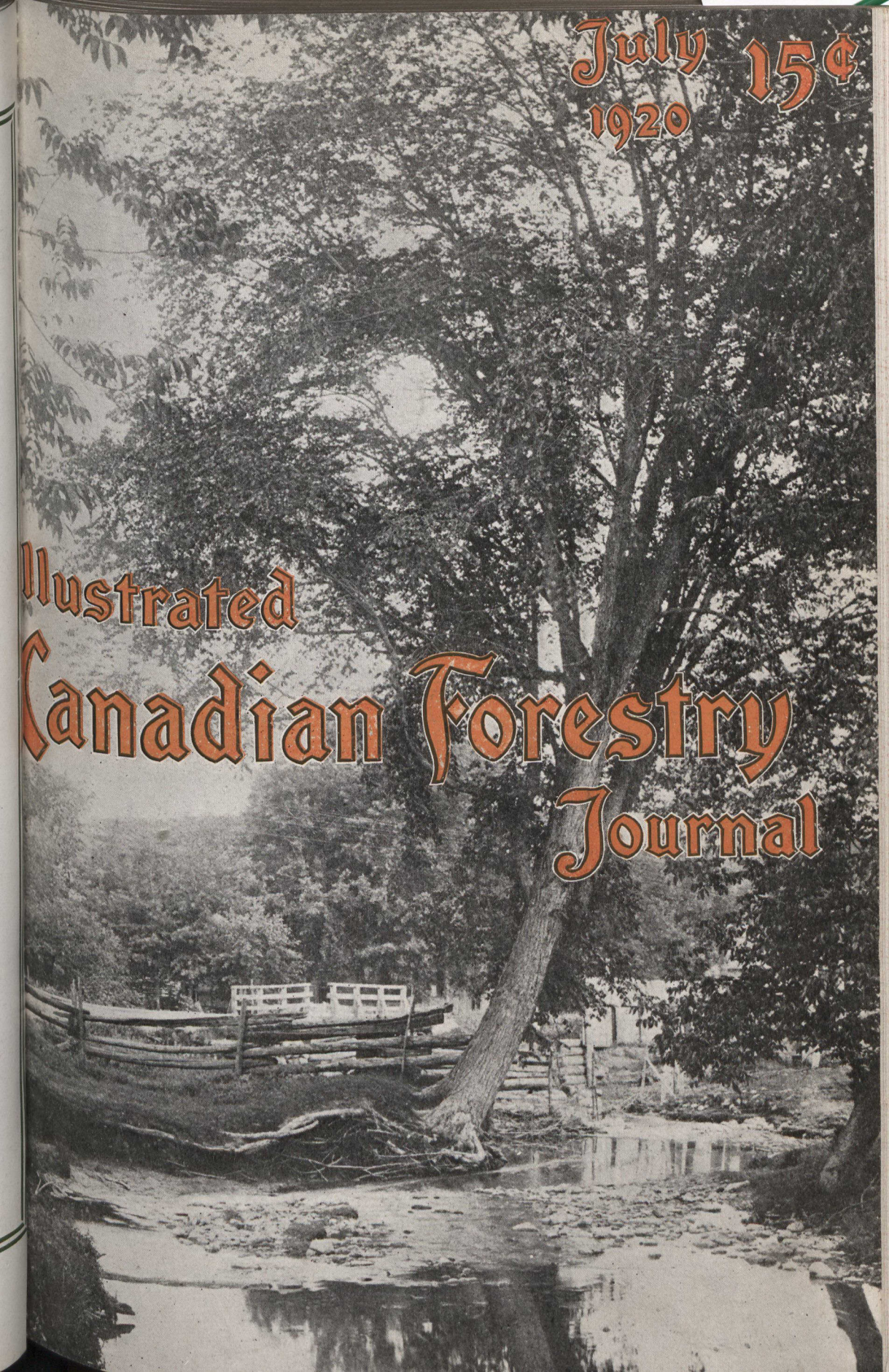


July 15¢
1920

Illustrated
Canadian Forestry
Journal



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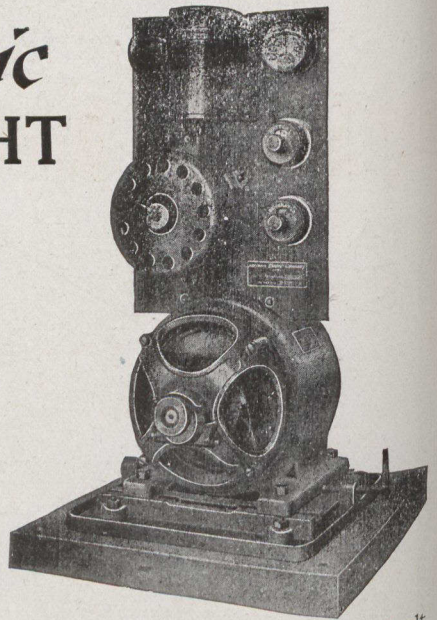
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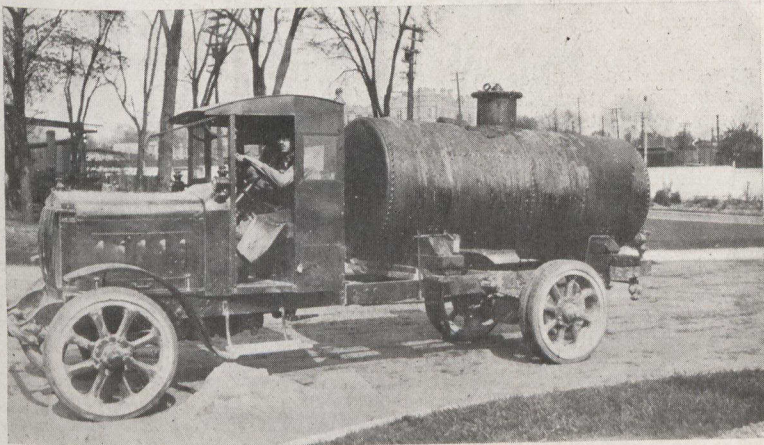
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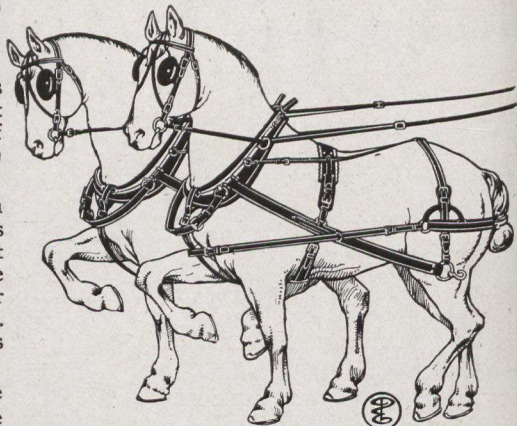
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Canadian Forestry Journal

VOL. XVI.

KINGSTON, CANADA, JULY, 1920.

No. 7

The Walnut Plantations at Point Platon

By Major Alain Joly de Lotbiniere



Remarkable Success Achieved on Famous Quebec Seignory--Importance of Wind Protection



The Black Walnut Plantations set out by my grandfather, Sir Henri Joly de Lotbiniere, 37 years ago, were in the nature of an experiment rather than a commercial enterprise. It was his purpose to prove that this valuable and beautiful species of exotic could, if the necessary time and care were taken, equal if not rival the growth of our own native species of the Province of Quebec. I believe that he succeeded, and in the following paragraphs hope to lead the reader to think so too, and to impress on his mind one vital requisite if he wishes to put his belief to proof. I will first explain, then, how these experiments were carried out, what the results have been, and what conclusions may be drawn from them.

How the Experiments Were Carried Out.

The Black Walnut (*Juglans nigra*), can hardly be called a native of our country, except for certain portions of Southern Ontario, its most prolific habitat ranging from New England to Minnesota and then South to Texas. It will be seen at a glance that the natural habitat comes under very different climatic conditions from the Province of Quebec, where the tree must be prepared to meet our rigorous climate of intense heat in the summer and the cold icy blasts of the winter months. Our Province would then seem to be the last place in the world

to support the Black Walnut in any semblance of normality. But Sir Henri thought otherwise, and set out to demonstrate his theory in the following manner: First of all he chose three different sites to carry out his experiments:—

1. A cultivated soil (protected on all sides from the wind).
2. An alluvial soil (protected from the wind on one side only).
3. A boulder clay soil.

In these three soils he planted the nuts of the Black Walnut one late spring day when the frost had disappeared from the ground. The week previous he had soaked them in tepid water to awaken the tiny germ which would be called upon in so short a time by mother earth to fulfil its destiny, and into holes which he had staked out, 4 feet apart, he buried them two inches deep.

When Autumn came each little plant, and there were many of them, was very carefully covered with straw to protect it from the snow and ice, and then tied to a stake to keep it from being crushed. And although my grandfather was engaged in his parliamentary duties, he carried out this somewhat tedious work himself with only one man to assist him. It was only after 4 or 5 winters that this practice was discontinued, as by that time, with the rapid head growth which characterizes this species, its delicate

crown had got beyond the destructive snow level.

The crisis appeared to have been passed, but nature, through its powerful agent, the north-east wind, still disputed the "young emigrants" their right to live in their adopted land. The wounds made by the wind-blown branches on the bole of the trees had not sufficient time to heal in our comparatively short growing season, and as a result each year saw nature's unsuccessful attempt to close up the wound, resulting in a series of concentric rings, each growing successively larger than its predecessor. From a scientific point of view this was interesting, but it did not betoken any good to the young saplings, which were making such a brave stand. Some preventative must be found, and my grandfather anxiously cast about to find a remedy. He saw that there was only one thing to be done, and that was to protect them from the ravages of the wind and to carefully prune the branches which had been broken. In hardly less time than it takes to say it, he had planted a willow hedge as a wind break and had carefully gone over all his trees with his pruning knife. Although this was not a sovereign remedy, it assisted the plantation materially.

What the Results Have Been.

On a late spring day, the same season when the first Black Walnuts were planted, 37 years ago, it has been my

pleasure to enter a grove of tall, clean limbed trees, fragrant with the breath of new green leaves. This is plantation No. 2, the one I mentioned as having been planted in an alluvial soil, and the one I have considered as the most successful, not so much from the size of the trees, for the plantation on the cultivated soil boasts of larger ones, but from the fact that it illustrates more clearly and definitely the salient points these experiments have to teach us.

If one looks at the profits of this plantation, photograph No. 1, one is struck with its resemblance to the side of a sloping roof, the apex consisting of the largest trees being under the lee of a hill, and the eaves, the smaller trees, growing in the open. Now, although these trees were planted in the same year, there is such a marked difference in growth that it will be interesting and instructive perhaps to compare their height and diameters.

It will be found that the average diameter of the trees in the lee of the hill is 7 inches, while those in the open have only a diameter of 4 inches. Taking the age of the plantation as 37 years, the diameter growth of the former would be equal to 1 inch in 5 years. In other words, the trees in the lee of the hill have grown almost twice as fast as those in the open. The height growth bearing very much the same proportion, as will be seen from the following table:



Walnut Plantation No. 2.



Walnut Plantation No. 1.



Walnut Plantation No. 2.

	Age.	D.B.H.	Height.	To grow an inch.	Site.
Black Walnut	37 years	4"	32'	9 years	In the open
Black Walnut	do.	7"	55'	5 years	Protected
Paper Birch	40 years	6.8"	54'	6 years	
Chestnut	do.	do.		do.	
Oak	do.	6"	57'	do.	

Conclusion.

The reader, if he has had the patience to read this far, will without a doubt be relieved to know that there are no more tables to be consulted, and although I am going to refer him once more to the one he has just read over, it is not with the intention of imposing on his good graces, and if any one is to blame, I think that that ancient Greek philosopher, Pythagoras, should be, as he made arithmetical figures the basis of his philosophy, and ever since we have been burdened with them.

I have referred to the very striking difference in growth between the trees which were planted in the open to those planted near the hill. The reason for this is quite simple, for those that were planted near the hill were sheltered from the wind, while the others were not, and it is just this

single condition that has made all the difference, for PROTECTION FROM THE WIND IS THE KEYNOTE TO SUCCESS in planting the Black Walnut in a cold climate, allowing for the fact that the trees are planted on a good soil and are given a fair start.

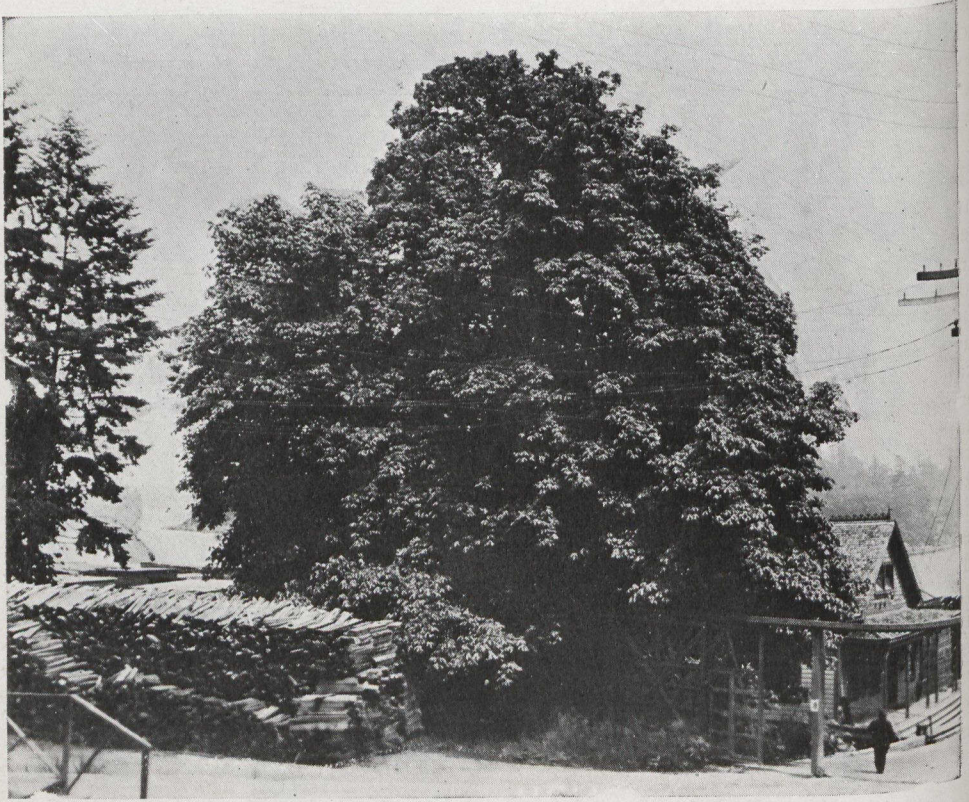
Finally, if you will again consult the table you will see that the Black Walnut can compare very favourably in growth with our native Canadian species, and when you consider its value from a commercial point of view, especially for use in the construction of aeroplane propellers, you will agree with me, I am sure, that he who plants this tree has the future of his country at heart, for although he may not, himself, always taste the fruit of his labour, those that follow him will without a doubt rejoice in the good fortune he has bequeathed to them.



Maligne Lake (Courtesy Dominion Parks Branch).

Our Canadian Maples

By B. R. Morton, B.Sc. F.



Large-leaved Maple, Vancouver Island—(Courtesy of Dominion Forestry Branch).

There are no trees in Canada more popular for shade purposes than our maples. If a census were taken of the trees in our towns and cities, they would lead numerically. Although we have a hundred or more trees from which to choose, probably eighty per cent. of our city trees are maples. The reason for the maples' popularity, however, is easily apparent. As a whole, they are healthy trees with luxuriant foliage, producing abundant shade. They are symmetrical, and their forms adopt themselves readily to the requirements of the street and town. They are fairly rapid in growth.

Distribution

We have ten native species of maples. No other tree with the exception of the oak is represented by more species. There are eleven native oaks, most of them confined to a very limited range in south-western Ontario. Of our ten native maples, only five are used to any extent for shade tree planting. Throughout Eastern Canada four of them, the hard or sugar, the white or silver, the red or soft and the Manitoba or box elder are most commonly planted. In addition to these two species imported from Europe—the Norway and the sycamore maple are

widely used. In the prairie provinces the choice is restricted to the Manitoba maple. No other species has been found sufficiently hardy for general planting there. British Columbia, particularly in the coast region, is more fortunate, for there, all our eastern maples, in addition to that splendid native one, the large-leaf maple, may be grown.

The Hard or Sugar Maple

For our eastern towns and cities the hard or sugar maple is one of our best trees. It is an ornament to any street, erect, compact and symmetrical in habit. When young it is oval shaped, but as it gets older the crown spreads out into a broad rounded dome. The branches divide into many twigs, which form a fine network against the sky, so that the beauty of the tree is not lost even in the winter when bare of foliage. The brilliant autumn foliage of the sugar maple, with its shades of yellow, orange and red, is unsurpassed by any other tree. Unfortunately in most of our streets this tree is not given sufficient room for the free development. They should be spaced at least forty feet apart, so that when mature the full beauty of their form and foliage may be seen.

The Red Maple.

The red maple is also a good street tree, and when once established, its growth is somewhat faster than that of the sugar maple, especially if the soil is rather moist. It is well adapted to narrow streets, but should not be planted too close together. Thirty-five to forty feet should be allowed between trees. The summer foliage of the red maple is of a lighter green than that of the sugar maple, and though it looks well at all times, it is when decked in its scarlet colours in the early autumn that it appears at its best. The red maple is one of the first trees to show its colour in the fall.

The White or Silver Maple.

The white or silver maple does not make so good a street tree as either the sugar or red maple. It has a beautiful form with wide spreading limbs, drooping at the ends, but one of its chief dis-

advantages is the brittleness of its branches, which are broken by every heavy storm and mar its appearance. It makes rapid growth, and for this reason has been largely planted.

The Manitoba Maple.

The Manitoba maple also makes very rapid growth. It has been planted throughout Eastern Canada by well-meaning citizens. It is, however, not the best tree to choose, where the sugar or red maples may be grown. Of all our street maples it has the most irregular form, and constant trimming is required to keep the tree in good shape. None of our maples are more hardy, however, and it is, therefore, an excellent tree for the prairie provinces and those parts of the country with severe winters.

The Large-leaved Maple

For the southern coast region of British Columbia there is no better shade tree than the native large-leaved maple. This tree has been well named for its leaves, from 7 to 14 inches wide, with stems 6 to 12 inches long, are the largest of all our maples. There is no finer sight than the massive dark green crown of this tree when it has been permitted to develop to its full size.

The Norway Maple.

The Norway maple is the best of the two imported species commonly planted in Eastern Canada. It is hardy and seems to withstand city conditions even better than our native species. It is an exceedingly attractive tree with its round form and rich green foliage. The leaves are somewhat darker and larger than those of our sugar maple, which they otherwise closely resemble.

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No. of Fires.	Cause.	Damage.
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7	Farmers	\$ 7,220.00
2	Smokers	\$ 1,001.00
17	Railway	\$ 1,529.00
37	Unknown	\$11,689.00
13	Fishermen	\$38,956.50
3	Portable Mills	\$ 1,550.00
1	Inccendiary	\$ 500.00
Total.		\$63,439.50



CHARLES LATHROP PACK,
President American Forestry Association.

Forestry and Friends

By Charles Lathrop Pack, President, American Forestry Association.

Through a curious turn of events the two great English-speaking countries of North America are to be brought still closer in friendly relations. The World War, of course, was a great forward step to be taken in that friendliness. We are now about to see, I am told, a minister from the land of the Maple Leaf appointed to represent his government at Washington. This is a step in the right direction. Of late there have been misunderstandings, fostered by these with mistaken motives, but these will soon be swept away. These misunderstandings have come about over the pulp wood and newsprint situation, as it involves the two great countries. I believe it can be honestly stated that out of this misunderstanding there will come, yes, even now has come, the right view point. It all points to the need of a national forest policy on both sides of that imaginary line we call the boundary. I think I am safe in predicting that through national legislation on forestry, the friendship of the two countries will be cemented more closely than ever. If this comes about, and I am sure that it will, it will certainly be a great tribute to those of us both in Canada and the United States who have labored so long and patiently for this reward.

In the United States the newsprint paper problem has resulted in placing the broad problem of forestry before the people. Will it not have the same effect in Canada? Will the outcome not be an awakening to the value of the forests, the backbone of all industry, and will not this result in what we have worked for these many years, a national forest policy with better fire protection as the first step? What a great monument such a result would be to the work that has been done. I see a still greater reward for the forester; the bringing together of the two countries because of their mutual interest in the perpetuation of the forests.

To the forester comes a great opportunity out of the present situation. The publishers are hard pressed; the home builders are hard pressed, and when we find this situation in these two great industries inquiries must naturally result. What have we been doing with our greatest natural resource? At this point the forester comes into his own. His knowledge takes on added value. Every wood using industry cries for action. The action will come slowly, a great lesson is to be learned, and the forester will become the teacher in the great school in which forest perpetuation will be the watchword.

The millions of acres of undeveloped country in the great land to the north of us cannot help but react to the advantage of the United States in that development. We cannot live to ourselves any more than can you, our neighbors, live to yourselves. In the working out of that development comes the still greater friendliness that will result in a united people greeting each other across a dividing line that is found only in geographies. I feel that a broad understanding of our common forestry problems will bring that about.

ORGANIZERS WANTED!

The Canadian Forestry Association will employ, at good remuneration, Organizers in the following cities: Vancouver, Victoria, Calgary, Edmonton, Saskatoon, Regina, Winnipeg, Toronto, Ottawa, Fredericton, St. John and Halifax.

A sterling opportunity for profitable and dignified employment. Applicants must have had successful records in some form of salesmanship.

Jackson Bldg., Ottawa.

The Training of a Forester

By Dr. C. D. Howe,

Acting Dean, Faculty of Forestry, University of Toronto

An Interesting Description of an Undergraduate Forester's Training in Canadian Forest Schools

The education of a forestry student centres upon and revolves about a living tree, since the chief object of the forestry profession is the production of trees for utilization by the various wood-using industries. So long as nature unaided produces trees in quality fit for the manufacturing arts, in quantity as great as that used by lumbermen and destroyed by disease, fire and wind; there is no economic necessity for creating trained brain power to be applied to the production of trees in order to supply the manufacturing industries. Such need develops slowly, and is dependent upon many economic and industrial factors. The realization of the need comes even more slowly, for public opinion is lethargic, often insensible to the solution of problems whose effects lie beyond the present, and the making of trees for pulp-wood spans one generation, and the production of good saw logs spans two generations of men. Of necessity foresters have been more propagandists than foresters in the strict interpretation of the word. After thirty years of unremitting toil the tide is beginning to turn in their favor. The oft-repeated statements that over one-half the commercially forested area of Canada, about 1,000,000 square miles, has been burned, and that forest destruction by fire still continues practically unabated, except in wet seasons, in some of the most valuable forest regions in the country, are bearing fruit, and the significance of such facts in relation to the future prosperity of Canada is beginning to penetrate the public consciousness. In order to maintain at reasonable cost continuous supplies of wood for the industries, forestry should begin with forests which nature has made and not with deserts that man has made. It is both

illogical and expensive to destroy and build anew after many years what might have been kept continuously productive under intelligent direction. It must be admitted, however, that recent events such as the soaring prices of lumber and newsprint, the disclosures of callous indifference to the just dues of the people on the part of those charged with the administration of the forests in certain portions of the country, the possibility of strained international relations over pulpwood exports, the scramble for supplies in far remote regions of the country on the part of certain great wood-using industries have focussed the attention of the public upon the necessity of conserving our forest resources. In fact, some of the conditions foretold by propagandists are already upon us, conditions which we are in a measure unprepared to meet because we have not developed a sufficient number of men properly trained to solve some of the most urgent problems, and a good portion of these very problems are concerned with the habits and peculiarities of our most valuable trees.

The Tree as a Starting Point.

With this introduction, I will come back to my first statement. For the actual practice of forestry, the tree or rather an aggregation of trees, the stand, is the nucleus about which all knowledge revolves. In the first place the forestry student is introduced to trees as individuals. He studies their characteristics as revealed by their flowers, fruits, leaves and bark, and he learns how to recognize them and call them by name when he meets them in the forest. A tree is a plant, and in many ways the most successful plant nature has ever produced. Thus in order that the student may gain a proper perspective he is given a course in



Yellowhead Pass, Jasper Park (Courtesy Dominion Parks Branch).

Botany, where he learns about the long series of experiments and trials by which nature finally perfected our modern tree. All through his work in forestry he will come in contact with other plants which influence to a greater or less degree the lives of trees, and he gets acquainted with them in his course in Botany. In a similar manner there are animals, particularly insects, that affect trees often disastrously. These are not studied in the first year, but the foundations for such study are laid by the course in Zoology. In most forestry schools a kind of introductory course to forestry is given to the first-year students, in which the forest conditions of the country and methods of lumbering are described, the principles of forestry are laid down, and the work of the various forestry organizations is presented.

Mathematics and Forestry.

Unless a practising forester is thoroughly grounded in mathematics he is handicapped throughout his professional life, since the principles of estimating and measuring timber, topographic and land surveying, making

roads and trails, etc., are based on mathematics, and so this subject is stressed in all forestry schools. Chemistry and Physics are fundamental subjects, and they are studied during the first year. The forestry student usually takes French or German in the first year, and at Toronto the language he selects he must continue for three years.

By this time the student, if successful, has completed his first year. His summer holidays are taken in the bush, where he carries chain or calipers trees in a timber cruising party, or assists in land classification and reconnaissance surveys, or works in a sawmill, in a paper mill, or on a log drive or acts as a camp cook; in fact, he takes any job that will give him practical experience. He may fight flies or other pests continuously; he may sleep on the ground in wet blankets during two weeks of continuous rain; he may spend his time on his knees in a forest nursery; he may repeat the same operation over and over again until the monotony of the thing nearly drives him frantic, but it stiffens the backbone and it is all good for the soil; it weeds out the non-courageous and the

non-persistent. Those who come back to us after the first summer we no longer call boys, but men.

In the Second Year.

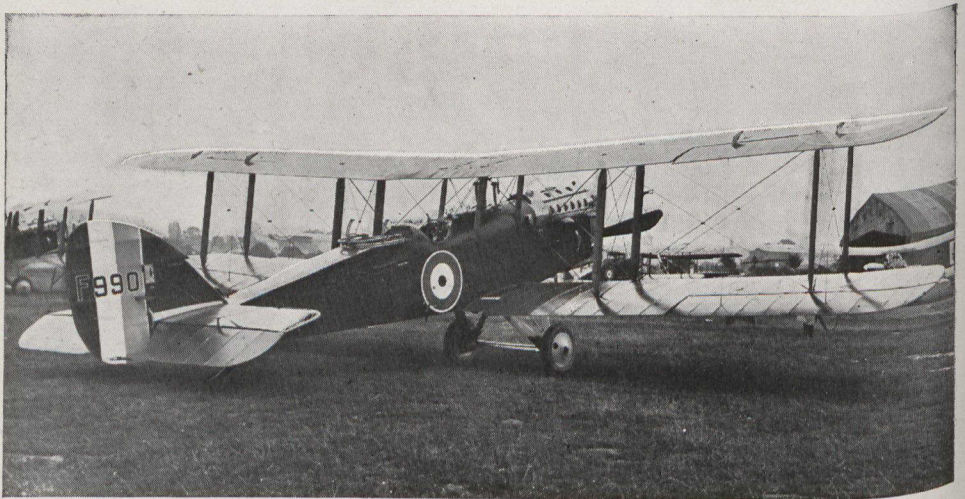
During the second year the forestry student gets a still more intimate knowledge of trees both as individuals and in their economic aspects. He learns how trees come into existence, how they live and work and, not least, how they get along with their neighbors. He studies the methods of determining the contents of single trees and stands of trees in terms of cords or board feet. He learns how the rules for determining the board feet in a log were made, and is shown why some of those in use are so unjust to the seller. He is taught how to make volume tables according to the diameter of the trees or to the diameter height or according to the diameter and the number of logs in the tree. He is thoroughly grounded in the methods of cruising and estimating timber and the application of the various methods to the different parts of the country. The student counts the rings on stumps or at the ends of logs and determines the present volume of the trees, and the contents ten, twenty or thirty years ago, and he predicts what the contents will be ten, twenty or thirty years

hence. Grouping the trees together according to diameter and rate of growth, he can predict future yields on a given acre or on a larger tract.

The course in Surveying begins in the second and continues through the third year. The forestry student is made familiar with the general principles of surveying and the instruments used, such as the compass, chain, plane-table and transit, with practice in their use. The student in his second year also learns how the earth has been made as well as the making of the trees that grow upon it. The origin of the various Canadian rock formations is described and their distribution is determined. At the same time he is taught to distinguish at sight the common minerals and rocks. The course in Chemistry is continued from the first year, and the course in tree description and identification extends down through the shrubs and other woody plants that are found growing beneath the forest.

The second year students in their summer work usually get positions of increased responsibility—and they get more pay.

We have now gotten the student half way through his course, and we will leave him there until next month's issue.



De Havilland Aeroplane—(Courtesy Air Board).

Price Bros., Limited, Aerial System

An Interesting Description of a Canadian Pulp and Lumber Company's Aerial Operations

One of the striking features of the Great War was the remarkable work accomplished by the aeroplane and the great benefits that might be derived from its use by the business interests throughout the world, and among those who were attracted by its possibilities were a number of Canadian lumber firms. To the war also can be attributed the tremendous advance in recent years in the development of aircraft, both in respect to the mechanism and its control on the part of the pilots.

Among the firms that were quick to realize the great advantages likely to result from putting into force an aerial service was that of Price Brothers, Limited, of this city, whose limits cover an area of over 8,000 square miles, scattered throughout the Eastern part of the Province of Quebec, and the following summary of the work that will be done, the equipment used and the personnel employed by the Company, which is but a prelude to more extensive aerial operations, will, no doubt, be read with interest, not only by those engaged in the lumber business, but also by those who have the welfare and progress of their country and province at heart.

Photography and Mapping

The operations will consist of photographing with special aerial cameras a part of the limits of Price Brothers & Co. The photographs once developed will either be enlarged or reduced to a predetermined scale, built into mosaic maps and then re-photographed into finished aerial maps ready for comparison with known surveyed ground. Special photographs of dams, river heads, burnt areas, etc., will be made from photographs taken at a height of 1,000 feet. The cameras that will be employed are two Thornton Pickard as were used on the Western Front during the late war, also one Model

K-1 Aero Film camera that contains a roll of 100 films; this latter camera is used solely for map making and survey work; a plane flying at 10,000 feet can photograph with a single roll of 100 films over 75 square miles of territory, allowing for overlaps.

To facilitate this work the maps of the Province of Quebec have been squared according to the military system used during the war. The squaring and lettering system has been approved by the Forestry Branch of the Provincial Government of Quebec, and several large lumber firms.

Type of Machines

In the carrying out of this work special attention had to be paid to the class of machines provided, and those to be employed are two Martinsyde type "A" Mark I Seaplanes, convertible into land planes, both of which are equipped with a Falcon III Rolls Royce 12-cylinder engine of 275 H.P. Their climbing power with full load of 1,000 lbs. is 10,000 feet in 15". They have a maximum speed of 127 m.p.h. Either 1,000 lbs. of cargo and a pilot, with fuel for seven hours, can be carried; or 2, 3 or 4 passengers, with 200 lbs. of cargo and pilot. When it is decided to carry out more extensive flying operations more of this type of machine will be employed.

All equipment used in this department was purchased in England, and is the very best of its kind for the work.

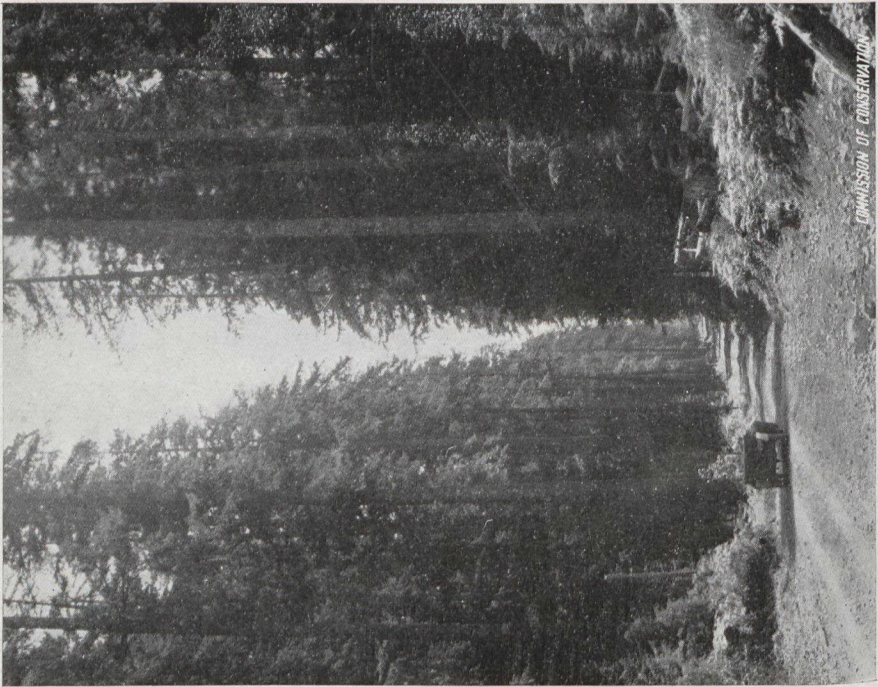
Staff

Realizing that the nature of the work required, the utmost skill on the part of those engaged upon it, the firm of Price Brothers, Limited, set about obtaining men whose attainments in the art of flying left no doubt as to their qualifications in this respect, and all pilots employed are late Offi-



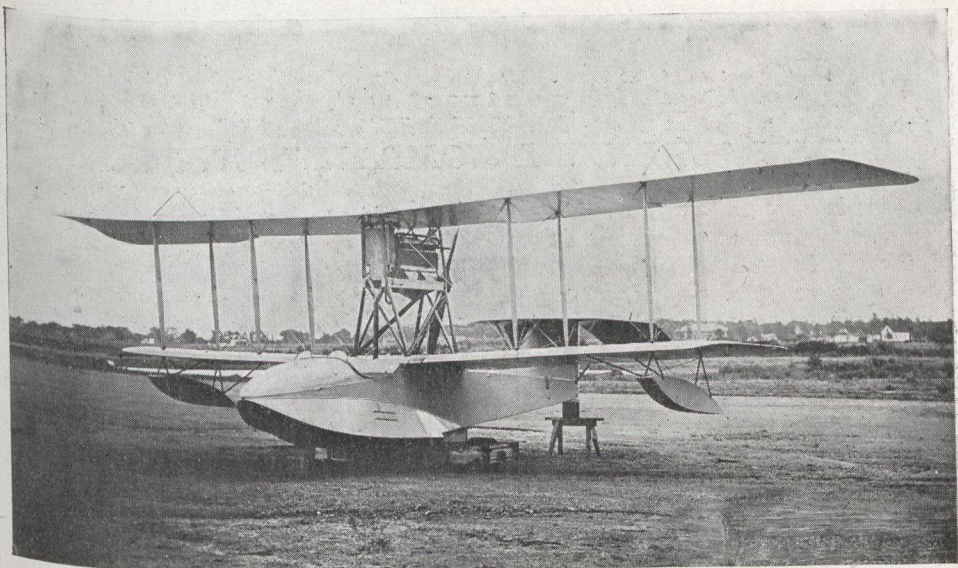
COMMISSION OF CONSERVATION

Red Cedar, Hemlock and Douglas Fir near Chilliwack.



COMMISSION OF CONSERVATION

Large-Leaved Maple, Vancouver Island (Forestry Branch), Dominion.



Model 40 Flying Boat—(Courtesy Air Board).

cers and Instructors in the Royal Air Force, who have had an extensive experience in flying with different kinds of engines.

Due regard was also paid to the ability of the mechanics employed, and these also are late of the Royal Air Force, experienced in all makes of planes and engines both before and during the war, and in every respect are fully competent to perform the work required of them.

The photographers are men who during the war gained their valuable experience at the front, and it is interesting to note that, in this connection, one of these men built the largest mosaic map of the Western Front during the war. This work is perhaps the most important to be done in connection with Price Brothers & Company's aerial operations, and with the photographers rests a great deal of the responsibility for the ultimate success of the undertaking.

Aerial Transportation.

Owing to the extensive limits of Price Brothers & Co., and the difficulties therein, it is a very difficult matter for bush managers and superintendents to keep in close touch with outlying operations. In the past it meant a trip of several days, with much waste of time, due to bad roads, floods, etc. Today this difficulty is solved by the aeroplane. The manager can now start in the morning, visit any part of his district comfortably, without waste of time en route, and be back by evening—a great saving of time and energy to the manager, and in case of something serious happening, a quick and efficient way of getting to the scene of operations.

Again, in the case of a cruising party who are setting out on an exploring trip through some distant limits, they can be transported quickly to the nearest possible point with provisions, etc., thus saving considerable cost and supplies.

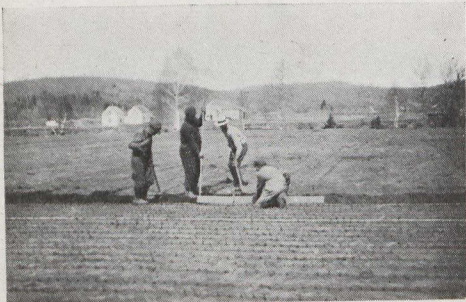
**SCENES AT
THE LAURENTIDE COMPANY'S NURSERY**



Trench for Transplants.



Transplanting.



Transplanting with Transplant Board.



Lifting Transplants with Fork.



Loading Transplants.



Lifting 2-year-old Seedlings.

Reforestation and Pulp Companies

By

ROBERT W. LYONS, B.Sc.F.,

Forester in Charge of Reforestation,
Laurentide Company, Ltd.



More than seven years ago, in 1912, the Laurentide Company, Limited, established a small nursery at Grand Mere. At this time, little was known concerning the operations connected with the growing of tree seedlings, and, consequently, the first three or four years were spent in experiments and in learning the fundamentals applicable to Northern Quebec. At the end of three years, however, the knowledge gained prompted the Company to take a great and effective interest in reforestation.

Therefore, in 1916 the purchase of waste land for the propagation of a new forest was begun. It was decided to establish a permanent nursery at Proulx, 6 miles north of Grand Mere, conveniently located to labor conditions and nearness to the land to be planted. From this beginning has developed a nursery of 27 acres with a production in 1920 of 80,000 four-year-old transplants, and there is under construction the acreage to increase this output to an annual production of 4,000,000 four-year-old transplants.

The land had to be stumped, cultivated and thoroughly cleaned of all debris such as sods, roots, sticks and stones. Although the soil is light and sandy, grading was necessary to insure proper drainage and in laying out and forming the roads and paths, open drains were formed which successfully carry off the surplus water. The nursery was broken into three sections, therefore, as the stock is two and two, this permits a rotation crop every two years. In other words, two-thirds of the nursery is in trees, while a soiling crop (buckwheat or field peas) is grown on the other third.

Water, which is an essential factor, is obtained from a small lake lying below the nursery. Here a pump is installed, and by means of a gasoline engine, the water is pumped into an iron tank, 10' x 6', placed upon a tower 25' high. From this tank water is conveyed to all parts of the area through 2" iron pipes laid along the ground and for sprinkling $\frac{3}{4}$ " rubber hose is used.

Seed Beds.

Seed beds are placed in the best drained section of the nursery, are raised three inches above the path, and the surfaces rounded off slightly, so that the centre is about one inch higher than the outer edges. They are made 100' long, 4½' wide, 3" on each side allowed for washing away. After being shaped, the soil is thoroughly moistened to a depth of 4". They are then firmed and smoothed and the seed is sown in drills 4" apart, ½" deep. The seed is covered, rolled and then covered with burlap and kept damp by sprinkling with water until germination takes place.

Care of Seed Beds.

When the seed starts to break ground, the burlap is removed and lath shade screens are supported on frames about 18" above the bed. These screens are so constructed to produce half shade, and remain on the beds until the season's growth is over. In the late Fall the beds are covered with straw, burlap or moss. This serves as a protection against heaving by frost. In the Spring the coverings are removed, leaving the seedlings the same as when covered.

During the second summer the seed beds require very little attention, except for weeding, and they are not covered the following winter.

Transplanting.

At the end of the second year, the seedlings are lifted carefully and are transplanted in nursery rows 10" apart and 3½" apart in the row, to secure strong, well rooted trees for the permanent site. The work begins as soon as the frost is out of the ground, and is completed before new leaders form. In Quebec the season is the month of May. The transplanting is done with a 7' Yale transplant board. The accompanying photographs show this board, the trench made to receive the small seedlings and the system of filling in this trench, thus leaving 24 small trees planted at a time. A gang of twenty-two men, girls and boys transplant 60,000 seedlings per day.

Care of Transplants.

This is confined to cultivation, and for this purpose a small Garden Tractor will be used with special attachments for cultivating 8 rows at a time. The transplants remain in the transplant beds for two years, are then lifted by means of a fork and packed with moss in boxes and transported to the permanent site by motor truck.

Field Planting.

This is planting to the permanent site. The season is short and the planting force is large, consisting of four or five crews, each under a foreman. Each crew is composed of ten gangs; a gang comprises a man to run the planting machine and a boy to load the same and carry plants. A photograph shows the Jenssen planter in operation. In rough places, a shovel is used. The trees are placed at regular intervals, 5" x 5", in rows. To carry this out the first gang is given a straight line, and the second pair start another row 5", opposite the first plant set by the first gang. A man and a boy plant 1,000 to 1,200 trees a day, and with our present spacing 1,740 trees are planted to the acre.

In 1919 and 1920 were planted 1,800,000 trees, and the Company has now over 2,000 acres in plantations.

To meet the demand of the nursery policy outlined above the Company has acquired thirteen square miles of the surrounding land and purchases two or three square miles annually. This land is classified under swamp, brush, cleared and good coniferous reproduction. As soon as the land is obtained work is commenced to put it in shape for planting either by clearing out brush or draining the swamps. Therefore, this work in connection with roadwork allows us to keep our best labor all the year.

Experimental work is being carried out in cuttings, thinnings, draining and planting swamp land. In the plantations the Commission of Conservation, Ottawa, has fifty sample plots.

FORESTRY GRADUATES

Three students were graduated from the Faculty of Forestry of the University of Toronto at the recent Convocation, which took place on 4th June, namely: Messrs. F. H. Horton, H. A. Parker and W. G. Wright. Mr. Horton is employed by a pulp and paper company, Messrs. Parker & Wright, by the Dominion Forestry Branch. Thirty-eight undergraduates have found employment for the summer months. Twenty of these are working for pulp and paper or lumber companies, 10 for the Dominion Forestry Branch, 4 for the Commission of Conservation, 2 for the Ontario Forest Branch, 1 for the Entomological Branch, at Ottawa, and 1 is employed by the Canadian National Railway. Of the 5 other undergraduates 3 were unable to work on account of illness and 2 are engaged in private business affairs. There has been a greater demand for students for summer work than could be filled.



Ycho Falls (Courtesy Dominion Parks Branch).

Dr. Fernow Receives New Honors

An address by President Falconer of the University of Toronto, in introducing Prof. B. E. Fernow for the degree of LL.D. at Convocation on June 3rd, 1920:

"Those who have known this University for the past thirteen years have recognized Dr. Fernow as one of its distinguished figures. Both in the United States and in Canada he was the pathfinder, and still remains the outstanding authority as to the theory and the practice of the forester's profession. His knowledge of the subject is unrivalled, his labour in spreading its

principles by pen and speech has been unceasing, and his success as an organizer unqualified. A well educated gentleman of refined tastes and perfect self-control, Dr. Fernow has won the admiration of his students and his colleagues, and he has our deep sympathy in the impairment of his health, which has been partly caused by his unremitting activity over a long life in extending a profession to which he has most unselfishly devoted himself. This degree will be but a slight expression of the gratitude of the University for his services as first Dean of the Faculty of Forestry."

IMPERIAL FOREST CONFERENCE

The following Canadians prominently connected with Forestry work in this country are at present in the British Isles attending the Imperial Forest Conference representing their respective organizations: Clyde Leavitt, Chief Forester, Commission of Conservation; E. H. Finlayson, Forester, Dominion Forestry Branch; W. B. Stokes, in

charge of Exhibits of Timber and Forest Products, London, of the Forest Products' Laboratory, Montreal; Avila Bedard, Assistant Forester, Province of Quebec; Ellwood Wilson, Chief Forester, The Laurentide Company, Grand Mere, Que.; Wm. Kilby, Fire Inspector, Canadian National Railways; and Robson Black, Secretary, Canadian Forestry Association.

BIRDS PROTECT FORESTS

In a recent test case the State of Missouri challenged the constitutional right of the United States to enforce the Migratory Bird Treaty Act. Hon. Mr. Justice Holmes, who delivered the opinion of the U.S. Supreme Court, took a wide vision of modern conditions and requirements. Reciting the objects of the treaty, Justice Holmes said that numerous species of birds, in their annual migrations, traversed many parts of the United States and Canada, that they were of great value as a source of food and in destroying insects injurious to vegetation, but that they were in danger of extermination through lack of adequate protection. After dealing with the authority vested in Congress to enact the legislation,

he said: "The case before us must be considered in the light of our whole experience, and not merely in that of what was said a hundred years ago; we must consider what this country has become . . . Here a national interest of very nearly the first magnitude is involved. It can be protected only by national action in concert with that of another power. The subject matter is only transitorily within the State, and has no permanent habitat herein. But for the treaty and the statue there soon might be no birds for any powers to deal with. We see nothing in the Constitution that compels the Government to sit by while a food supply is cut off and the protectors of our forests and crops are destroyed."—From "Conservation."



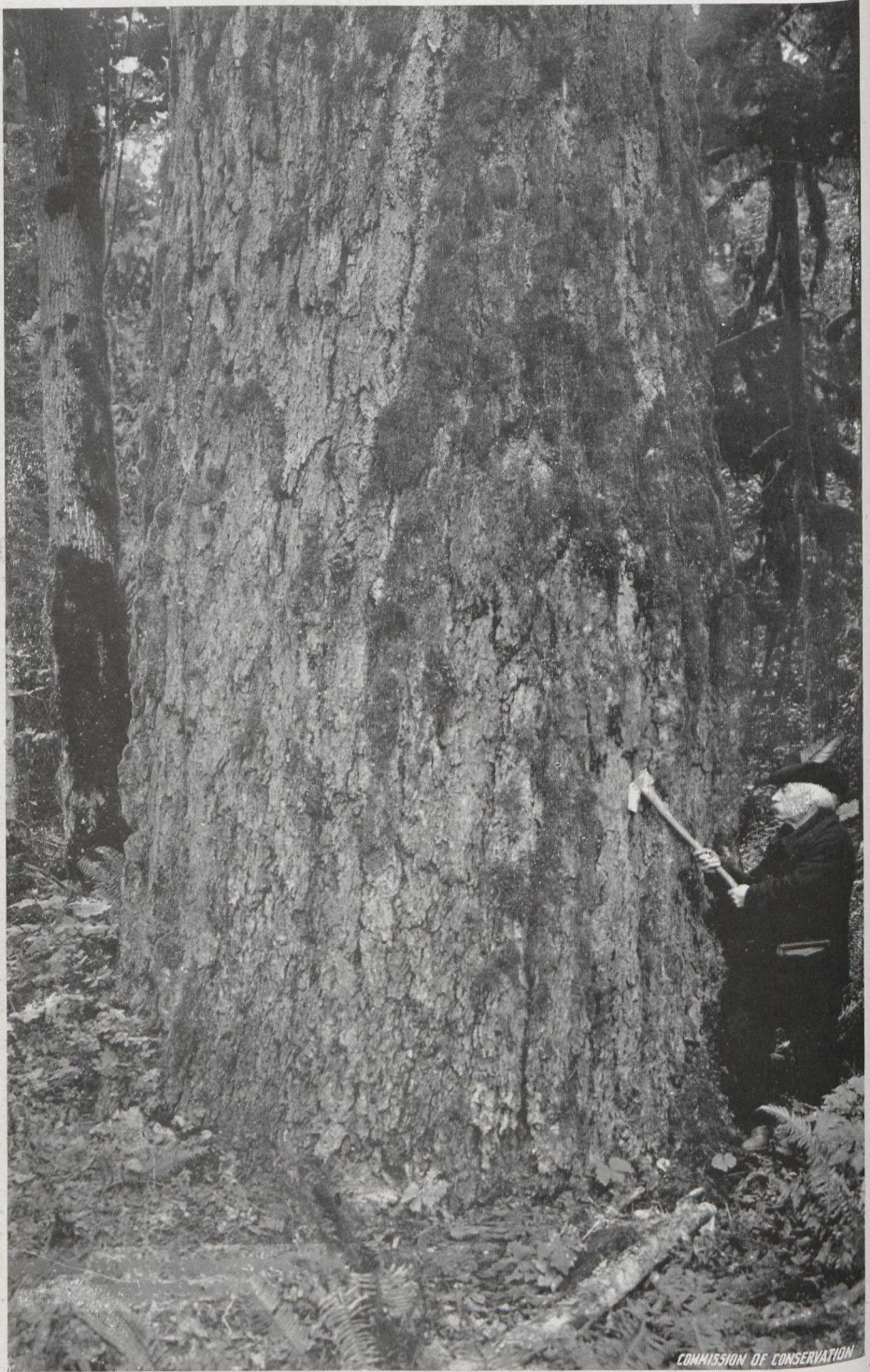
COMMISSION OF CONSERVATION

Western Yellow Pine, Nicola Valley.



COMMISSION OF CONSERVATION

Western Hemlock, Lillooet Lake.



Douglas Fir near Chilliwack.

Reclamation of Pennsylvania's Desert

By Gifford Pinchot

Chief Forester, Commonwealth of Pennsylvania.

Pennsylvania was once covered with large, dense, and extremely productive forests. The large have become small, the dense have become open, and the productive have become waste. To-day there are five million acres of idle mountain land in Pennsylvania too rough and rocky for the plow. This is the Pennsylvania desert.

Many agents helped create these vast reaches of idle land, but man played the leading role. It took him but a few generations to remove the original forest, which required many years of Nature's best efforts to build up. Where once stood the best stands of timber in the United States east of Idaho, there remain to-day only wide stretches of bare and barren mountain land. This is our meagre heritage. It has little present value, but many fruitful possibilities, if handled in a constructive way.

To let this land remain idle is an economic crime. It is the duty of Pennsylvania to restore these vast areas of desolation to productive value. This is the work of the Department of Forestry, which began in 1893 as a division of the Department of Agriculture, and is now 27 years old.

The first thing I did upon taking charge was to ask members of the field force to give me a plan for the reorganization of the Department. They did it promptly and well. These recommendations resulted in a complete recasting and marked simplification of the entire organization of the Department, the effect of which shows already, for the morale of the personnel is improving and the output is increasing. This is important, for there is much work ahead and only a few men, little money, and meager equipment available with which to do it.

Four bureaus will handle the executive work. They are Protection, Operation, Silviculture and Lands. In addition, the Forest Academy and

the offices of Maintenance and Information have their special work.

The most important duty ahead of the Department is the suppression of forest fires. Every other kind of work must give way to it while the fire season is on. The entire state has been divided into forty fire districts, each in charge of a trained forester who has direct charge of fire wardens, patrolmen, observers, and other employees. Forest protection is needed in every section of the State, for there is no part of the Commonwealth of Pennsylvania without forest land.

We are doing our best to eliminate fire hazards, and to hold responsible all persons, including companies and corporations, who through carelessness or negligence, cause forest fires. The forest fire laws of Pennsylvania are in many respects good and strong, although not yet complete. They will help do the work, but we are trying to get results through friendly co-operation, rather than by costly lawsuits. Public attention has been widely called to the need and value of forest fire prevention, and conferences are being held with forest land owners and representatives of railroads, mining companies, and other organizations interested.

To stop forest fires is a large order, but even a few men who mean business can do a lot to overcome them and to restore a green and growing cover of valuable forest trees upon the barren hillsides of the Keystone State.

A budget for the Department and each individual State forest has been prepared. A re-grouping of State Forests into units of about 50,000 acres each is now under way. The present area in charge of a forester averages about 20,000 acres. This increase will permit a more economical and efficient use of the working force and reduce overhead charges. A new system of inspection is in operation,



On the Way to Yellowhead Pass—(Courtesy Dominion Parks Branch).

which will help to systematize the various forest activities, promote efficiency, and prevent misunderstanding.

As yet, only a good beginning has been made, but the outlook is promising. Much important work will be done at a summer meeting of all State Foresters, which will be held on one of the State Forests. A Committee of Foresters has been appointed to revise the rules and regulations of the Department, and will submit its report at the summer meeting.

Pennsylvania Desert ought to be bought as an investment by the State, for that is the only sure way to reclaim the five million acres which are now producing nothing of value.

Hitherto, the policy of the Department of Forestry has been to consider the purchase of those lands only which were offered for sale by their owners. Now it is proposed to locate by actual investigation on the ground the forest land which is producing nothing, so that when funds become available, the Forest Commission will be ready to proceed to purchase.

The purchase of the Pennsylvania Desert will be an investment, not an expense. The million acres of forest land already purchased by the State at an average price of \$2.28 per acre has already more than doubled in value. In the preliminary draft of the new constitution there is a provision which

authorizes bonding the Commonwealth for \$25,000,000 for the purchase of such forest land. If, when the time comes, serial bonds are issued for the purpose, the interest, before many years are past, will be carried by the lands bought, and before the whole series has been paid off, the purchase will represent a net gain to the State.

FULL SPEED AHEAD!

The Canadian Forestry Association's Eastern and Western Cars are attracting great crowds. Latest reports from Mr. Archibald Mitchell, in charge of the Western or "Tree Planting Car," show that the enterprise is meeting with great success, and that the farmers are taking a very keen interest in the daily lectures and discussions on tree planting. Mr. Brule, F.E., Manager of the Southern St. Lawrence Protective Association, is in charge of the Association's Eastern or "Forest Products Exhibit Car," which is touring the Gaspé Peninsula at time of going to press. Mr. Brule reports an average daily attendance of approximately 300 persons. The Eastern Car will next tour the province of New Brunswick under the direction of Mr. G. H. Prince, the Provincial Forester of that Province. Mr. J. A. Doucet, B.A., B.Sc.F., has been recently engaged by the Association to lecture in the Province of Quebec on forest conservation and fire protection. Mr. Doucet is at present visiting eleven towns in the Temiskaming district, and on completion of this tour will visit the Lake St. John district and a number of towns in the vicinity of Grand Mere and the St. Maurice River. Too much praise cannot be given to the different railway companies which are so heartily co-operating in the various educational enterprises of the Association and making it possible for our two ears to visit a widely scattered population.

DEFORESTATION AND BRIDGES

The effect of the removal of the forest cover on the watersheds of our waterways is more widespread than is generally supposed. Not only is the snowfall allowed to melt more quickly

and heavy rainfall permitted to reach the streams more rapidly, but in doing so carries with it much lumbering waste and other forest debris. Such material causes serious jams, forming itself into closely-woven masses against the abutments and piers of bridges; the pressure of the water behind these jams carries away the bridges and their approaches, and floods much surrounding territory.

The rapid rise of the streams in response to the precipitate run-off also requires the provision of greater clearance between the abutments of bridges, whereas the tendency has been to reduce the spans, thus emphasizing the possibility of their destruction by freshets. Mr. James W. MacKenzie, Assistant Road Commissioner of Nova Scotia, says:

"It seems to have been the custom for years, as wood became scarce, to narrow up and confine the streams in smaller vents. If it is a fact that the clearing of the country is the cause of the water runing off suddenly in case of heavy downfalls, our bridges must be enlarged to carry the increased streams, and this has been my experience during the last twenty years.

The most destructive summer freshet experienced in the counties of Antigonish and Pictou for the last twenty years, was the freshet of August 2nd, 1908. Some forty-six bridges in Antigonish county and fifty-six in Pictou were carried out, and in some sections every structure in wood was cleared away. I took particular notice that, where the lumber trimmings had been thrown into the stream, the destruction was the greatest.

Steps should be taken to prevent lumbering and mill refuse being washed into the streams, and to remove obstructions in the streams on which jams may form."—From Conservation.

BRING BIRDS TO THE PRAIRIES

(Saskatchewan Farmer.)

"The vision which we would like every farmer on the prairies to see is a shelter belt a rod wide on the west and north of every square mile of the prairies.

Draw a diagram of a township in sections, and mark it off with such a border of trees and what would it mean? Every mile square would be surrounded with trees. In twenty years these trees would be thirty to forty feet high. Then what?

Let us answer briefly:

1. Hot winds would be checked in their sweep close to the ground, for they would have to rise over the belt of trees, just as a man is checked in racing over a continuous line of hurdles.

2. The moisture that falls as snow would remain on each farm, instead of being drifted into ravines, it may be miles away, never to be returned where it is most needed.

3. Moisture in the form of rain would be attracted and precipitated more evenly over the prairies.

4. Cyclones would find no nesting or birth places.

5. Millions of insectivorous birds would find homes on farms and would aid farmers in fighting insect pests.

6. The beautifying of homes, changing them from what they are to-day—a bare location on the prairies, where men, women and children live, work and sleep to earn a living—to homes with beautiful surroundings that in themselves give rest and contentment, homes that attract, homes that will keep young people on the farm, homes that after young people grow up and go out into the world for themselves, are always remembered as “no place like home.”

**MAJOR CHAS. G. POWER, M.P.
(QUE.). ENDORSES THE
ASSOCIATION.**

(From Hansard Report of House of Commons.)

Mr. POWER: “I would call attention to an item of \$4,000, a grant to the Canadian Forestry Association. I should be the last to ask the Minister to indulge in any extravagance, but it seems to me that if there is one association in the country which deserves well of the country and of the Government it is the Canadian Forestry Association. Since its inception some years ago it has called the attention of the public of Canada to the fact that our forest resources throughout the country were very rapidly

diminishing and that if we did not within a very short time take some action we would be in the same position as the United States.

Since this association has taken up its work it has, by means of lectures and an exhibition car, instructed the people throughout the length and breadth of the country, both the children and the grown-ups, many of whom were in sad need of instruction in this respect, in the necessity for forest conservation. The association has lecturers who tour the country at considerable expense. It is true that their members are fairly wealthy, but to my mind this is a work which should be materially helped by the Government of Canada, and I am sorry to see such a small sum as \$4,000 provided for it. You could easily raise the amount to \$10,000 and do \$10,000 worth of good to Canada.”

“Mr. MEIGHEN: The amount is the same as in previous years. I believe that the Forestry Association, speaking generally, does very excellent work, and I enthusiastically believe that the work it is undertaking now in the way of public education in the matter of forest conservation is one of great importance. Possibly, if that work develops, we may consider an increased appropriation next year.”

THE OAK

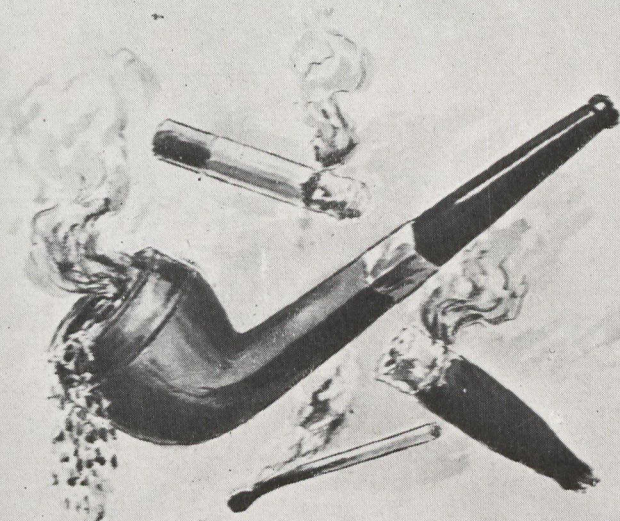
Live thy Life,
Young and old,
Like yon oak,
Bright in spring,
Living gold;

Summer rich
Then; and then
Autumn-changed,
Soberer-hued
Gold again.

All his leaves
Fall'n at length,
Look, he stands,
Trunk and bough,
Naked strength.

—Tennyson.

SAVE THE FOREST



**SMOKERS,
EXTINGUISH THE ABOVE
BEFORE DISCARDING**

A Unique Fire Warning Notice—(Courtesy Dominion Parks Branch).

Trees vs. Drought

By Prof. George Bryce, LL.D., F.R.S.C.

"It is the expectation of the writer's relations every autumn that we go out to spend a week or two on a visit in the south-eastern corner of Saskatchewan, which we used to know as Assiniboia. That region lying to the south of Moose Mountain has been a favorite district for the growth of horses and cattle and of a fair amount of agriculture. For the last two years the crops have been light on account of the violence of the Dakota Sirocco which swept over from the south of the American boundary line. Lately the writer paid the usual visit and saw the

damage done by the serious drought that has visited the district. North of this region is the range of the Moose Mountain or Hills. Moose Mountain still retains its noticeable height, displaying a considerable quantity of trees and shrubbery, and the heights still retain the pretty lakes which make a popular resort.

The writer journeyed north from Kisby, a station on the Canadian Pacific Railway, Regina branch, and saw in the open fields, which are mostly cultivated by good farmers, this year as it was last year, an almost complete failure

of the crops. So great this year is the necessity in this region that a number of farmers have shown a wonderful example of courage. A band of these farmers, having no food for supply of their flocks and herds have gone four hundred miles northward near Prince Albert and have leased a considerable stretch of hay land, and will utilize the C.P.R. coming by way of Regina, to bring plenty for their horses and cattle, and will likely have a surplus for their neighbors in the dry region. This place demands admiration of the grass adventurers of the district.

To see what going north in Eastern Saskatchewan across the Moose Mountain might result, the writer made a visit to Indian Head to see the contrast. Indian Head is north-west of Kisby across country some sixty or seventy miles. Yet in Indian Head there are the two splendid government farms—one for ordinary agriculture, the other for forestry. While south of the Moose Mountain there is this year serious drought, not only the government farms are flourishing with great success, but the ordinary farming in the Indian Head district has a most abundant crop.

We cannot evade the question, why there should be such a contrast from the two points distant from each other as the crow flies only seventy miles apart? No doubt the answer is that the difference arises from:

1. The occurrence of the barrier of Moose Mountain between them.
2. More from intervention of the belts of trees and shrubs that intervene and maintain the moisture in spite of southern winds that blow. The only remedy to meet drought is not only now to chant our song, "Woodman spare that tree," to the reckless tree destroyers that are found in every rural district, but to press upon our local legislatures to make it a misdemeanor to cut down forest sheltering trees as well as brushes and shrubs to any great extent without the permission of a government inspector.

Further, "Arbor Day," which began years ago as a provincial duty to plant

trees in town and country, should be renewed and instead of its now being made a mere holiday, to be a day of sacred duty lying at the very base of our prosperity. Let city, town, village and rural municipality unanimously determine to fight and destroy this most dangerous menace, which in some future, not far distant day, may involve our whole province in dismay."

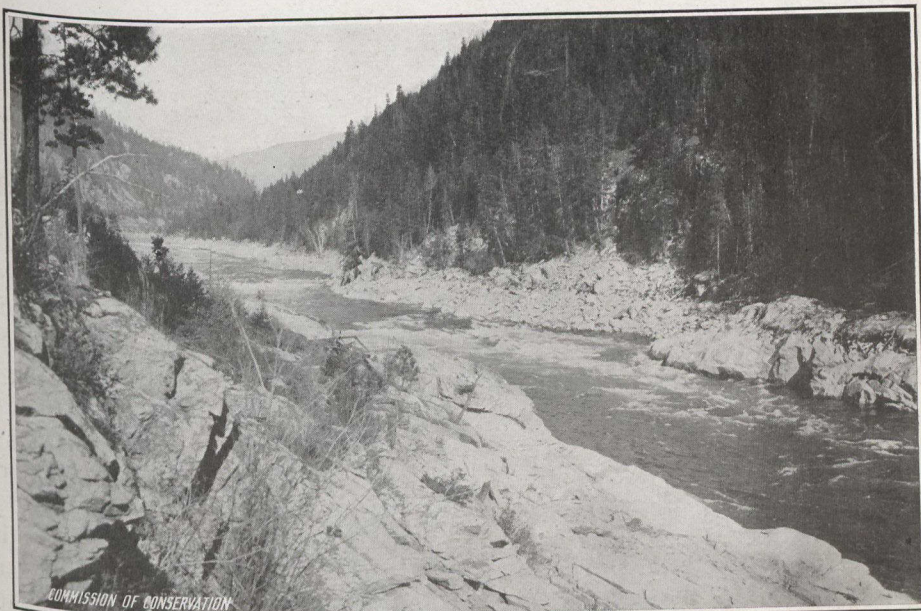
FOREST WASTE

The frequent reports of forest fires in this country make depressing reading. Our forest areas, the envy of other countries, are being depleted not so much by the woodman's axe as by negligence and lack of closer forest supervision.

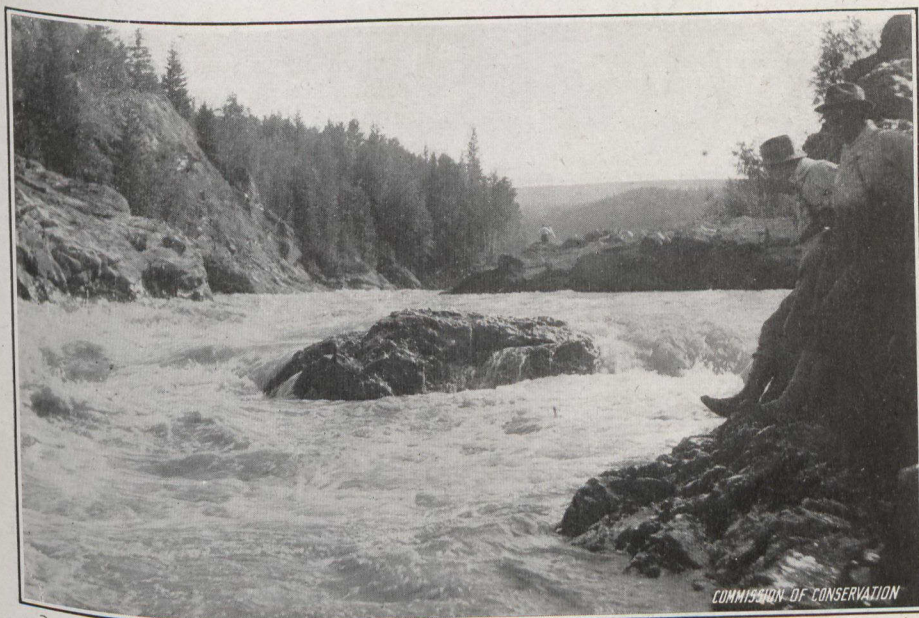
The great majority of the forest fires are due to carelessness. Every summer many fires are traced to camps. It is astonishing with what childish unconcern those travelling through woods, and camping, will throw away lighted matches, and show stupidity as to the care which should be exercised in stamping out camp fires. Carelessness such as this is criminal and should be treated as such. There is something pathetic and terrible in the spectacle of enormous areas of gaunt and blasted trees.

There was never a time when timber was so valuable the world over, and laws safeguarding it cannot be too stringent.

Owing to the dry spell the danger of forest fires has been particularly great of late. The absence of rain makes the carelessness of the camper a still greater menace. Until such time as such offences are promptly punished, and this can only be accomplished by more strict forest supervision, there is little promise of better conditions prevailing.



Scene on Kootenay River, B.C.



Quesnel River, B.C.

Private Forestry in Canada

By Clyde Leavitt

Chief Forester, Commission of Conservation

There is a steadily increasing movement toward the employment of trained foresters by private concerns, principally pulp and paper companies. Not less than fourteen such companies in eastern Canada now employ foresters for exploration, mapping, cruising, surveying, inspection of woods operations, forest research, forest nursery work, tree planting, or some combination of these activities. While this is a splendid development and one most promising for the future, it must still be recorded that only to a very limited extent have foresters in private employ yet been used in the actual supervision of woods operations, and that their influence has not yet been felt to any great extent in modifying the methods of conducting such operations with a view to increasing the productiveness of cut-over lands. Developments along these lines must, however, be gradual, but will increase as the forestry profession demonstrates its worth, and with increasing shortage of timber supplies and consequently higher stumpage values.

The reduction of unnecessary waste in logging operations opens a large field to thoroughly practical men with forestry training, and is one in which only a beginning has been made as yet. Adequate action along this line would greatly lengthen the period of operation in virgin supplies of many concerns. Aside from more complete utilization of merchantable material in the trees, by cutting lower stumps and higher up into the tops, it is a well-known fact that in years past great amounts of cut timber have been carelessly left to rot in the woods or have been left stranded in the smaller streams. More careful supervision would correct a great deal of this abuse, though considerable loss by sinkage and stranding in stream-driving seems unavoidable.

Looking After Jobbers

Another field of large possibilities lies in the better control of jobbers' operations, with a view to ensuring the removal of all merchantable material on areas being cut over. There is evidence that, in some cases at least, lack of adequate supervision results in jobbers being given a larger area than they require for the cutting of the number of logs contracted for. The result is that the jobber is likely to pick and choose, taking the best and most accessible trees, and leaving behind a good deal of merchantable material which really should have been taken, but is too small in amount to justify a later operation, and which is likely to be lost through windfall, insects, decay or fire before the undersized timber shall have made sufficient growth to justify another operation.

Among the pulp and paper companies which have undertaken programs of reforestation, the pioneers are the Laurentide Company, Limited, and the Riordon Pulp and Paper Company, both in Quebec. Both these concerns are working toward a planting program of two million trees annually.

During the past year the Abitibi Company has organized a forestry department in connection with its limits in Northern Ontario. In addition to other lines of forestry work, this company has established a forest nursery, with a view to undertaking planting operations.

That the field for private forestry is increasing rapidly is clearly indicated by the increasing number of foresters who are going into the work on a consulting basis. Forest surveys, mapping, cruising and exploration are, for the present, the principal lines open to such men.

Aircraft in Forestry Work.

It was hoped that upon the cessation of the war a considerable amount of aircraft equipment and personnel would be employed in forest patrol and reconnaissance in Canada, but as yet practically the only attempt to use aircraft for this work is that made by the St. Maurice Forest Protective Association in Quebec. The Department of Naval Affairs loaned two seaplanes to this association and an experienced aviator, Lt. Stuart Graham, was engaged to operate them. Unfortunately these machines were not in commission in the St. Maurice valley until the fire season was practically over, and the limited service they were able to render by patrol was not commensurate with the cost of operation. It is generally conceded that these machines, like practically all the types developed for war work, are not suitable for the most efficient and economical service in this field.

In spite of these handicaps it was demonstrated that in a country such as this, where lakes are abundant, hydro-aeroplanes can be used with comparative safety and they offer a splendid means of detecting fires. It is a mistake, however, to claim that aircraft can replace in any great degree the existing ground systems of fire control. They must be supplemented by a considerable amount of ground patrol, telephones and means of transportation, so that men and equipment can be quickly assembled to put out the fires when reported. Planes in some cases can no doubt assist in transportation, but it is frequently impossible to land in the immediate vicinity of a fire. Forest organizations often handle other lines of work in addition to fire protection, for which the maintenance of a ground force is essential.

Aerial Photography

Some very interesting aerial photography was accomplished from these machines in the St. Maurice valley. Photos taken from an altitude of from 3,000 to 5,000 feet showed distinctly the main geographical fea-

tures such as lakes, streams, roads, etc. Swamps and burns could be distinguished from forested areas, and by comparing the lengths of the shadows, the heights of the trees could in many instances be determined sufficiently at least to tell reproductoin from mature forests. From the photos taken in the autumn, when the hardwood leaves had turned color, the hardwoods could be distinguished from the softwoods and it is claimed that it is possible, after some experience in interpreting these pictures, to distinguish quite satisfactorily the various forest types, for purposes of mapping. To secure estimates of timber stands, a certain amount of supplemental work on the ground by cruisers is essential, to give average contents per acre for the various types of forest. It is confidently believed that excellent results can be secured in this way.

In providing quick transportation to distant points, aircraft can be used to great advantage. Work can be done in a forenoon which with the ordinary means of transportation would take a week to accomplish.

The extent to which aircraft can be used in forest work will depend primarily on the cost of operation, and as yet no satisfactory figures as to this point have been secured.

In Quebec, two of the pulp and paper companies, Price Brothers and the Brown Corporation, have purchased aircraft, primarily for general administrative purposes.

The Air Board of Canada has been presented by the Imperial Government with 100 aircraft of various kinds, including very complete equipment. As a result of the Air Board's operations this year much valuable information will be secured.

It is expected, however, that until a type of machine is developed which provides for greater safety and carrying power, with a smaller fuel consumption, the use of aircraft will not become as general as some of the enthusiasts have predicted. Efforts are being made to develop a type of machine which can land on, as well as

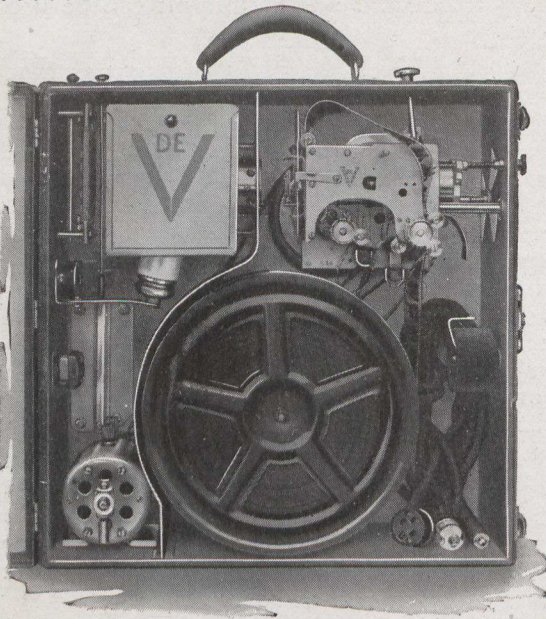
take off from land, water, ice or snow. After seeing the phenomenal development during the war one cannot doubt that in the very near future these objects will be attained, and aircraft will become an established branch of many of our forest services.

It is of interest to note that the United States Air Service has prepared plans for approval by the Government at Washington, which call for the assignment to fire patrol service over western forests of five squadrons of eighteen planes each. Should this plan or any considerable portion of it meet with approval, the results, in conjunction with those which will be secured by the Canadian Air Board, will go far toward determining both the possibilities and limitations of aircraft in forest work, besides furnishing a basis for the determination of costs. The importance of the latter should not be overlooked.

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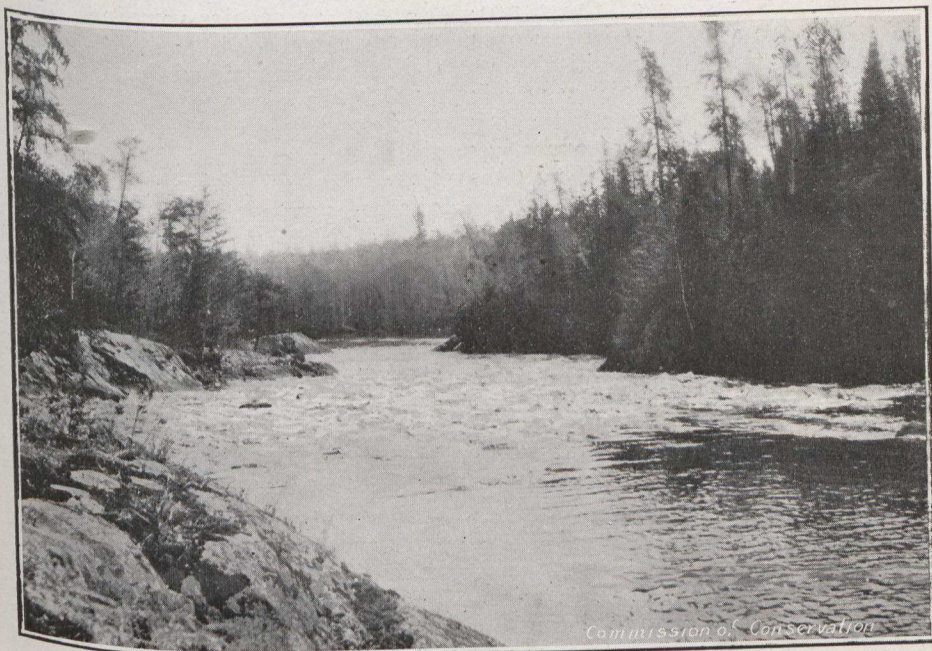
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WINNIPEG



Wood Fall, Manitoba.



Rapids, Manigotogan River, Manitoba.



Timber Treatment

By B. M. Winegar

Assistant General Tie Agent, C. P. R.



It is now generally recognized that the forests of this continent are not inexhaustible. Intensive studies made during the last five years of the stands in the east have revealed that conservation must be practised to insure a continued supply of forest products.

Planted forests in eastern Canada will meet but a small percentage of future demands. Natural reproduction must provide our future forests. Fire protection, which is yearly becoming more efficient, has in view the care of the young growth as well as the matured timber.

In two other ways can the drain on the forests be relieved; first in the use of substitutes, which although decidedly on the increase, have had little appreciable effect on timber demand and prices; and, second, a reasonable and scientific handling of those products which are so vital. In the case of the railway tie: timber will always be a necessity. We must have wood; traffic conditions, which are becoming more severe as the weight of operating equipment increases, allows of no substitute.

Timber, though having many virtues, is a decidedly perishable product, especially under conditions in which ties are placed. Contact with the ground hastens decay very rapidly. This decay of wood is caused by parasitic growth of a number of varieties of fungi. In securing nourishment the fungi destroys the wood upon which they feed. The destroying elements are the roots or filaments which enter the walls of the cells and break them down and then work through the timber. The growth of fungi requires air, moisture, food material and a favorable temperature. An antiseptic is necessary to poison the wood-destroying fungi, as the other conditions cannot be modified or controlled.

Superficial treatment only is necessary in a great many cases, but where subsequent ruptures expose the unprotected surface such as occur in ties caused by vibration, heaving of track, etc., that is, by mechanical operation on the timber, the treatment must be forced into the wood. Penetration to be effective should be reasonably deep and uniform.

Timber treatment not only increases the life of those species which have been used for ties, but it also makes accessible large bodies of timber otherwise considered unfit for this particular use. We have drawn heavily on the soft wood forests such as Jack Pine, Hemlock and Tamarack. The hardwoods: ash, beech, birch, maple, elm and poplar, with treatment, will now render satisfactory service. Formerly these latter species were not considered as tie material.

Several systems of tie treatment are used in Canada and the United States to-day. Their use largely depends on the weather conditions under which ties are to be laid for service. Creasote oils are now generally considered the most efficient material for timber treatment. They have great value as a germicide, are waterproof, reasonably cheap, and can be obtained readily and in large quantities. They are used straight or in mixture with some of the mineral salts.

Zinc chloride, Sodium flouride and Mercuric chloride, effective germicides, have a high value as preservatives, but on account of bleaching their use alone is generally restricted to climates where there is a precipitation of 20" or less. The "Card," "Allerdyce" and "Wellhouse" processes, which inject a relatively small percentage of oil as filler—use mineral salts as the germicide; their aim is to make timber so treated as effective as that treated with

straight creasote, and, of course, at a much lower cost. Proper seasoning of ties is of great importance in their preservative treatment. Weather conditions in this country, however, are against such complete seasoning as is considered necessary. Steam seasoning generally follows whatever air seasoning can be secured on the piling ground.

Treatment aims to increase the life of the timber from 100 to 300%, depending largely on additional improvements such as the use of tie plates and the elimination of heaving from defective drainage. As treatment increases, the drain on the forests will decrease proportionately.

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FOREST DESTRUCTION IN FRANCE

The present wholesale destruction of timber, which it is necessary to repair quickly, is not the first France has suffered, and its exceptional gravity arises from the fact that the preceding one is not yet wholly made up. The great destruction of forests in France during the Napoleonic wars was estimated at 12½ million acres, and it still weighs heavily on the country. The deplorable results of this destruction and of the upsetting

of systematic forestry are well known. Much was done to repair the disaster, but the forestry effort of the nineteenth century was insufficient. Although the Dunes and the Landes of Gascony were planted and some afforestation was done in the mountain regions, M. Daubree could only announce an increase of 1½ million acres in the area of forest, or about one-tenth of what was required.

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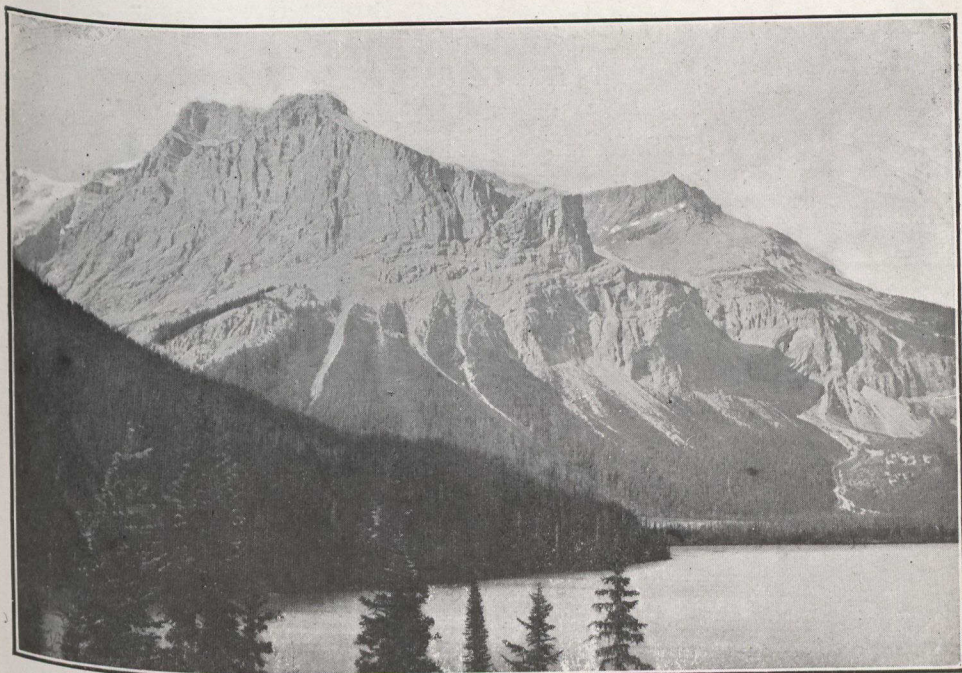
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Can Timberlands Be Fire-Insured?

By Hon. W. R. Brown



General Loss in Forests Not Greater than other Forms of Property



The idea of insurance on standing timber grew out of observations and records obtained after six years of fire protection in the United States. In the years before adequate fire protection to timberlands by Federal, State and private associations was afforded, there had been a disinclination to consider standing timber as insurable, due to the lack of means for apprehending and extinguishing incipient fires or combatting larger ones. After six years of fire protection carried on by over thirty private associations, fifteen State departments and the Forest Service of the Federal Government, with the co-operative assistance of towns, railroads and other agencies, data was collected and combined to show the character of stands burned over, the extent and frequency of fire occurrence, situations most exposed, and total values destroyed in relation to the total value of all timber in the region.

These data showed the average yearly loss in value over widely separated areas, as the Pacific Northwest, Quebec forest region, New England States, and the Michigan-Wisconsin region, to be below one-half of one per cent annually, which compared favorably with the loss by fire in all other forms of property.

Presuming that the cost of management would also not much exceed one-half of 1 per cent yearly,—the usual average cost of doing business in insurance companies—the possibility of giving protection to their woodlands was seriously considered in the winter of 1917 by a group of New Hampshire timberland owners. The various forms of commercial, mutual,

and interinsurance organizations were studied, and it was decided that the mutual form was the most desirable to meet the State laws of New Hampshire and give the greatest latitude for organization. A bill was introduced and passed by the New Hampshire Legislature of 1917 to authorize the incorporation of the Timber Lands Mutual Fire Insurance Company of Concord, the first company of its kind organized in the United States, for the purpose of effecting insurance of standing timber against loss and damage by fire, lightning or other destructive elements or cause.

A form of policy was adopted which provided for additional security through the pledging of the policy holder to meet a loss if called on to the amount of twice his annual premium. The company was authorized to write a line in New Hampshire to the extent of \$5,000 at 2 per cent annual premium on a mutual basis, it being understood that the policy holders retained their rights and interests in any unexpended balances there might be at the end of the year, when used to build up a reserve. The policy also bound the policy holder by a co-insurance clause to an approximately correct estimate and valuation of his stand to within 10 per cent, so that beyond 110 per cent or under 90 per cent of true value he would be the co-loser with the company in a damage settlement in the proportion that the amount he over or under-valued his stand bore to the actual amount found existent by careful estimate and appraisal made after the fire.

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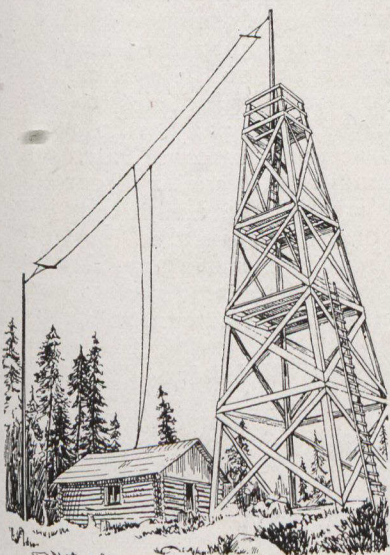
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out the State, to make them small if for full value or take but a partial risk over a large area, and to have these risks at least one-half mile apart in a wooded area or separated by some natural fire line, as a farm, lake, sizable river, clearing, etc. Any policy holder who wished to receive more insurance on his timber than represented by \$5,000 could be accommodated by an arrangement made with the Globe-Rutgers Fire Insurance Company of New York, an old-line stock insurance company of size and resources, to take the additional risk at approximately the same rate, but on this insurance there was no return of unused premium at the close of the year.

Estimates and values were determined on the basis of a written statement, filed by the policy holder with the company. If plantations or unmerchantable young growth of natural reproduction, a predetermined valuation per acre was agreed upon as the basis of loss settlement. If second cuttings or old growth, the statement supposedly represented a fair market stumpage estimate and value of the full amount of merchantable and accessible softwoods and hardwoods on the land, large enough to make pulp or lumber, and did not include land values in any way or young growth too small to be merchantable. Final settlement was made on the actual value of the timber destroyed, as found by the company's adjuster, with the co-insurance clause working as described above. In case of a dispute over the salvage value of timber left, the company reserved the right to pay the value of the lot as set in the policy and salvage for its own account. The regular standard policy of insurance authorized in New Hampshire was used, with a rider concerning the special clauses applicable to timber insurance. A higher premium charge was required for a policy taken out only for the dry season, or for carrying over the dry season when canceled at the close of it. During the first season insurance was written to an amount of \$276,000, no risk exceeding \$5,000 in 57 towns in New Hampshire,

Massachusetts, and Vermont among 62 policy holders, 87.4 per cent of which was merchantable timber, 4.2 per cent plantation, and 8.4 per cent young growth. Care was exercised in the acceptance of risks and avoidance was made of land close to railroad rights of way, recent slash, portable mills, picnic grounds, large cities, and other unfavorable environments. Cutting or the establishment of portable mills upon an insured lot vitiated the policy unless special permits for same were secured in advance. During the life of the company, which extended for two years, the largest loss sustained was \$600, which occurred in a young plantation completely destroyed.

Due to the war, the solicitation of insurance was given up in 1918 and the company effected reinsurance with the Globe-Rutgers Fire Insurance Company of New York at a rate which left it a small balance for management. At the close of the first year premiums were reduced to $1\frac{3}{4}$ per cent and a further reduction of $\frac{1}{4}$ per cent was in contemplation when the company, having established the principle of timberland insurance and not being particularly interested in the commercial aspect of the matter, decided to turn over its policies to the Globe-Rutgers Company, who were willing to assume the same rates and agreements and offered a larger line to the policy holders, adequately secured by capital and reserve. At the final wind-up, the guaranteed capital was returned to the directors with 5 per cent yearly interest for the two years.

A New Profession—Forest Actuary

The profession of forest actuary had necessarily to be created, and the company's manager, S. L. de Carteret, C.E., and his assistant, Victor Beede, M.F., collected considerable data concerning the relative danger in various sites and from various causes, and the losses in old growth, second cuttings and plantations. Old growth proved the best risk, both on account of its resistance to the spread of fire and the usual care that was taken of it, and

on account of the large salvage return possible by prompt logging, if in reasonable proximity to market. Complete loss was rare, the fire commonly did not consume the whole tree, but merely ate into the base, often hardly penetrated the bark higher up the bole. Second cuttings were found to be more dangerous, on account of the large amount of slash commonly present and the prevalence of immature trees that constituted a complete loss when burned. Because of its low value this land was less often adequately protected, but the loss when it burned was correspondingly low. Plantations were the greatest risk, being subject to complete destruction by slight fire. Plantation values per acre being largely labor, it was necessary that they be agreed on in advance between the policy owner and the company. In actual practice in the future varying rates should be charged, based on the relative risk of each particular piece insured, according to actuarial tables which are not now in existence. Such

tables could be constructed by combining the accumulated experience gathered by all insurance companies doing this line of business. The profession of timber insurance actuary should be created and at least one such expert maintained as an adjunct to general fire insurance companies, such actuary having previous practical experience as a timber cruiser, estimator, surveyor, operator and trader.

What the Experiment Proved

The following conclusions are based on experience gathered:

(1) A mutual timberland fire insurance company, to be organized safely, should be on a very large scale, with ample funds behind it, and should extend its insurance over wide areas in order to get an average risk. Risks should not be written unless there exists ample protection against fire afforded by State and town or the owner himself, over the area to be insured.

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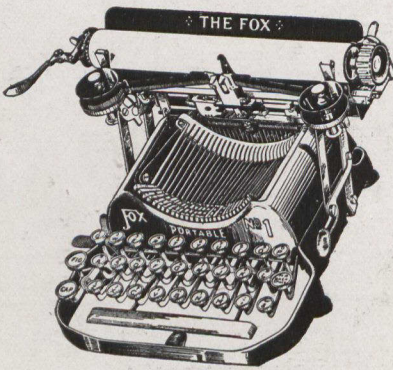
(2) The expense of preliminary estimate and valuation of small lots of land is prohibitive in view of the small premium received. With the co-insurance clause inserted it is safe to take the members' own returns as to amounts and value as correct, and when a number of adjacent risks have been secured, they can be passed upon by the manager in one trip rather than many.

(3) A very large capital reserve is required by law to enable a company to obtain a charter to write freely a considerable line in all States and secure the advantage of covering a wide area and the average risk. The National Lumber Manufacturers' Association might possibly do this if general co-operation by large timberland owners could be obtained. Old line commercial insurance companies, however, who have a well-established business and large reserves are in a particularly desirable position to take on this new line of insurance if they distribute their risks wisely, secure suf-

ficient volume, and charge appropriate varying rates based on previously ascertained tables. If it were possible to secure unlimited backing at the start by the creation of a Federal Timberland Insurance Department at Washington as an adjunct of the Forest Service, with the Government's assurance behind it, it is my opinion that an annual premium of one-half of 1 per cent on policies written over all States and on selected risks would more than pay all losses, and if the management was carried on as an integral part of the Forest Service, in connection with its other duties, and little charge made therefor, a sufficiently low annual rate could be offered timberland owners to attract the large as well as the small, and secure the average risk. The effect of insurance on the practice of forestry and the conservative management of timberlands cannot be overestimated.

(4) A standard expenditure for fire protection must be insisted upon absolutely wherever fire insurance is

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carried. In New England 1 cent per acre per year seems to be satisfactory; in the Province of Quebec, where vast areas are uninhabited from one-quarter to one-half cent proves sufficient; in the Middle Western States 2 or 3 cents per acre is the practice; and in the far West, where values per acre are high, as much as 5 or 6 cents per acre is often required. New England offers the most security on account of the character of the climate, species and soil, and the farm and other natural barriers that cut the danger up into blocks and make the danger of a widespread conflagration small. In proportion to values the New England States and associations assess themselves the most for fire protection.

(5) Fire protection might well be made obligatory by law upon all timberland owners within a State, under some State co-operative plan, as the small owner is equally a risk to his large neighbor, but does not commonly contribute. Fire protection should not be done by insurance companies on account of their possible legal liability in case of loss for want of furnishing sufficient protection. Insurance companies should withdraw their insurance if their preventive and protective requirements are not lived up to.

The Public as Partner

(6) The cost of fire protection should be borne by the public as well as the owner, as the causes are often natural, like lightning, and the loss in conflagration affects not only the owner and the industry, but all other in-

dustries in the State and serves to depreciate the wealth of the State in general.

(7) Hurricane, insect or fungus devastation should not be included in a policy until statistics sufficient to cover the risk have been gathered.

(8) Comparison of statistics concerning timber loss from fire should be commenced at once by an actuarial board, with members from various sections of the country, to correlate experience gathered, such board to meet either at Washington or at a place designated by the interested fire insurance companies.

Timberland insurance appeals to owners of timberlands one-half to two-thirds grown, who have escaped fire on their timber up to a point where it is near fruition, and who feel they can afford to pay for a few years' insurance even at a relatively high rate until such time as the timber becomes fully developed. They consider they have cashed in a long-awaited investment when they sign an insurance policy, as the danger of complete loss of their investment in unsalvagable immature timber has been removed, and if it matures they will reap its value anyway, and can afford the few years' premium costs. It is doubtful if complete insurance can be carried on plantations, unless the timber values are very great, as the insurance rate eats up a considerable percentage of the growth. Where plantations are necessary for waterworks, windbreaks, etc., it may be wise to keep them protected by insurance.

Timberland insurance appeals to farmers who wish to borrow money on timber lots, bankers universally granting loans more readily if an insurance policy is deposited with them. In this way a large amount of capital can be liquidated and put to work to earn more than the one or one and one-half per cent which it will cost to write the insurance. In other words, an insurance company acts as a bond house for the small timberland owner who cannot afford the cost of regularly bonding his property, and for this reason alone it is of great economic value to the country. Timberland insurance also appeals to owners who wish to leave an estate in trust for their children.

Large timberland owners are attracted by insurance only at a very low rate, as their holdings are commonly so widely distributed as to insure themselves to a certain extent. If large holders could be brought to insure together, the size of their premiums would no doubt enable old line insurance companies to give them a much reduced rate on account of the volume of the business, and because when combined they would represent the average rate over the whole region.

WESTERN FIRE SITUATION (Dominion Forest Reserves)

Manitoba.—In Manitoba no forest fires occurred during the month of April, owing to the backward spring and the large amount of snow in the woods.

The second and third weeks of May proved a danger period on the Turtle Mountain and Riding Mountain Reserves, but careful patrol prevented any fire loss. Elsewhere in the Province the weather and ground conditions were such that it was still impossible for fires to run. After May 20th the heavy rains and good growth of grass removed all further danger of fire.

Saskatchewan.—Much the same conditions obtained as in Manitoba. The late spring, timely rains and rapid growth of vegetation, together with careful patrol during a short period of great danger covering May 12th to 25th, and the close supervision given to settlers' fires rendered the fire losses entirely negligible.

Alberta.—In the Rocky Mountains Forest Reserve three to five feet of snow covered the ground dur-

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ing April, and the moisture from this source, along with subsequent rains, has prevented any loss from forest fires during the spring. The same welcome immunity occurred in the fire ranging districts, although in the dry part of May numerous small fires were located and extinguished by the ranging force in the Edmonton District.

British Columbia.—Reports so far indicate that no fire losses have occurred on the Forest Reserves in this Province. In the Revelstoke Fire Ranging District during May seven incipient fires were extinguished without loss. In the Coast District the weather was very dry in the first half of May, and some eleven large and fifteen small fires occurred, the total area burned over being about 1,350 acres, mostly in grassland, old

burn and slash. The loss is estimated at fifteen cords of shingle bolts and 500 M. B.M. of timber. Good rains towards the end of May precluded further danger of destructive fires.

(Dominion Parks.)

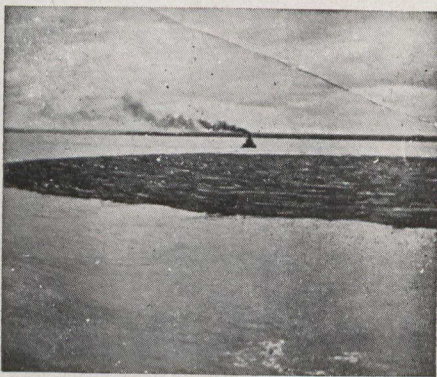
The first quarter of this year shows very satisfactory conditions in all Dominion Parks, the season generally being favorable to fire protection.

There have been 25 fires in all to date, of which 23 were railroad fires and the cost of extinguishing all fires was \$23.70.

The only timber burnt was in Jasper Park, where 3 acres of young reproduction were destroyed and of no commercial value.

The other fires, which were in grassland, occurred both in Jasper and Rocky Mountains Parks.

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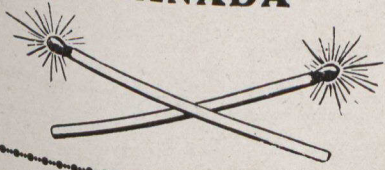
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