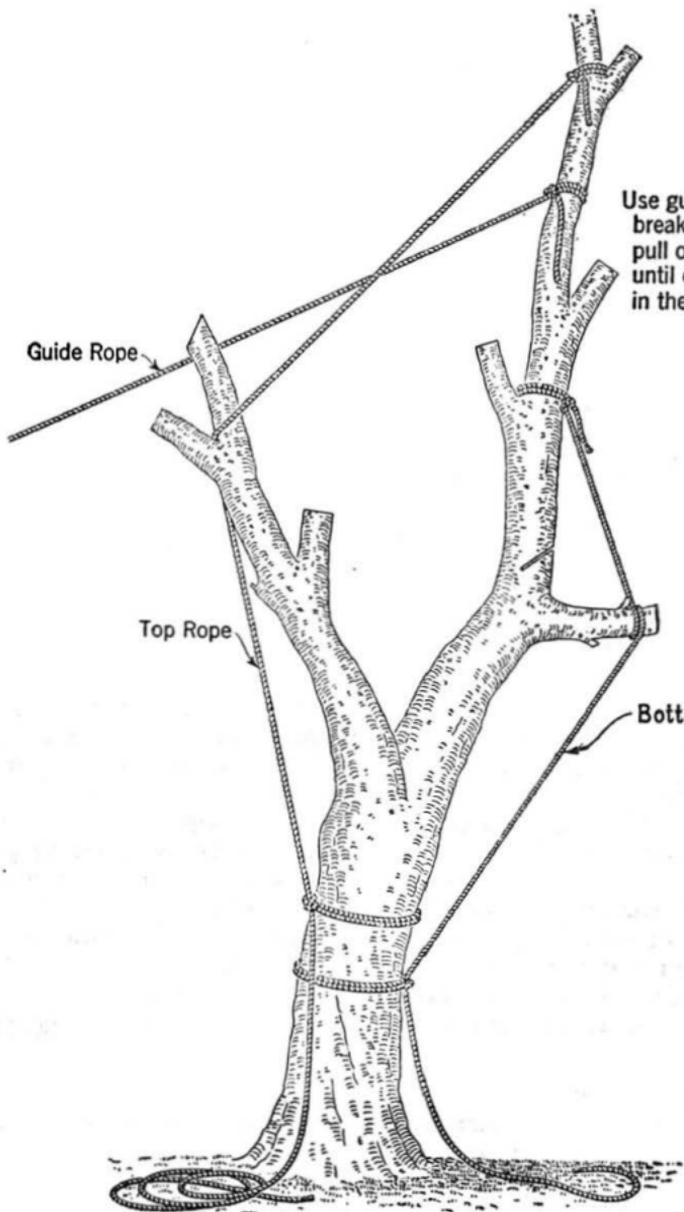
17.03 With both of these types of trees it usually is the best practice to start cutting the lower limbs first, leaving stubs two or more feet in length which will serve as aids in

climbing and as points for crotching ropes. When removing limbs from a tree that is to be taken down, no consideration need be given to protecting the limbs from splitting. Therefore the limbs should be sawed off with the easiest type of cut, and from the most convenient position. In general, the saw cut will be made from one way only (hinge cuts). By using this method, the top rope (see Part 5 covering the roping of limbs) can be slacked as sawing proceeds and the limb permitted to drop gradually so that there will be no final sharp break such as occurs when the cut is nearly complete before the ropes are slacked. Ropes should always be used when cutting large limbs.

17.04 In trees having two or more central stems, select two stems which have side branches and which are in a position to permit lowering limbs from them. In one of these stems, crotch the rope seat and in the other stem the holding ropes. The crotches used for the holding ropes should be located as nearly as possible over a point where the limbs can be lowered with the least effort. The size of these ropes depends on the size of the limbs which are to be removed, but in general, the rope should be $3/4$ inch or more in diameter, and sometimes it may even be necessary to use a piece of strand. Whenever pieces less than six feet long and six inches in diameter are being cut, a $5/8$ inch rope is considered to be of sufficient strength. The number of ropes to be used on each limb depends on the conditions encountered and the space available. Sometimes one rope is sufficient, tied near the butt so that the limb will be top heavy, but many times both a top and butt rope are required so that there will be no possibility of losing control of either end of the limb after it has been sawed off.

17.05 A third rope (called a guide rope) tied near the small end of the limb often is very useful for breaking off the limb after the workman in the tree has moved into the clear. This rope also permits a man on the ground to direct the fall of the cut-off limb.

17.06 After all the limbs have been removed except the two selected stems, these can be cut down alternately in small lengths and lowered in ropes crotched first on one stem and then on the other, as illustrated below. As a safety measure, the limb should be cut only sufficiently deep to permit breaking off with the guide rope. Do not pull on the guide rope until the employee in the tree has retired to a safe location.



Use guide rope for breaking limb. Do not pull on guide rope until employee is in the clear.

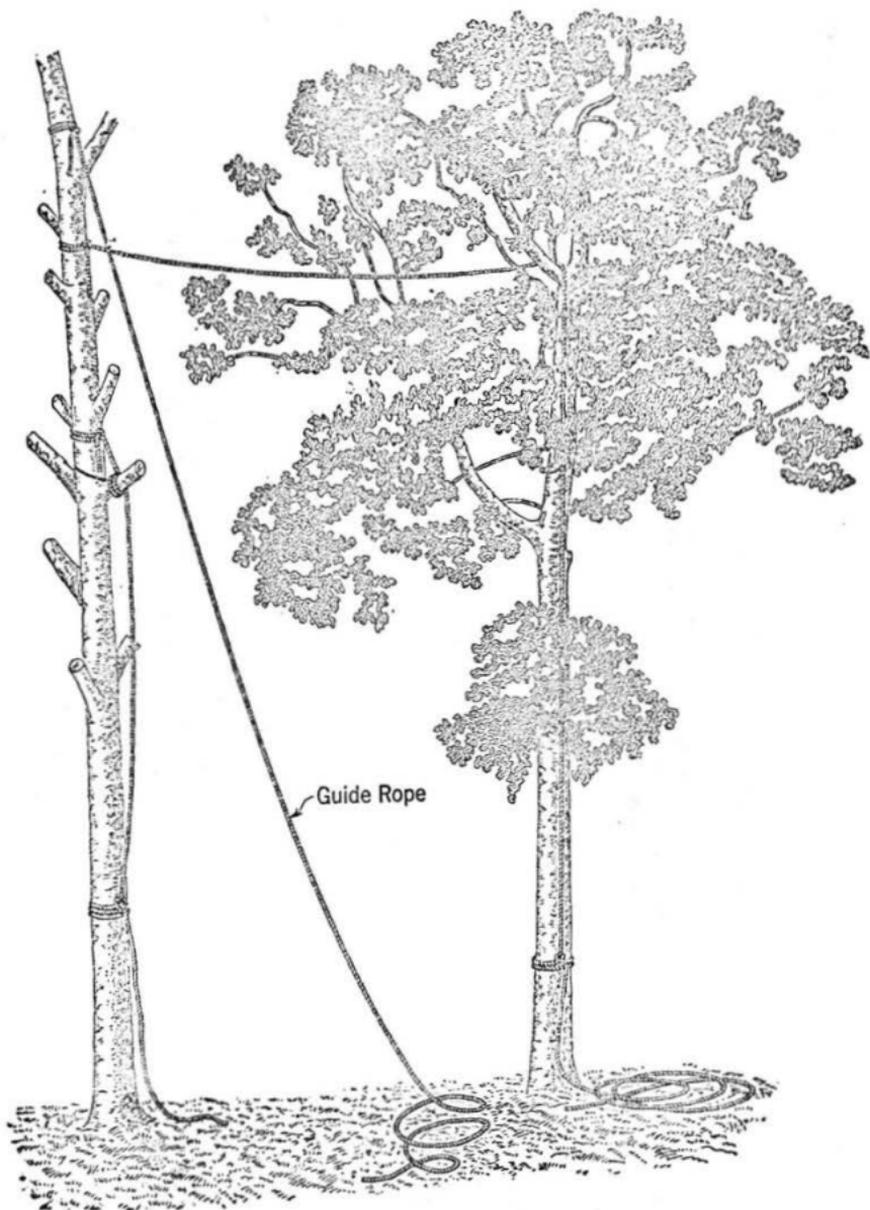
Guide Rope

Top Rope

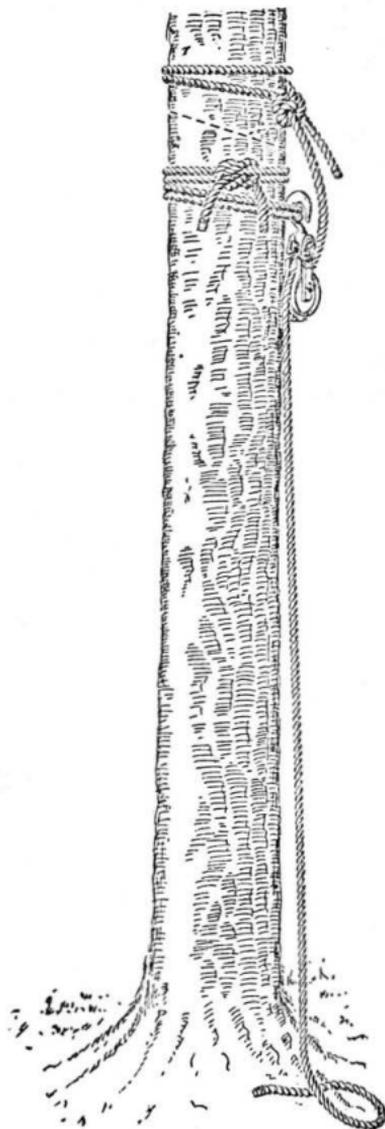
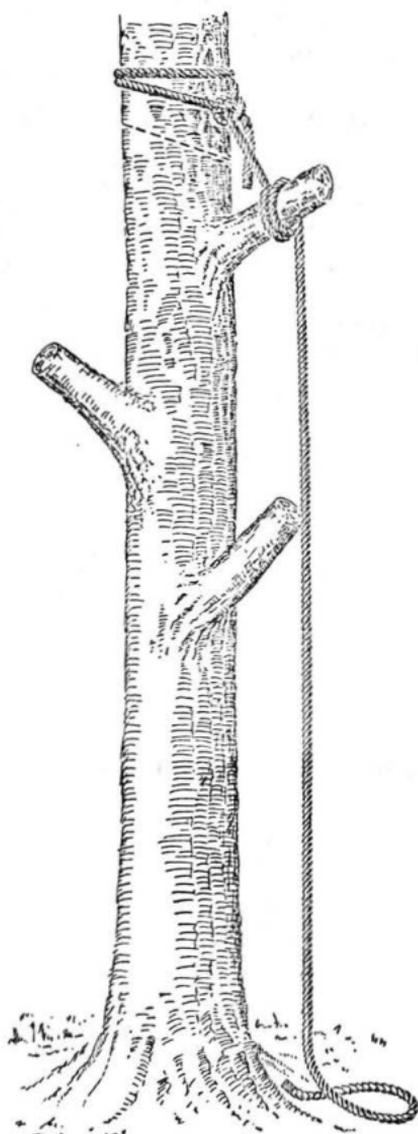
Bottom Rope

17.07 Sometimes the rope seat and guide ropes can be crotched in a nearby tree, making it possible to cut off the side branches and the stems without changing the position of either of the ropes used. This is especially desirable when the tree which is being cut is not very strong and there is a possibility that it might break off when subjected to an unusual strain. This practice should, wherever it is practicable, be used with trees having a single stem. If it is not practicable to place the long rope of the rope seat in an adjacent tree, it may be crotched in the top of the tree which is being taken down and left there until the main trunk is to be cut.

17.08 One of the holding ropes should be transferred from the tree which is being taken down to an adjacent tree, if possible, for the remaining cuts; otherwise it will be necessary to cut small pieces and the work also becomes more hazardous. If it is thought that the section, after being cut off, will swing against the other tree and damage it, another rope should be tied to its base and snubbed on a stub of the tree in which the work is being done so that the piece, after being cut off, will not swing suddenly against the other tree. A guide rope may also be used to advantage for lowering the limb. This same practice should be used to prevent limbs from swinging into or near the telephone line.



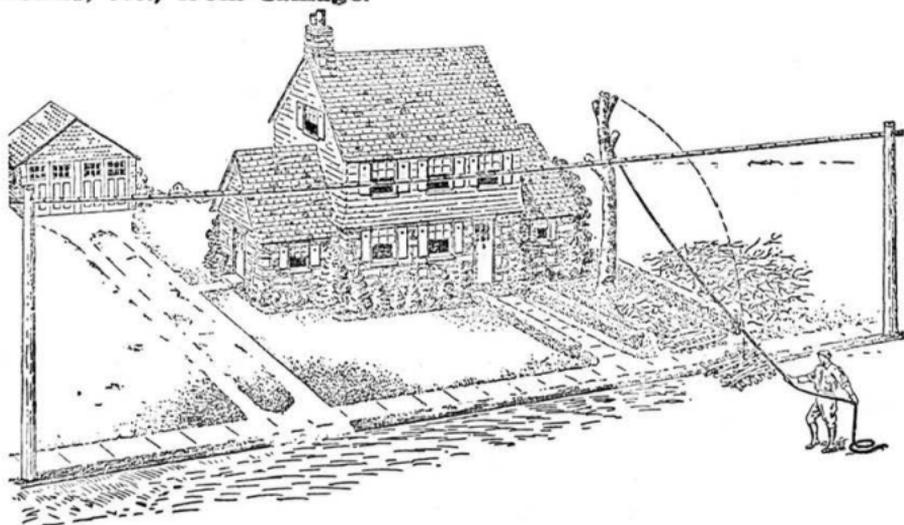
17.09 If there is no other tree available in which to crotch one of the lowering ropes, a strong rope should be tied securely to the lower end of the section which is to be removed, and snubbed around a stub of a limb located below the point of the proposed cut. A snatch block which has been lashed below the point of the proposed cut may also be used in place of a stub of a limb for crotching the ropes whenever such stubs are not present.



17.10 If the stub method is used, two or more turns of the holding rope should be snubbed around the stub to insure catching the limb, should it fall in the wrong direction. When a large section is to be lowered in this manner, the workman should descend to the ground, or otherwise move to the clear, while the section is broken off by a man on the ground using a guide rope which has been tied near the top of the section. Thus the tree is taken down piece by piece until the length of the trunk permits felling from the ground without damage to property or personal injury.

17.11 If it happens that there is no suitable tree in which to secure the rope seat, it may be crotched over one of the stubs which were left when the side limbs were removed. This must necessarily be below the point where the saw cut is to be made. The rope seat may also be secured around the main trunk of the tree the same as a safety sling.

17.12 After the top has been removed to permit felling the remaining section, the trunk may be sawed off at the ground line as outlined (see Part 16) for taking down the trunk as a whole. It may be necessary to fell it on limbs piled as shown or other material in order to protect sidewalks, lawns, etc., from damage.



17.13 If the stump is to be taken out at the time the tree is being taken down, a trench should be dug around the base of the tree and the exposed roots cut off. Then attach a pulling rope near the top of the tree and by means of block and tackle or power winch, pull the tree over. The trunk of the tree acting as a lever will pull the stump out of the ground. If

this is not practicable, the stump should be removed in accordance with the instruction contained in G10.322, "Use of Dynamite—Locating and Preparing Bore Holes."

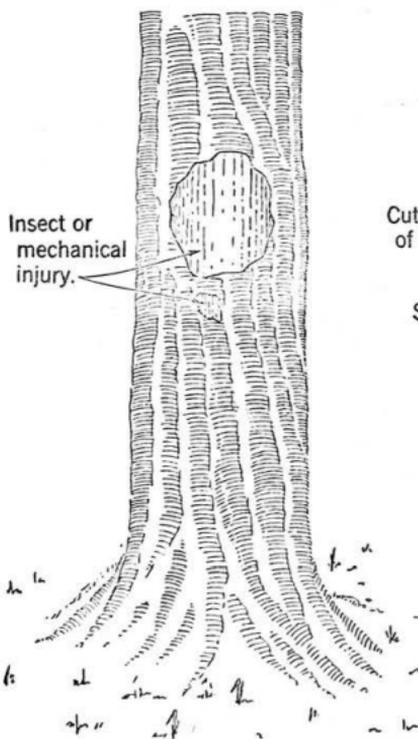
18. BARK TRACING AND OPEN CAVITIES

18.01 Telephone employees are not, in general, required to treat injured trees in connection with their tree pruning work and therefore should not undertake bark tracing or preparing open cavities, except with specific approval of the supervisor. Where this approval has been received, the work should be performed in accordance with the following methods, as they have been found to be satisfactory.

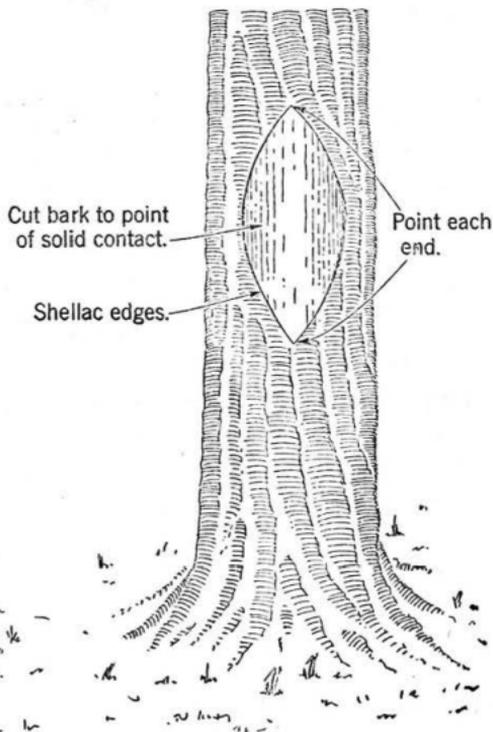
(A) Bark Tracing

- (1) Trees that have lost a portion of bark as a result of insect or mechanical injury should have the ragged outside edge of the wound and the dead outside tissue cut back to a point of solid contact between the bark and wood, producing an elongated shape, pointed at each end to insure more positive healing.

BARK INJURED



PROPER SHAPE TO BE CUT AT INJURED AREA



(2) After cutting the edges of the exposed bark, cover the cut with shellac to prevent checking and drying.

(3) Treat entire open surface with bichloride of mercury, 1 part to 1000 parts of water.

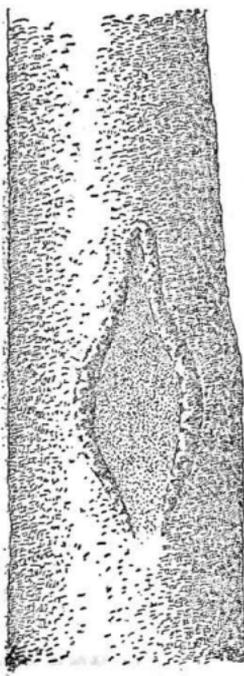
Note: Bichloride of mercury is poisonous and therefore it should be kept out of the reach of children.

(4) Cover the whole exposed surface with tree pruning compound.

(B) Open Cavities

The following method is for cavities of a superficial nature:

(1) Cut out all decayed wood in the cavity, cutting into the solid wood for at least 1/4 inch.



Open Cavity

(2) Dress cavity so as to obtain an elongated shape, pointed at each end. The points shall run parallel to the flow of the sap, i.e., vertically for trunks and upright branches. The edges of the bark should be shellacked as soon as possible after shaping.

(3) The bottom of the cavity shall be pitched from the inside out so as to provide a drain for rain that may enter the opening.

- (4) Treat entire surface of cavity with bichloride of mercury, 1 part to 1,000 parts of water.
- (5) Cover the entire surface of the cavity with tree pruning compound.

18.02 While the wound is healing there is a tendency for the bark at the bottom of the cavity to grow so as to prevent proper drainage. Where this condition is encountered, a slot should be cut at the bottom of the cavity to permit draining the opening.

19. MAINTAINING PROPERTY UNDER THE LINE

19.01 Wild cherry and other growth of a similar nature are commonly called "weed trees." They have little or no value in themselves and tend to serve as breeding places for insects that may later attack and destroy fruit and other desirable trees. Every effort should be made to remove such growth when young, not only to destroy as soon as possible these breeding places, but also to avoid future pruning problems. The owner is also likely to overestimate the value of these trees if they are allowed to grow to maturity.

19.02 When removing wild cherry trees it is advisable to move the branches out of reach of livestock, as there is a possibility that this foliage in a wilted condition may be poisonous to them.

19.03 It often is the desire of property owners to leave scattered brush along banks to prevent their washing down and sliding away. This brush, if left undisturbed, may take root and grow and will eventually need to be pruned. In view of this it may sometimes be advisable to replace the brush with a low growing shrub such as Spiraea or Japanese Barberry. Such shrubs will prevent erosion and will also be of decorative value.

19.04 Vines growing up a guy wire, pole or tree, if left undisturbed, will cause considerable interference. If cut at the base, they will eventually grow back in their original position, but if a vine is pulled down and laid on the ground it will tend to grow in the direction placed and not back up the pole or guy. Poison ivy should, if practicable, be removed from a pole or guy with a heavy wire, the end of which is formed with a hook. If this is impracticable, and it is necessary to use the hands to remove the ivy, gloves should be worn.

19.05 Employees who are practically immune to ivy or sumac poisoning should, if practicable, be selected to perform the work of maintaining property under the line or clear

right-of-way in areas where it is known that these poisons exist. Employees working in such areas should wear leggings or high top boots, long leather gloves and heavy work shirt as protection. In the absence of leggings or high top boots and gauntlet gloves, the trouser cuffs should be snugly tied around the tops of the shoes and the shirt sleeves connected in similar manner to the cuff of short gloves. Do not permit twigs of poison ivy or sumac to brush against the face or permit gloves or clothing that have been in contact with the plants to touch the face. All articles of clothing coming in contact with the plants should afterward be removed and washed thoroughly with laundry soap and hot water before being worn again.

19.06 Employees who have been exposed to ivy or sumac poison shall wash themselves thoroughly with laundry soap and hot water. The soap should be applied freely, so as to produce an abundant, heavy lather on the exposed surface, then rinsed completely and the operations repeated immediately four or five times (see page 92, First Aid and Health Textbook.)

20. DISPOSAL OF BRUSH AND STUMPS

20.01 Care should be taken to clear the tree of all brush and hangers. Brush that is left in the summer becomes very unsightly as soon as it has dried. Dead brush along a roadside is not only unsightly but frequently provides a breeding place for insects that are harmful to farm crops and foliage. Brush left may also take root and become interfering scrub trees.

20.02 The branches and brush that have been cut off should be disposed of or arrangements made for their disposal in accordance with any state laws which may be in effect. If the owner is to use or dispose of the brush all details as to his agreement should be clearly understood. The work should be done as soon as practicable and the finished job made to look as neat as possible. Delay in disposal of brush may result in the loss of good relations at other points in the vicinity.

20.03 If the property owner has a preference as to the method of disposal of the brush, it should be followed, except when such a method would create a possibility of injury to person or damage to property, obstruct roadways or waterways, or would cause the brush to be placed in such a location that it might accidentally be set afire.

20.04 It is frequently possible to secure permission to pile brush in locations where there will be little or no possibility of damage by fire, and where it will help to prevent

washouts by rain and running streams. In hauling brush it often is more convenient to use the larger branches as a sled with the smaller ones piled on top, than it is to load the brush on a wagon or truck.

20.05 When brush is burned, adequate precautions should be taken to prevent the fire from spreading to adjacent woodlands or other property.

20.06 Place the brush in small piles and burn as soon as possible after cutting. In burning green brush the fire should be started and the brush piled on as the fire progresses. Do not burn brush when there is considerable wind or when the surrounding vegetation is very dry. Do not burn brush under wires, cables or trees. Employee should not leave the fire until the ashes are entirely burned out or are covered with a sufficient amount of earth to prevent any possibility of developing damage. In burning brush containing ivy or sumac poison, care should be taken so that their fumes are not encountered.

20.07 To burn a stump while in place dig a hole about two feet deep on one side of the stump and remove the adhering earth from the tap root so that the fire will come in contact with the stump. A 1-1/2 inch or 2 inch hole should then be bored diagonally through the stump into the excavated hole from a point a few inches beneath the surface of the ground on the opposite side of the stump. A fire should then be started in the excavation, the auger hole serving as a flue. After a fire is well started the stump usually requires very little further attention except to prevent spread of the fire.