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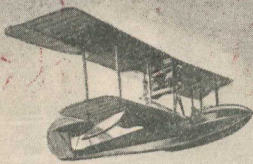
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# CANADIAN FORESTRY MAGAZINE

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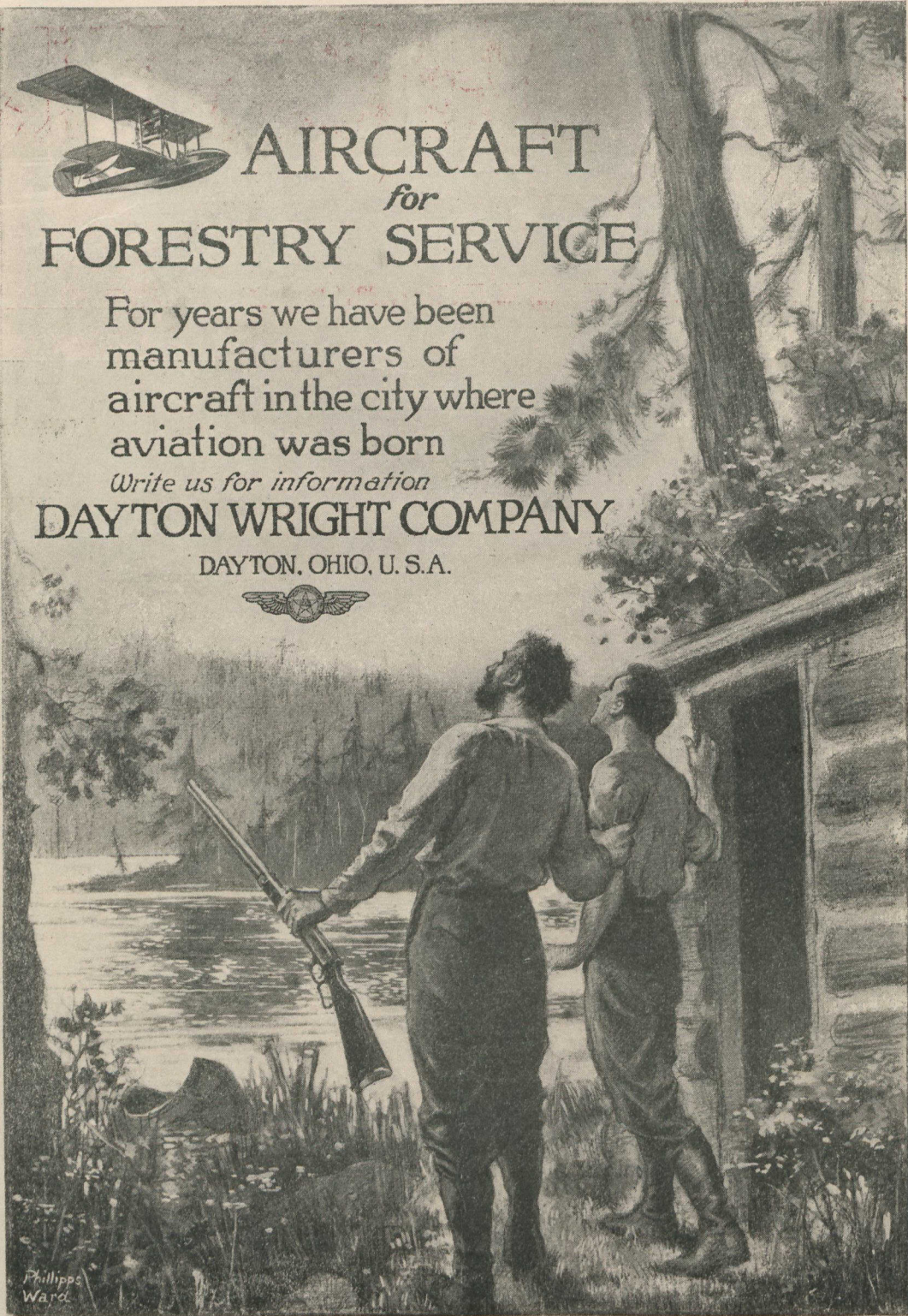
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THE  
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CANADIAN  
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MAGAZINE



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No. 9

## Our Yukon, its Forest Wealth and Future Development

By H. H. Rowatt, Sup't. Mining Lands and Yukon Branch, Ottawa.

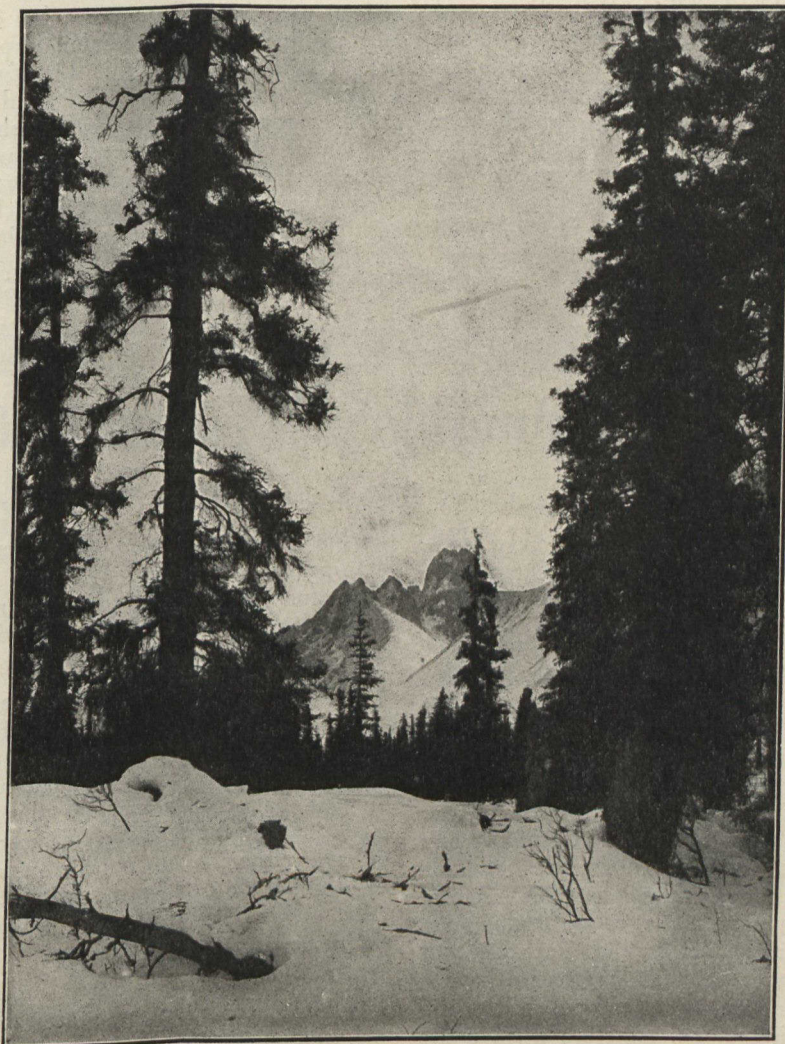
The products of the forests in the Yukon Territory have played no mean part in the development of that district. The wooded areas are of much greater extent than any person unfamiliar with Northern Canada and the territory of the Yukon has any conception of. Naturally the growth is slow. The number of years it has taken the trees to reach a size that would be useful is staggering. One wonders whether a miner, prospector or trapper ever thinks when he first puts his axe into a growing eight-inch tree in the North these days that that tree entered on its career sometime about the date of the coronation of Queen Victoria.

The principal forest trees are white and black spruce, balsam poplar and birch. These occur on the mountain slopes up to eighteen hundred feet and sometimes up to twenty-eight hundred feet above the rivers and lakes. The white spruce is the most valuable tree and furnishes good timber for building and mining purposes. The best groves of this tree are found on the islands or on the alluvial flats along the rivers, but good specimens have been observed on the slopes of the hills to a height of two thousand feet above the rivers. There is a marked deterioration both in size and appearance of the spruce as the more northerly branches of the river are approached.

The balsam fir occurs only on the valley slopes mixed with spruce, beginning at an elevation of twelve hundred feet above the rivers and continuing upward to the limit of the trees. On the slopes of the Ogilvie range, however, the balsam disappears entirely.

### Well Timbered Valleys

On the Pelley River between the Macmillan and the Lewes the Northern exposures are thickly wooded. There are numerous groves close to the river, with good spruce up to two feet in diameter. Spruce of the same size is also found along



In the Heart of the Yukon.

the upper Pelly, but not so plentiful. In different parts of the territory one sees, along the vally is about half a very occasionally, a grove of jackpines, mile in many parts. The spruce It is considered that the best timber in is straight, tall, and averages about the Yukon Territory is situated on the twenty inches in diameter and some have Macmillan river, a tributary of the Pelly, a diameter of about three feet. These The valley of this stream is well timbered trees carry the size well up, and are cap- for about one hundred miles from its able of furnishing five twelve-foot logs

to the tree. The prevailing trees on the river-flats of the Pelly River are cottonwoods, aspen, alder, spruce and willows.

The Yukon Territory has produced roughly about one hundred and fifty millions in gold. A great proportion of that gold would never have been produced were it not for the fact that there were trees in the Yukon Territory of sufficient size and in sufficient quantity to enable the miner to obtain at reasonable rates logs, lumber and wood. Lumber, of course, is not one of the exports of hte territory. The only products exported from that district are gold, furs, mastodon bones and a few live animals required for fur-farming purposes.

#### The Fuel Question

The great rush of miners and prospectors occurred in 1898, and the largest centre of population was and is the City of Dawson. To provide lumber for houses, stores, public buildings, sluice boxes and other mining purposes there were at one time four sawmills at Dawson with an aggregate capacity of ninety thousand feet per day. There were also sawmills at Selkirk and White horse. In addition to lumber, it should be remembered that wood formed the only fuel supply worth mentioning. There is coal in the Yukon but not conveniently situated to the main consuming centre. It was and is used to

some extent, and of late years it has been used to a great extent by the river steamboats. This is due to the fact that the wood supply along the Yukon and Lewes Rivers between Dawson and Whitehorse has been heavily drawn upon for the last twenty years by the steamboats and it eventually became necessary for the steamboats to obtain some other kind of fuel, as the cost of wood delivered to the river bank became exorbitant.

Up to the end of the last fiscal year there has been cut in the Yukon Territory about two hundred and twenty million feet of lumber and three hundred and fifty thousand cords of wood on which Crown dues have been paid. The Crown has received in dues for timber cut in the Yukon Territory about \$611,000.00. The figures given are no indication of the total cut, as wood, logs and lumber used for mining purposes are not subjected to the payment of Crown dues and the amount used for such purposes can only be roughly estimated. Mining is practically the only industry in the Yukon Territory. Logs and poles are used for cabin construction, for timbering shafts and tunnels. Wood was used for thawing purposes before the introduction of stream thawing devices, for fuel in boilers after the introduction of machinery, for fuel for dredges until the introduction of hydraulic electric power, and lumber

was used for sluice boxes and flumes. When it is considered that for all these purposes the products of the forest were used without the payment of Crown dues, it is thought that it would be safe to say, in order to arrive at an estimate of the total cut to date, that the amount on which Crown dues have been paid might be multiplied by three. This would result in an estimate total cut of over one million cords of wood and six hundred and sixty million feet of lumber. This would mean that the timber resources of the Yukon Territory have been diminished to that extent to produce gold to the value of one hundred and fifty million dollars.

#### The Yukon's Future

The Yukon Territory is only in its infancy. There is untold wealth in minerals not yet developed. There are tens of thousands of square miles not yet prospected. Its future is all before it. There are large areas of magnificent grazing lands on which many herds of cattle will some day be turned loose. Today, the population is counted by the thousands, but for every thousand now there will be hundreds of thousands some day. There is great timber wealth not yet touched, and the miners and settlers for many generations will probably find ample timber resources for their purposes.

## British Columbia's Way of Enforcing Fire Laws

By C. S. Cowan, Assistant Provincial Forester

Victoria, B.C., Oct. 11, 1921.

Canadian Forestry Magazine, Ottawa.

Your letter of October 4th is received.

THE procedure we are carrying out in British Columbia is this: The Forest Act makes provisions for the issuance of permits for fires during the close season. Regulations under which camp fires can be built as well as regulations which cover the conduct of smokers, blasting operations, land clearing or any industrial purposes within **one half mile** of Forest or bushland have been made. Having passed legislation concerning these things, a penalty was also provided for non-compliance. So long as we have a law which we do not enforce so long will it be disregarded, therefore when a fire occurs as a result of contravention of the Act, our ranger's first job is to get this fire out and the next is to secure his evidence and lay an information. Very often we cannot get actual eye witnesses but the circumstantial evidence is taken, as the Forest Act lays the onus of proof upon the defendant. These are cases, of course, where we bring an action and where we know we will not gain conviction

but even in such cases the prosecution of suspected individuals may have a good effect, for it shows that our men are on the job and sooner or later they will be caught.

In dealing with infractions of the Act, where a case is contentious it is referred to the District Forester for advice as to whether an action should or should not be brought but our instructions this year made it clear that the Field Officer who did not gather, where possible, evidence as to the origin of a fire was as much derelict in his duty as a man who did not do his best to extinguish a fire.

It is a good thing in Forest Protection services to keep a fire curve for each man, i.e., the number of fires reported each week and where peaks occurred to analyze the given causes. The percentage of fires of unknown origin should be small, the percentage of fires caused by campers would show the need for greater vigilance and education. The number of railway fires will point to the necessity for a properly organized and efficient patrol force as well as close inspections of locomotives, fire appliances, and so on.

As to the imposition of fines, that is a matter which rests in the hands of the local magistrates, but if our men carry out their functions in a workmanlike manner, convictions must be gained and a fine must of necessity be imposed, or failing that, a jail sentence. It would appear to me good policy to enroll each magistrate on the list of Forest Protection enthusiasts. There are certain districts where this is not so and such magistrates are avoided.

To sum up, we have at last grasped the very point that we have been preaching for years, that 90 per cent of our fires are caused by human agencies and any means which we adopt to prevent such occurrences is a step in the right direction. We have advertised for years: this is the velvet glove. We are now showing that the quality of firmness is still retained inside the soft cover.

There is, in reality, little sympathy in this world for the wrong doer, and our men really gain in local esteem by the proper carrying out of their legal functions.

# The Forest as a Perpetual Wood Factory

Nature, without Human Guidance, is as Incapable of "Running" a Forest on an Economic Basis as "Running" a Farm.

By Dr. C. D. Howe, Dean, Faculty of Forestry, University of Toronto

## THE FOREST.

As I understand it, the primary object of forestry is the production of wood of a certain quantity and of a certain quality under certain given climatic and soil conditions. The material which we call wood is a certain chemical substance produced in large quantities only by certain types of plants which we call trees. If the chief object of a forester is the production of wood, then it goes without saying, that he must understand how wood is produced in nature, that is, he must understand the physiological relationships of trees: how they manufacture their food, how they digest their food, how they assimilate the digested food and transform it into wood. Now, we know that certain things external to the tree influence its wood production. These are particularly the climate and the soil. In order to produce the largest quantity of the most desirable quality of wood, the forester must understand how trees are influenced in their growth by the climatic and soil factors, that is, he must understand the biological relationship of trees.

While a forester must understand the life relationships of individual trees, I be-

"Ninety-five per cent of the trees in a forest sacrifice themselves that others may live."

"I have seen Western hemlock seedlings at the rate of 3,000,000 to the acre; yet, when these trees reach maturity, scarcely a hundred will be left upon an acre."

"Nature has no economic sense. The function of foresters is to improve upon nature as expressed in the forest and guide her into economic channels, just as the farmer has improved upon nature in his work and compelled her to serve his economic purposes. Where would we be to-day if the farmer had allowed nature to have her own way?"

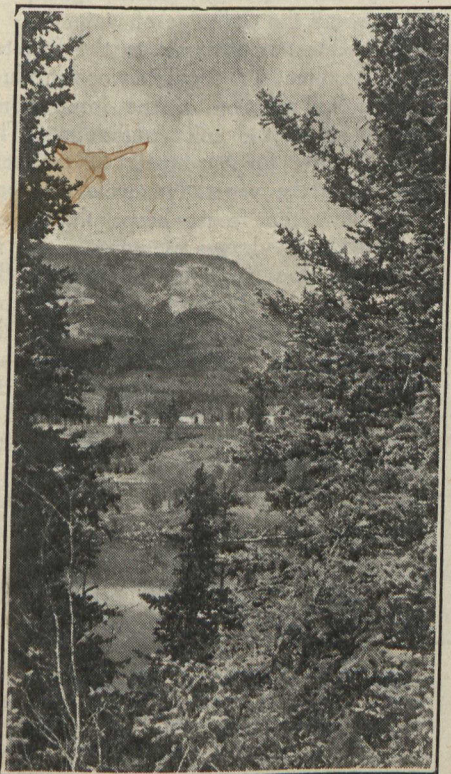
lieve that in order to be successful in his work of producing wood, he must acquire a broader conception of forest life. He deals not with single trees alone, but with tree aggregates, with tree communities. These tree communities, like communities of humans, have their mutual relationships, their dependencies, and their interdependencies. And like other living communities, they have their stratifications, their laws of reproduction, development and decay; their laws of progression and of retrogression. By this I mean to say that in order to do his best work, a forester must have the broader vision which regards the forest as an entity, an organism with its own peculiar structures and its peculiar functions; an organism which has its period of birth, of infancy; its juvenile period, its adolescent period, its period of maturity and decay.

"It takes all kinds of people to make a world," and it takes all kinds of plants to make a forest. The reformer or the politician will fail, if he recognizes only one class in human society, so the forester will fail who sees only and thinks only about the pines and spruces, or whatever the commercial class may be in his woodlands.

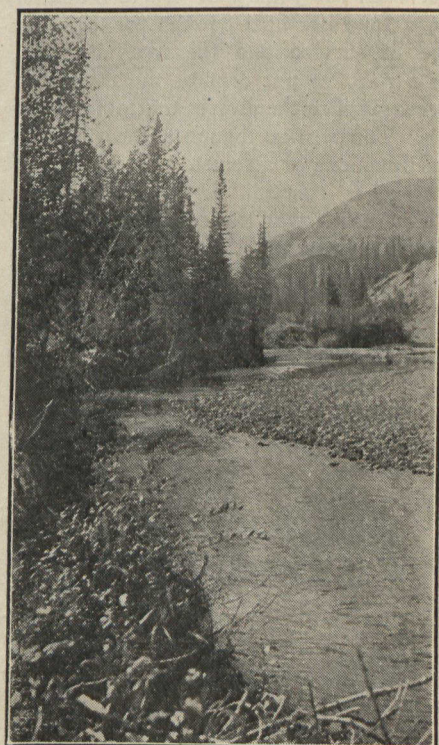
### The Forest's "Middle Class."

In the forest the differentiation of the social structure is just as pronounced as in the city of Toronto. There are the meek and the lowly in the forest; even those who live in the dark places beneath the soil cover. There is the great middle class of ordinary every day trees. They make up the bulk of the forest and give it stability and character. And then there are the few dominions, the aristocrats, who stand head and shoulders above their associates. They indicate what might be accomplished in the forest world if living conditions were equally

good for all. To state the case more specifically there is a greater or less number of vertical layers of vegetation in every forest: a moss layer, an herbaceous layer, a layer of shrubs or seedlings, a layer of saplings, a layer of suppressed trees, of co-dominant and of dominant trees. This is called vertical zonation, and it results from the fact that there is a difference in life conditions at the ground and at various heights above the ground in a forest. This leads to a differentiation in structure of the forest, just as there is a differentiation in the structure of a tree itself. The conditions in a forest also vary in a lateral direction. The soil may vary from place to place; here sand



A beautiful glimpse of the forest ranger's cabins on the Clearwater Forest Reserve, Alberta.



Looking along Brown Creek on the Clearwater Forest Reserve, Alberta.

and there clay. In one place the soil may be so thin that trees cannot grow; in another place the soil may be damper than the average and a stand of different trees result, or there may have been a windfall and conditions are changed so that another kind of tree comes in. These horizontal differences result in alternation in the structure of the forest.

#### Mortality in Juvenile Trees.

Now, a forest regarded as an organism not only has structures, but it has functions of its own apart from the functions of individual trees. The first of these is reproduction, which consists in the production of seeds and their germination. When the seeds have germinated they must establish themselves on the area. Whether or not the seedlings will live depends upon the natural vigor of the seedlings, the amount of food material stored in the seed, the length and vigor of growth of the roots, the ability to endure drying-out conditions. When seedlings have succeeded in establishing themselves, they at once come into competition with seedlings of their own kind or those of other trees, and as you know this competition continues throughout life. We do not know, by experimental evidence at least, why some succeed and others fail, but we do know that the slaughter is terrific. I have seen Douglas fir seedlings at the rate of 500,000 to the acre, and Western hemlock at the rate of 3,000,000 to the acre; yet, when these trees reach maturity scarcely a hundred will be left upon the acre. The ordinary coniferous tree requires about four square feet of soil when 20 years old, and 150 square feet when 100 years old. There is neither room, food nor light enough for them all. The fit survive and the weaklings die. As a rule, 95 per cent of the trees in a forest sacrifice themselves that others may live. Competition then is one of the normal functions of a forest.

Another function is succession. By this is meant that the composition of the forest is constantly changing until it finds itself in equilibrium with the factors of soil and climate which have brought it into being. The familiar illustration of this is the birch and poplar on the burned areas. They control the ground for 20 or 30 years, then, if there is reproduction of the original forest, it in turn gains its normal control. Vegetation through its influence on light and soil conditions is constantly making conditions less favorable to its own kind and more favorable to another kind. This results in succession, one of the most pronounced functions of vegetation and nowhere more pronounced than in the forest, to those who have the eyes to see.

As I have just said, succession ends in a forest in equilibrium with the factors of



Northern Ontario's Winter Crop. An operation on Pickerel River.  
Photo by C. Harding, Pakesley, Ont.

its environment, that is with its climatic and soil conditions. We call such a forest a climax forest, and we regard it as stationary. This conception is perhaps satisfactory if we look ahead only 100 years, and as foresters we should look ahead that far. But freeing ourselves from this cramped vision, we can look still farther ahead and say there is nothing fixed and stable in nature and, therefore, in the strict sense of the word, there is no stationary type of forest. In the first place, there would always be minor fluctuations, due to openings from natural causes, such as windfalls, lightning, and consequent changes in the light relations. There would also be wider fluctuations due to biological causes. For example, a light-demanding species such as the pines cannot control an area for more than one generation. The white pine in central Ontario cannot be considered as a climax type, especially when in pure stand. It cannot reproduce itself beneath its own shade; therefore it must give way in the end to a shade-enduring species, such, perhaps, as the balsam in the northern portions of its range in Ontario.

#### The Forest as a Wood Producer.

Coming back to our conception of a forest as a community with its own particular activities, we note another fact of general application, and that is, that a forest community reacts upon its environment, qualitatively and perhaps quantitatively, as does a community of human beings. The human community reacts upon its environment by clearing the forest, tilling the fields, building houses, harnessing the power of boiling and falling water and the lightning in the skies. The forest does things just as wonderful. The forest harnesses the energy from the sun; it solidifies the carbon of the air; it adds a very dilute solution of mineral

salts and transforms them into wood. It is the function of the forester to regulate and direct the growth-energy of the forest.

Just as in a human community the individuals react upon each other so in a forest community. No tree can live surrounded by other trees and be the same tree that it would if it were living alone in the open. This leads to a change in the form of a tree, and it is the function of a forester to fashion that tree into the form which best serves his purpose. The forest community reacts upon its local climate; the temperature, the humidity and the precipitation are not quite the same as in the open. The forest community reacts upon the water regime, the storage and the drainage of waters.

Of greatest importance to the forester who is to direct and regulate wood production is the reaction of the forest community upon the soil conditions. The forest is the great restorer of the soil. You know the vegetative cycle and you know how the forest keeps that cycle unbroken. A larger percentage of its contents comes from the air than in the case of the field crops, the trees being chiefly solidified sunshine. Not only the material taken from the soil, but the additional material taken from the air, decays upon the soil and thus the soil is enriched year after year, generation after generation. The soil is the cemetery of the ages. In order to have something living there, something must be dying there. The forest quite literally lives on the bones of its ancestors. The character of the forest today depends upon the successive generations that have gone before. The accumulated vegetable matter in the soil increases its waterholding content, and thus replenishes and regulates one of the most necessary and most variable factors in plant life. You know, the decaying  
(Concluded on page 505).



# A Shelter Belt of Trees for Every Prairie Farm

How to Make Tree Planting Successful under Conditions of Limited Moisture—How to keep down Grass—Some Common Difficulties and their Solution.

By Archibald Mitchell, Western Lecturer of the Canadian Forestry Association

IT SHOULD not be difficult for us to understand how necessary it is for us to have belts of trees to shelter our homes and playgrounds on the Prairie.

This Prairie is very bare, and high winds often sweep over it making it very unpleasant sometimes for the people living there.

Trees are the means nature has provided for breaking up these winds, and as fast as she can, nature is covering the Prairie with trees. Further North and East, this tree covering is quite general, the whole country being almost entirely under trees, and as you would expect, the winds there are neither so high or so frequent as we find them out in the open.

This natural tree covering has spread very rapidly onto the Prairie in the last ten or twelve years and thousands of little bluffs of native poplar are now to be found in many districts where formerly there were none. The reason is not far to seek for the people who have come to live there during these years have kept the fires down which used to run all over the country nearly every year, burning the grass and the little bluffs just about as soon as they had got well started.

We do not know how far this natural tree covering would spread, but so far as we have seen, there does not seem to be any reason to doubt that if human population moved out the whole Prairie would in time become almost entirely covered, the same as in the North, if the fires were kept from burning as they used to do before the settlers came in.

This natural tree-covering would possibly take hundreds of years to accomplish but as the trees would interfere with our farming, it will never of course be allowed to be completed.

At the same time it is good to know that trees will grow naturally if they are



Saskatchewan has made excellent progress in the beautifying of school grounds with trees and shrubs. There are subtle education influences in a beautiful tree-enclosed playground which no pile of text books can rival.

given a chance, when we are thinking of planting trees. We know we need not fail if we go about the business the right way.

One very encouraging thing the last few years have taught us is that, even if we did not have rainfall enough for grain crops during these years, we had enough for trees. If we had not, then all the trees on the Prairie would have died, both those grown by nature and those planted by man. But we know they have not, and there are thousands of trees living today that have withstood the dry years. No doubt some of you will remember having seen many planted trees which have died during the dry years, but there is always another reason somewhere. They died not because enough moisture in the shape of snow or rain did not fall. That was not the reason. Enough rain fell, but the reason the trees died was because the most of the rainfall was lost before the trees could use it.

### How to Save the Moisture.

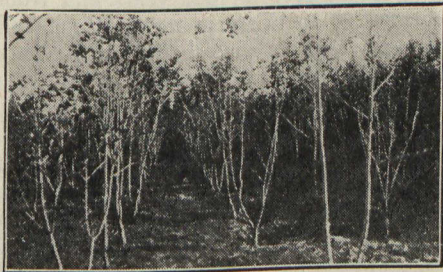
And this brings us to the most important part of our subject and the real secret of success in tree planting on the Prairie, the conservation or saving of enough of the moisture that falls every year so that the trees will be able to keep on growing.

We must remember too that Western Canada is not the only place in the world where this moisture saving is important, for many other countries have the same problem and yet they grow large forests there.

The mention of the conservation or saving of moisture immediately suggests the question, "how do we lose it?", and the answer is very simple and easy to understand for it is lost almost entirely through the action of the sun and the wind. Everybody has seen wet clothes hung out on the lines, and you have all seen how quickly the sun will take up the moisture and dry the clothes.

Some of you no doubt have also noticed that the drying takes place much quicker on a breezy day, showing that the wind has a great deal to do with drying up the moisture. If this is true in the drying of clothes, it is also true in the drying of the Prairie soil and in our tree planting it should be very natural to conclude that if we could keep the sun and the wind away from the soil in which the trees are growing, there would be a far better chance for them to have enough moisture to enable them to live.

We find this is quite true, so true indeed, that the whole success of tree growing depends on it. Those of you who have



Another successful tree planter under prairie conditions is Mr. John W. Lucas, of Cayley, Alberta. The photograph shows a wood lot of 2,000 trees planted four feet apart. This is a big asset that adds value every year with practically no human labour, now that the trees have established themselves and killed out the grass.



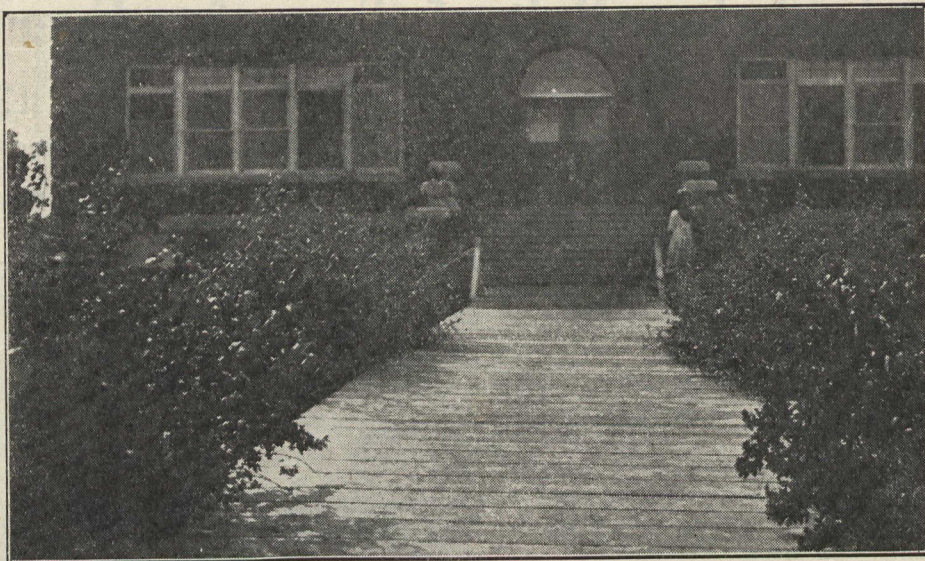
Another view of Mr. Lucas' shelter belt at Cayley.

seen the little bluffs of native poplar now taking possession of the Prairie in certain districts will remember that this is just the way that nature does. The trees in the little bluffs are very close together and no wind can blow through them to dry up the moisture, and the leaves form a more or less dense shade which keeps out the sun.

#### Take a Lesson From Nature

This is nature's way, and in our planting we just follow nature and plant our trees close together using varieties that will give us plenty of shade. We plant them four feet apart each way and use a lot of Manitoba Maple along with the other trees to shade the ground because their leaves are large and close, making it one of the very best trees for the purpose.

Very small plants are used. They are best only about a foot high, and of course while they are so small they can not keep much wind or sun out, so we cultivate the soil between them to act as a moisture keeper till trees are big enough to do it for themselves. This is easy to understand, for after all, surface cultivation only creates a dry loose layer of soil which lies on the ground and keeps the wind from touching the moisture down among the roots and also keeps the wind from shining directly on it. It is only a kind of artificial sunshade and wind shield and has to be renewed every week or two for the first few years till the trees are big enough and branchy enough to protect the moisture by themselves. Usually three years of this cultivation is enough if the trees have been planted four feet apart and the right varieties used. To help out the trees in protecting their moisture and also to save a year's work with the cultivator, it is a good plan to spread four or five inches of manure or straw under the trees. The best time to do this is at the end of the second year when the trees are bushy enough to keep the wind from blowing the protection



How the approach to the school door at Assiniboia, Sask., has been improved by the planting of trees and shrubs. The children of the prairie communities are entitled not only to splendid school buildings but to beautiful school grounds.

away and at the same time not too bushy to make it difficult getting the straw or manure mulch, as it is called, in among the trees. This mulch is useful in two ways for it is always loose and open enough to allow rain and melted snow to find their way down to the soil below, and, as we have seen, it acts as a screen which keeps the sun and the wind from stealing the moisture from the soil. The mulch is never taken off and may be added to every five or six years as may be considered necessary.

#### Plant Broad Solid Blocks.

To still further assist in moisture preserving, the strip of trees should be about four rods wide, as a broad, solid, block of trees keeps the wind out of a plantation far better than a narrow one.

Besides, the broad belt provides a far better shelter in winter when the leaves are off and when shelter is most needed.

It will now be easy to understand how this close planting and mulching helps to keep down the cost of establishing the

plantation, for if the trees were planted wider apart they would have to be cultivated for several years longer till they were big enough and branchy enough to take care of themselves.

Cultivation takes time and money, so that in reality it is far cheaper to plant trees four feet apart than six feet or wider.

You may require more trees but the time taken up in cultivation is very much less.

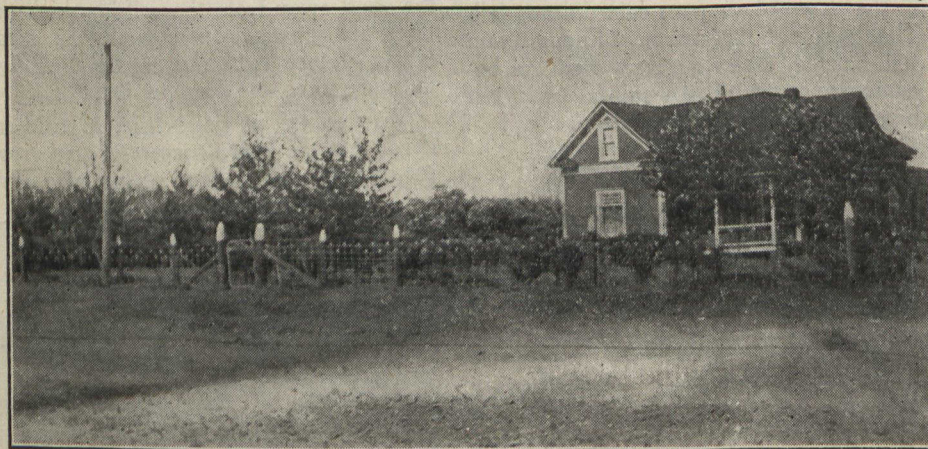
This matter of expense in establishing a plantation is one of the three principal points that must be borne in mind in planning a plantation. The other two are, "Rapid growth" and "Permanency", and we get both of them by using certain kinds of trees.

Rapidity of growth is very important for we don't want to wait any longer than we can help for the shelter we need. The best tree to give us rapid results is the Russian Poplar (*Populus Petrowskiana*). It is very cheap and grows readily from cuttings ten inches long, which also have the additional advantage of being easily planted. A cutting of this size will grow to about eight or nine feet in three years and as many of them will be from twelve to fourteen feet in four years and from twenty-five to thirty in ten years, it will be easily seen why we should plant plenty of Russian Poplar.

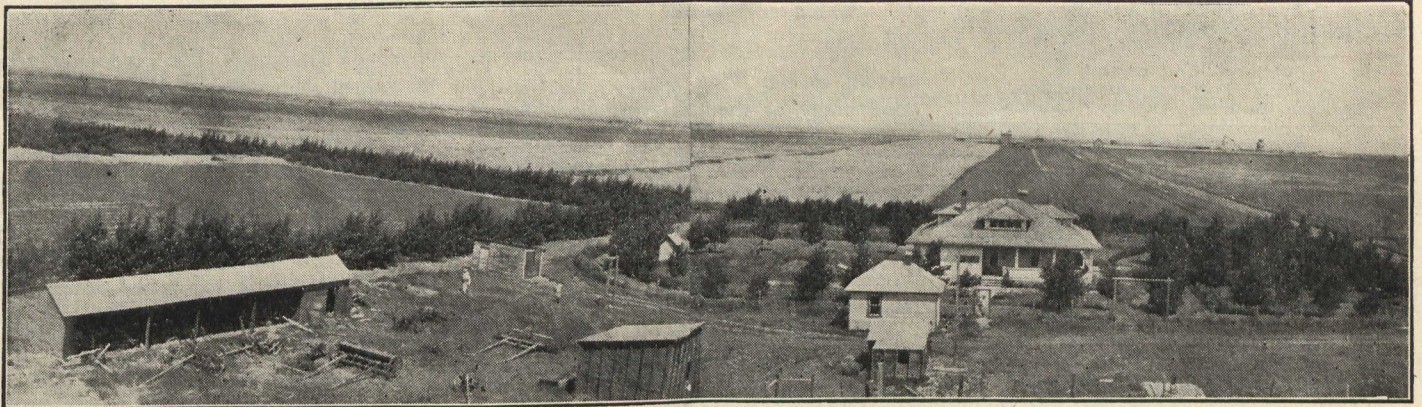
#### Russian Poplar a Favorite.

But Russian Poplars are supposed to live only about thirty years. That is to say, we have only had them growing in Western Canada for about that time, and we really do not know how long they will last, but, to help out the life of the plantation we use a few Ash and Elm among the other trees.

They are native and, with the maple will grow for 60 or 70 years or even longer.



In 1907 Mr. C. Gardiner, of Cayley, Alberta, took a few days off to plant trees about his home and part of his farm. To-day he has not only a better looking home but one much more comfortable to live in than would have been the case had he believed "you can't make trees grow on the prairie."



Mr. N. J. Anderson, Secretary-Treasurer of the U. F. A. at Barnwell, Alberta, is a great tree planter. He has succeeded in the driest years the West has passed through. His farm is good to look at, has a much higher selling value, and is able to produce abundant crops of vegetables because of the shelter from winds. To Mr. Anderson tree planting is a sound business investment

Thus you can see the variety of trees we use in our plantations is very important and we find that about the best mixture consist of rows of Russian Poplar and Maple alternately, with every fourth tree in the maple rows consisting of Ash or Elm. It is a good plan too to have the outside row of Caragana. This is a bushy plant and it helps still more to keep out the wind.

#### Plan Your Shelter Belt

Shelter belts to protect the farm building should enclose three sides of a square and sometimes even part of the fourth side may be planted. It is usually better not to have the solid tree belt in front of the house as it tends to shut out the view too much. It is better there, to have a well-trimmed hedge of Caragana with a row of shade trees beside it to act as a partial screen and also to afford a certain amount of shelter.

The ground for such plantation should be prepared by summer fallowing it thoroughly the year before it is planted, disking well early in spring, and plowing not later than the second week in June following with regular cultivation till the fall. If it is to be on new breaking, it will be better to work it up two years before planting it.

#### Beautifying School Grounds

School plantations will of course be much narrower than farm belts because the playground is usually not very large and there may not be more room for more than four or five rows. In such a case the outside row should be caragana and the others maple and Russian Poplar alternately in each row. The inside row may be either Caragana or Spruce or Pine.

Ornamental planting of the home or school grounds with large trees and shrubs is a different matter from shelter belts and will require different treatment.

All trees must be planted firmly.

In conclusion, I trust that this little talk on Tree Planting on the Prairie will have made several things clear to you.

First.—That the moisture in the plantation is the important thing.

Second.—That we get enough moisture on the prairies every year if we can only keep it.

Third.—That our two chief moisture robbers are the sun and the wind, and that if we can keep these two out from among our trees we are assured of moisture enough every year to keep them growing.

Fourth.—We find nature manages this very well by growing her trees close together so that neither sun nor wind can get to the moisture to dry it up.

Fifth.—To be successful in our plantations we have to arrange our trees with the same object in view, planting them four feet apart each way and using varieties that will shade the ground.

Sixth.—A mulch of straw or manure at the end of the second year will be of great service in helping to preserve this moisture.

Seventh.—All trees and cuttings should be planted firmly.

Lastly.—Remember that the saving of the moisture is the secret of success.

(Editor's Note:—One thousand western school teachers will read the foregoing talk to their pupils in January. This is part of the winter programme of the Canadian Forestry Association.)

#### An Aeroplane Stabilizer.

Paris.—Georges Aveline, an engineer, has invented a stabilizer for aeroplanes which, it is claimed, will make it possible for the pilot to leave his post while the machine continues flying automatically. The appliances have been tested by the Messageries Aerenes Company with success, it is said, on the Paris-Amsterdam line on the large passenger-carrying machine. The machine flew the whole route without the pilot, it is reported, once touching the levers. Great import-

ance is attached to the result by French aviation experts. It is declared that it will add enormously to commercial flying. In a fog or thick clouds the appliance, it is claimed, assures the aeroplane keeping the correct course. At night small electric lights reveal any deviation immediately.

#### Acronautical Evolution.

London, Eng.—The aeroplane of the future, according to the prediction of a writer in London *Tit-Bits*, may be driven by steam turbines, navigated by a pilot on the lookout, who will transmit his orders to the engine room like the captain of a ship. It may be able to land almost anywhere, and be large enough for use in war time to carry groups of soldiers for tactical operations. There is even a suggestion that a manless type may be evolved, for the torpedoing of battleships, from the air or the ramming of enemy aircraft. An apparatus is being developed at the Royal Aircraft Factory for automatic mechanical control of machines, both longitudinally and laterally, by means of a gyroscope. With the advent of large twin engines, and machines with four or more engines, the demands on the strength of the pilot when moving large controls began to approach the physical limits of the ordinary man, and the complication of the gasoline supply put a severe strain on the mental capacity of the pilot. A machine is now being constructed in which the depth of structure of the wings are such that engines can be installed in the wing structure. Another possibility is that of completely reversing the blades of the propeller, to act as an air brake.

#### Made New Record.

Hendon, England.—John H. James in winning the aerial Derby here Saturday made a record for the event. James covered the 200 mile course in 1 hour and 14 minutes, or on an average speed of 163.34 miles per hour.

ILLUSTRATED  
Canadian Forestry Magazine

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ROBSON BLACK, *Editor and Manager.*

## CALL IN THE POLICEMAN!

**H**AS not the time arrived when the "bite" of the forest protection laws throughout Canada should be supplied with a few front teeth?

It was inevitable, of course, that lawmakers and law enforcers sharing the popular tradition of "inexhaustible forests" and "unscratched resources" should equip statutory penalties for timber destruction with semi-nullifying devices. Until very recently, a small percentage only of the Canadian people took any serious interest in forest conservation or believed for a moment that the nation's timber resources were in the slightest peril. Even today to tell the man on the street that Canada owns not more than one-third of the timber growing in the United States brings an incredulous stare. To tell him that Canada's problems in forestry are more imperative and economically vital than tariffs, good roads, votes for women, or the exchange rate, provokes a patronizing smile, albeit a willingness to hear more and be convinced. Is it much wonder, therefore, than the "bite" of our forest protection laws, as regards penalties for carelessness in causing fire, has reflected the indecision, the indifference and lack of conviction characteristic of public opinion. Magistrates are prone to inflict the maximum penalty on the "vandal" who burns down his neighbor's woodshed, because that is the measure of public indignation, and seem equally prone to treat with compassion the "unfortunate fellow" who destroys ten million feet of our small reserve of white pine.

In many parts of Canada, however, a change has come about. Penalties have been increased, loopholes have been blocked and, mainly through the good work of the Government Forest Services and the forest protective associations of Quebec the sympathy and co-operation of local magistrates in many places have been won. Probably the indifference of the local magistrate stands less in the way than the indifference and lack of punch in the local protection officers. Some districts in British Columbia, for example, have this year received such a vigorous demonstration of law enforcement that campers, farmers, and others likely to

start fires now look upon carelessness as costing so much an ounce. In fact, a good many of them, having been found guilty of damaging the forests by fire, are now paying their fines, as some people pay for a phonograph, with "five dollars down and five dollars a month." The instalment plan of paying fines looks like a new find in psychology, spreading the painful lesson over many months.

Educational propaganda is the finest possible fire preventive with the great majority of people, but it needs a stiff supplement in legal penalties for the stubborn residue.

## WHAT CANADIAN YOUTH IS FED ON.

**F**ROM a widely circulated set of books for children, the Canadian chapters of which were edited by a Principal of a Canadian university, since deceased, the Canadian Forestry Magazine culls a few amazing blunders concerning the forest wealth of the Dominion. Considering that the book claims to represent the tested wisdom of all the best authorities, it is difficult to overestimate the mischief wrought in the child mind by such "information":

"Canada today is the richest country in the world in wood resources and forest areas."

(The fact is Canada has about one-third the wood resources of the United States).

"It has been stated that if the United States did not cut another stick of pulpwood for two hundred years and the Canadian trees should stop growing and remain in their present condition there would be enough pulpwood to keep the two countries going for more than two hundred years."

(Lop off 175 from the 200 years and the statement would be more nearly correct for Canada East of the Rockies. As regards West of the Rockies, the pulpwood would not "keep the two countries going" at all unless the mills, the towns, and hundreds of thousands of our eastern population moved across country to the Pacific Coast. Pulp and Paper industries must live "on top of" their forests. There's no such thing as shipping bulky raw material such as pulpwood from Vancouver Island to Bathurst, New Brunswick. Well, hardly!)

"The Georgian Bay district contains the largest area of white pine in the world, and sufficient to supply the trade for a number of years."

The foregoing quotations are quite sufficient to indicate the stuff fed to Canadian children these many years.

With such spread-eagle teaching of "unscratched resources," what incentive to conserve can be developed in the mind

## EDITORIAL

of young Canada? We save only what we value. We worry only in face of an expected misfortune.

If, as these ill-written children's encyclopedias teach, Canada is packed so full of timber that human comprehension stands aghast, what attitude can we expect from the next generation except that the present policies of forest devastation (being Canadian) are the greatest and wisest in the world?

## DON'T SPEND FROM CAPITAL!

**A**NY one acquainted with life insurance policies or the Canadian Government Old Age Annuities knows the arrangement by which the policy holder at 60 or 65 years of age obtains ten per cent or more on his investment but only by the gradual extinction of the capital sum. In other words he may enjoy a guaranteed life income until 85, far higher than the interest return, if he is content to leave no estate when he passes away.

How does this apply to the methods now in vogue by our provincial governments in forest financing? The provinces of Ontario, Quebec, New Brunswick and British Columbia own their forest lands. The limit holders are lessees of the timber growing thereon. They follow state-made regulations. Their title in the timber, not automatically renewable, is subject to forestry regulations, increases in dues, and whatever other provisions the state may impose. In other words the Governments are the bosses of the timber resources and are the legal and moral trustees in forest perpetuation. When a government "sells" a timber berth it does not sell its responsibility for keeping that berth in productive condition as a legacy to the next generation.

For many years past, the annual pillage of forest fires, insect depredations, etc., and the general lack of an effective scheme of forest management has kept our forest resources in a state of progressive deterioration. The United States Government considers that annual growth or increment of timber does not equal one-fourth of the annual timber cut. Applying even half that ratio to Canada we see at once that with the added inroads of forest fires and insects our forest possessions (certainly east of the Rockies) cannot stand the strain very much longer.

Is it wise or prudent that with a property travelling the road to eventual insolvency, any government should take millions of annual revenue out of the capital account of public-owned timber,

Is it good business to regard the forest resources as the savings account solely of this transient generation, from which we may enjoy a high annuity at the price of extinguishing the capital investment?

Just as surely as we weaken our capital account in forests, will the annual interest become progressively poorer. No government can extract timber dues from a barrens, or collect taxes from the owner of a sand dune.

If a province spends half a million on forest fire prevention and the timber losses run over two millions a year, is it not common prudence to spend another half million to block the inroads of fires?

If common sense management of timber cutting will increase reproduction of the best forest species, and maintain the capital stock of the forest for all time to come, is it not a fairly bright idea that twenty-five per cent of our forest revenues should be devoted to such an achievement?

When a million dollars a year could give a province a highly effective forest service, with an A-1 personnel, qualified to provide a perpetual insurance policy on the timber resources and the regularity of large state revenues from timber sources, is it a reasonable policy to rob the replacement account of this mighty resource in order to save the tax payer of 1921 from meeting his bills for roads, court houses, and such other public services?

A high provincial income from timber sources today means a low provincial income tomorrow unless replacement of forest capital is provided for from current receipts.

## Progressive Forest Policies Cannot be Postponed

"Whether we have a high tariff or no tariff, an income tax or a head tax, direct or indirect taxation, are matters which concern, to be sure, the temporary convenience of the members of society, but their prejudicial adjustment is easily remediable; when ill effects become apparent, the inconveniences may be removed with but little harm to the community and none to mankind at large, or to the future.

But whether fertile lands are turned into deserts, forests into waste places, brooks into torrents, rivers changed from means of power and intercourse into means of destruction and desolation—these are questions which concern the material existence itself of society, and since such changes become often irreversible, the damage irremediable, and at the same time the extent of available resources becomes smaller in proportion to population, their consideration is finally much more important than those other questions of the day."—Dr. Bernard E. Fernow, Director of the Canadian Forestry Association.

## Crowded Europe Retains Greater Percentage of Area under Timber than Uncrowded Canada.

Note how the chief nations of Europe have retained as timber reserves percentages of their total area far in excess of any of the Prairie Provinces of Canada.

### IN THE FOREST RESERVES OF WESTERN CANADA.

|                   | Acres.     | Percentage of total area. |
|-------------------|------------|---------------------------|
| Alberta .....     | 16,711,776 | 14.00                     |
| Saskatchewan..... | 6,197,707  | 3.97                      |
| Manitoba.....     | 2,606,400  | 1.75                      |

### IN THE FOREST RESERVES OF EUROPE.

|                       | Population per square mile. | Percentage of total area in permanent forest. |
|-----------------------|-----------------------------|---|
| Belgium.....          | 652.                        | 18.3  |
| France.....           | 189.5                       | 18.7  |
| Germany.....          | 310.4                       | 25.9  |
| Switzerland.....      | 234.4                       | 22.7  |
| Sweden.....           | 32.4                        | 47.8  |
| Russia in Europe..... | 64.6                        | 31.0  |

### A SOLDIERS' LIVING MEMORIAL.

Victoria, Oct. 3—Lieut. Gov. Nichol yesterday afternoon planted the first tree in what it is claimed, will be one of the outstanding war memorials of the empire, in the form of an avenue, which when completed, will contain one tree for each British Columbia soldier who lost his life in the great war. An enamel plate will be embedded at the base of each tree.

### BOOK REVIEWS.

#### Forest Mensuration

By Herman Haupt Chapman, M.F. Harriman Professor of Forest Management, Yale University Forest School.

This book contains a thorough discussion of the measurement of the volume of felled timber, in the form of logs or other products; the measurement of the volume of standing timber; and the growth of trees, stands of timber and forests. It is designed for the information of students of forestry, owners or purchasers of timberlands, and timber operators. The subject matter so treated is fundamental to the purchase or exchange of forest property or of timber stumpage, the valuation of damages, the planning of logging operations, and the management of forest lands for the production of timber by growth.

It is intended as the successor of Graves' Forest Mensuration, and was undertaken at the request of the author, H. S. Graves, whose original text, Forest Mensuration, appearing in 1906, set a standard for text-books in forestry and has been of inestimable value to foresters and timberland owners in America. The present text is not a revision of the former publication, but an entirely new presentation.

### FOR CANADA.

Canadian Forestry Association:

"Your travelling lecture car must be planting thoughts that will develop into something fine for Canada."

Dr. H. M. AMI, Ottawa.

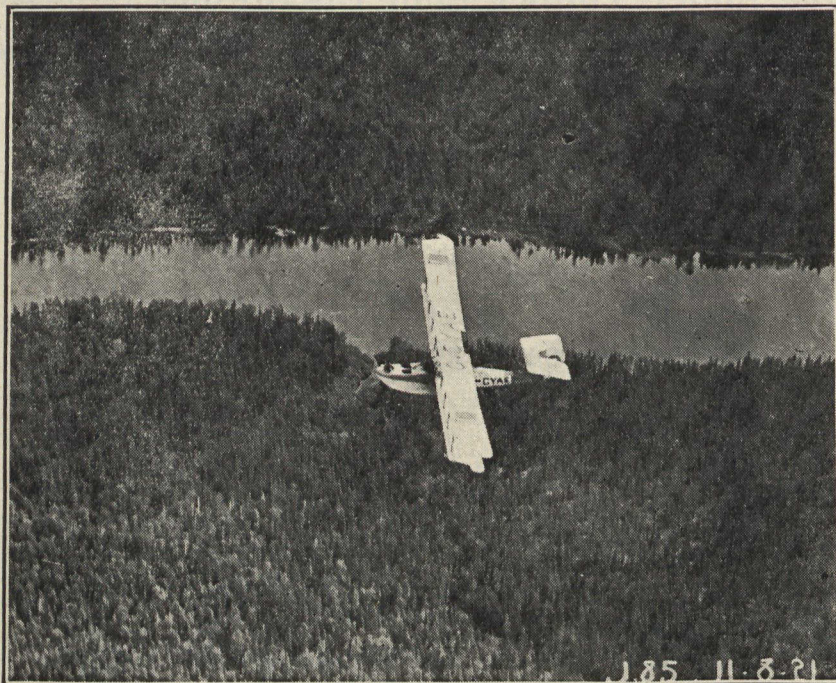
### AN OTTAWA WELL-WISHER

From Mrs. W. Vaughan, Ottawa, Ont.:

"Your wonderful Forestry Magazine is such a splendid book, and I notice how it has improved so fast, I wish it success and more success.

"I have the opportunity of visiting the lumber woods at times and the magazine finds its way to different men there who appreciate it highly. It is carefully preserved and passed around the camps to read and should put a lot to thinking.

## Europe Adopts Civil Aviation as Sound Business



A unique photograph taken by one plane of another while surveying forest lands in Northern Ontario

While aviation in Canada is yet in its swaddling clothes awaiting further proof of its service possibilities under Canadian conditions, it is good to turn our eyes overseas and learn what French initiative and susceptibility to new ideas has already accomplished with aircraft. In the opinion of the Canadian Forestry Magazine, no amount of timidity or prejudice can hold back the practical application of aircraft to certain of the field operations of the lumber and paper industries of Canada and Government fire prevention and forest survey projects. If time means money, as it actually does in all these enterprises, then the aeroplane or seaplane must find its place in the equipment of the progressive wood-using industry. Too much emphasis cannot be laid on the necessity for securing the most expert advice, from persons and firms concerned not in stunt flying or in ornamental aviation but in the adapting of aircraft to plain economic ends. Such firms can be found in the advertising pages of the Canadian Forestry Magazine.

### An Aerial Time-table.

The countries of continental Europe, particularly France and Germany, are leading in the development, with England and Italy close seconds. Almost every capital in Europe, except Berlin, is now linked with Paris, or about to be, by regular air lines, many with daily service. In Germany, the air lanes are shorter, being mostly confined to the nation's own territory, but, it appears, they are hardly less thoroughly developed and they connect with lines that lead nearly every-

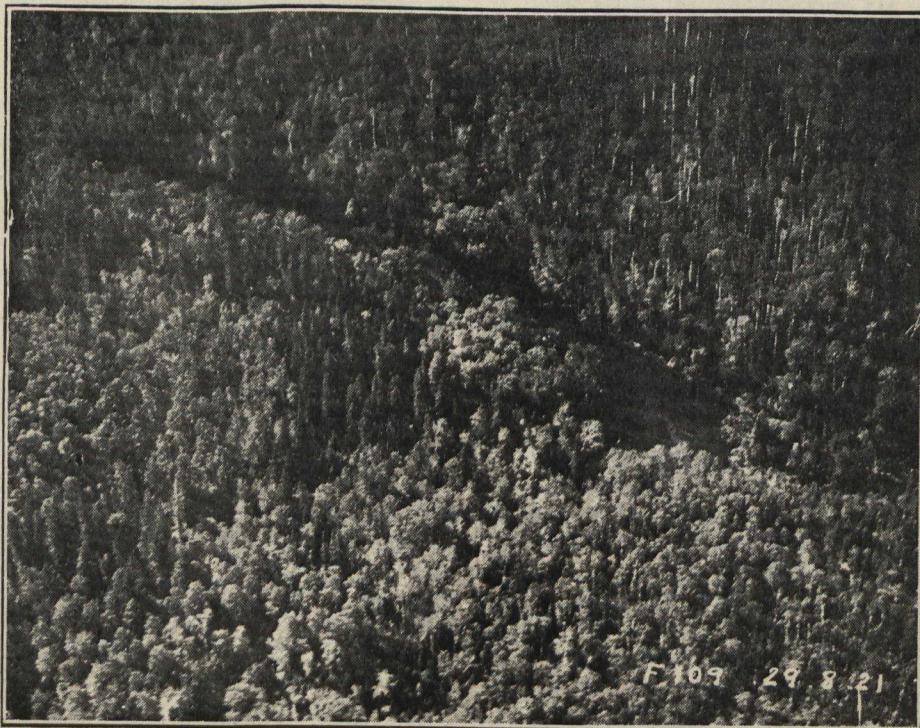
"Aerial Age" (London) quotes him further:

Fourteen pages alone are filled with the details of regular daily or twice daily services to places within the borders of Germany. They give to the minute the times of departures and arrivals. There is not even a saving clause about wind and weather permitting, so that it requires quite a mental effort to realize that before one are the pathless tracks of the air and not steel railroads.

By arrangements with Holland and other neighboring countries long distance services are linked up with England and Scandinavia. There is a map which shows at a glance the principal daily services inside Germany and their communications with overseas routes.

To this regular passenger transportation all sorts of subsidiary services are being added. The flying post, for instance, is rapidly developing, especially as it is not burdened with any special regulations apart from a slightly higher tariff. All one has to do to insure this speedy delivery is to mark the letter "by flying post," and drop it into any letter box in the ordinary way. In this matter, too, international arrangements have been made so that a letter posted in Berlin at 7.30 o'clock in the morning reaches London, for example, at 5.30 the same evening.

One interesting use of the aeroplane, to which special attention is directed, is for keeping the rest of Germany in swift touch with the lost territories, such as Danzig,



An aerial "oblique" photograph by the Dominion Air Board illustrating how clearly timber can be differentiated from "on top".

or areas like Memel, whose fate is not yet determined, so that the populations of these districts shall not cease to imbibe the true gospel of Deutschtum.

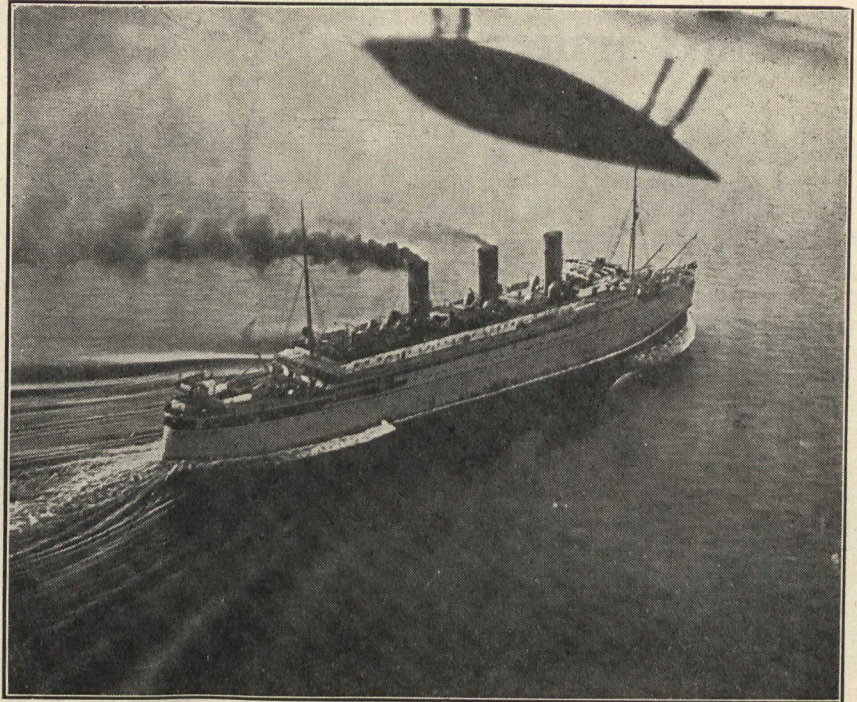
Aeroplanes leave Berlin early every morning loaded with newspapers. Hydroplanes serve the same purpose for the Island of Sylt, off the coast of Schleswig, leaving Hamburg immediately on the arrival of the Berlin journals by train.

**A Service Everywhere.**

Reverting to the aerial "Bradshaw," a glance at the advertisements reveals still further enterprise. Here, for example, is the Hamburg-American line offering its own services to any town in Germany. It will send passengers or goods by special aeroplanes available to start at the shortest of notice. Another firm supplies aerial photographs, suggesting their particular desirability for enterprising financiers on the lookout for suitable sites for establishing new settlements and spas.

During June the machines of the Lloyd Ostflug flew 41,480 kilometers without a single accident since the start of the service. Junker all-metal cantilever-wing limousines are used on the service, and are of a type suitable for it in that, owing to the possibilities of forced landings in open country which lacks accommodation, the metallic construction renders the machines almost weather-proof.

It is in France, however, untrammled by the troublesome air restrictions forced upon Germany by the Allies, says another writer, the Paris correspondent of the New York "Herald," that civil aviation and air transport have received their



Another use of aircraft in Canada: following the Empress of Russia into Vancouver to prevent the illicit trade in drugs. Formerly, packets of drugs were dropped from ships into the harbour with buoys attached, to be picked up by confederates.

greatest impetus. Working quietly over the space of the three years since hostilities ended, we are told:

France has accomplished records that are perhaps less imposing than the crossing of an ocean or the scaling of mountain peaks, but which nevertheless have placed her to the fore as a leader of the world's aeronautic development.

The year 1920 was spent in the successful remodeling of the whole system of aviation. Under a new branch of the

national government, an Under Secretariat for Aeronautics, the principle of unity of technical control has been reconciled with autonomy in the administration of the commercial, military and naval branches.

This department, nursed by the parent government through a separate budget, has assisted financially in the establishment of the prodigious net of commercial airways across the land. It is responsible for the preparation of efficient training centers, has instituted pilots' schools, created a national office of meteorology, and is at present seeking not only the betterment of commercial aviation but the encouragement of scientists and inventors who have turned their attention to aeronautics by offering substantial bonuses for improvements to the motor, control of the planes and everything that goes to make up the ship of the air.

It is the ambition of the French enthusiasts to permit one to breakfast in any part of France and lunch the same day in the most distant corner. Travel that requires more than twenty-four hours on the fastest express trains, from the Channel to the Riviera, has already been accomplished between lunch and dinner time. The whole programme of international airways now being worked up by the French department would permit breakfast in Warsaw and dinner the same day in Morocco, ordinarily a voyage by train and boat of four or five days.

A fraction of the progress made in the development of air travel is indicated in statistics compiled by this government de-

(Continued on p. 490.)



"Land of the forest and the lake" as the airman sees it.

## The Farmer and His Out-at-Elbows Wood Lot

(A Letter to the Canadian Forestry Magazine, from Mr. H. G. Cockburn, Guelph, Ont.)

The protection from fire and the reforestation with young trees is important in certain localities, but I do think a great deal can be done throughout the lower parts of the province of Ontario in educating farmers who are the owners, to preserve these woodlots. There has been an established department throughout the province in existence as long as the writer can remember, for the protection of our fish and game. This has been done through inspectors over stated areas, and which has apparently worked out reasonably well for what it was intended, and I have no objection to the expenditure of that department, but if the province had spent the same amount of money under the same system by having timber wardens established in like manner, my opinion is that \$1,000 would have been saved for the province for every dollar that has been saved through the preserving of game, and while there may be some other means of conducting such a department, I would be pleased if you could interest as many men as you can until something definite is put on foot. I will continue to do my part.

I am holding 30 acres on one farm of 150 acres, 60 acres of which is in apple orchard, and I am carefully preserving these 30 acres and keeping some record of tree growth which now runs from about four inches to twelve in diameter, of Oak and Pine. Besides this, having a field of worthless sand hills sprinkled with a few Oak trees, and worthless for general farming, eight years ago I planted 1,000 Chestnut and 1,000 Scotch Pine, and six years ago I planted about 4,000 more Scotch Pine, and this year I have squared out the piece with another 2,000 Pine. The Chestnut I do not consider as being a success, as they appear to get frozen back and have made slow progress besides a great number of them having died off. The Scotch Pine I consider a great success. You will probably be interested in a photograph of these eight year old trees, which you will note are now from 12 to 15 feet high, and some of the trunks now measure as much as four inches in diameter. I also enclose you a photograph showing a top view of the six year old plantation, which represents the face of a sand hill which was worthless for other purposes, and upon which this forest of Pine is growing without the loss of a single tree, and I have followed one root from one of these six years old trees the size of my finger, six inches below the surface for thirteen feet from the tree



WHY NOT TURN EVERY SAND DUNE INTO A CROP PRODUCER?

The photograph shows a stand of 2,000 Scotch pine, eight years old and from twelve to fifteen feet high with diameter averaging over four inches. These trees were about twelve inches high when planted, and were planted by Mr. H. G. Cockburn, of Guelph, Ont., an ardent believer in tree planting.

when it branched, and each branch was then traced about three feet further. These six year old trees now average about five feet high.

I also planted some Locusts which are doing very well, but according to my judgment the Scotch Pine looks like the best proposition.

## The Case for Forestry in a Nutshell

The following table prepared by R. D. Prettie, Superintendent of Forestry of the Canadian Pacific Railway Co., and a Director of the Canadian Forestry Association, shows exactly how a decline in forest industries (which means wages paid, capital employed, towns maintained, etc.) has followed the denuding of the main bodies of timber in the Lake States of the U. S. A. and the Northeastern States. From large exporters, most of these states do not today grow more than a fraction of the timber consumed within their own borders. This does not mean that the lands denuded of timber have been turned into good farms, because each of the States now importing possesses abundance of idle and barren land on which timber crops should be growing.

Note the remarkable decline in relative timber producing importance of the first two groups, which have surrendered position to the Southern and Western States.

Percentage of Total U. S. Cut By Groups of States

| Year | North Eastern States | Lake States | Southern States | Pacific States |
|------|----------------------|-------------|-----------------|----------------|
| 1850 | 54.5                 | 6.4         | 13.8            | 3.9            |
| 1860 | 36.2                 | 13.6        | 16.5            | 6.2            |
| 1870 | 36.8                 | 24.4        | 9.4             | 3.6            |
| 1880 | 24.8                 | 33.4        | 11.9            | 3.5            |
| 1890 | 18.4                 | 36.3        | 15.9            | 7.3            |
| 1900 | 16.0                 | 27.4        | 25.2            | 9.6            |
| 1914 | 9.0                  | 10.5        | 47.7            | 19.3           |
| 1918 | 7.4                  | 7.8         | 34.9            | 25.5           |

## What Happens When a State is Deforested

One of the most striking items in the pulpwood situation in Pennsylvania is the fact that 74 per cent of the total quantity of wood used was imported from outside of the State. This means that the forests of Pennsylvania were able to supply only 26 per cent of the wood used, and that 362,293 cords out of a total of 489,211 cords were brought into the State. Spruce, which comprises 26 per cent of

the wood used, was all imported and most of the Yellow Pine, Poplar and Gum was imported. One mill located in the northern part of the State uses Jack Pine almost exclusively, all of which is imported from Canada. Another mill located in the southern part of the State uses only Jack Pine, all of which is imported from the South.



# The Pulp and Paper Industry's Stake in Forestry

By Arthur L. Dave, Secretary Canadian Pulp and Paper Association

**T**HE Pulp and Paper Industry of Canada—in the East as in the West—is passing through a somewhat trying period, as can be said of practically every industry in this country.

The conditions which brought it about are universal and are not due to any inherent weakness in the structure of the industry nor to short-sightedness or bad judgment on the part of those who control its affairs. It is true that the years 1919-1920 witnessed a very considerable increase in the number of pulp mills in Eastern Canada, particularly in Ontario and Quebec, and that last year and this have witnessed notable additions to the number of paper-making and board machines in these two provinces.

## Planned Before Boom Period

Contrary to general belief, however, the bulk of these enterprises were not predicated on the abnormal demand for pulp and paper which developed soon after the war ended and reached its peak in the closing months of 1920. They were in most cases the outcome of plans made long before—in some instances even antedating the fateful summer of 1914—and were founded upon adequate knowledge of the fundamentals of the industry and a confidence in Canada's advantageous position as a contributor to the world-wide demand for such staple commodities as pulp and paper and their numerous derivatives. There is no reason, therefore, to apprehend that when conditions are once again stabilized Eastern Canada will be found to have outrun prudence and prescience in providing for the future. On the contrary, when the disabilities at present imposed on Canadian commerce in these commodities by reduced demand and by the deflated money of our chief foreign competitors are removed, as they will be in due time, there will be a ready and profitable market for all the pulp and paper Canada can produce and an orderly and consistent expansion of the means of production will continue, as in the past, so long as the Canadian forests are able to provide a steady supply of pulpwood.

## Investment of \$264,000,000.

Canada's pulp and paper industry represents, according to latest census figures obtainable an investment of \$264,581,300. (Current estimates place it at between three hundred and three hundred and fifty millions). Of this amount \$232,551,227, or 87.5 per cent, is represented by pulp and paper mills in Eastern Canada and \$32,030,073 by those in the West, chiefly in British Columbia. The Eastern provinces are represented as follows: Quebec \$124,101,154; Ontario,



Work that takes real grit. River drivers on the Key River, Ontario, operations of the Schoeder Mills & Timber Co. Photo by Leslie B. Powell, Pakesley, Ontario.



Showing how accurately timber can be photographed from the air by special aerial cameras. This shows a timber area with river and clearing. Hundreds of these pictures are taken and accurately fitted together to make a complete photographic mosaic.

\$95,281,040; New Brunswick, \$1,208,255; Nova Scotia, \$1,208,255. The totals in the two last-named provinces represent investment in the production of pulp only, with five mills in Ontario with a capital investment of \$6,703,755 and seventeen in Quebec involving \$9,489,520. Ontario has nine pulp mills, capitalized at \$21,575,584 and Quebec seventeen representing an investment of

\$28,763,850. The investment in combined pulp and paper mills in the Eastern provinces is as follows: Ontario, thirteen mills, \$67,001,700; Quebec, twelve mills, \$85,487,794.

## 1921 Will Equal 1919

In 1919—before the era inflated prices—Quebec produced pulp and paper products valued at \$52,549,103 and Ontario

\$48,683,437. Despite decreased demand and a falling market in 1921 there is reason to believe that when the returns are made up for this year it will be found that they are equal to if they do not surpass those of 1919, which, up to that time, was a record year.

#### Must Increase Canadian Pulpwood

But, as already indicated, the future of this great industry in Eastern Canada depends altogether upon a continuous and, in fact, an increasing supply of pulp wood at a price which will enable Canada to compete in the world's market. It is with this phase of the future of the industry, rather than with its more purely commercial aspect, that Canadian forestry is chiefly concerned. Unless steps are taken at once to ensure a more reasonable use of our forest wealth than in the past, and adequate provision is made for their replacement by either natural or artificial means, there is bound to come a time when the industries dependent on them will run short of their raw material and cease to expand and to keep pace with the world's constantly increasing demand for pulp and paper. The intelligent application or the withholding of these policies is bound to affect not only Canada's industrial status but also the price that the world consumers will ultimately pay for these commodities.

#### Lower Cost of Labor and Supplies

Labor and supplies play a large part in logging operations, but the cost of these two factors will not steadily increase. Logging is, after all, mainly a matter of transportation, and the farther from the mills and the more difficult the transport of logs is, the greater the logging cost. Also, as we go farther into the North for our timber, the time it takes to grow trees increases, the trees are smaller and give a smaller yield per acre, making the cost of logging greater. The cost of transporting wood, as logs, the handiest package of fibre we know, is so great that most of it must be borne by rivers. With proper methods of handling our forests and of replacing them by planting the above process becomes reversed and our curve of costs, while at first rising slightly, owing to increased costs of more conservative logging and the cost of planting, will soon commence to decline because the number and size of the trees per acre will increase and the plantations can be made in close proximity to mills, reducing the distance that the wood will have to be transported, decreasing the cost of logging and fire protection and enabling the employment of machinery for logging which will reduce the number of men. The planting and care of these forests will also give employment to large additional populations.

#### Pioneering in Forestry

In Eastern Canada the pioneer in forestry progress has been the Province of Quebec, which under Sir Lomer Gouin,

established a forest school and forest service. The Hon. Jules Allard, Minister of Lands and Forests, established the principle of cooperation with the holders of timber lands for fire protection which has given timber lands in Quebec a security from destruction by fire second to none. Steady progress has been made along lines of conservative forest management and the Provinces of Ontario, New Brunswick and Nova Scotia are following the lead of Quebec.

#### Co-operation With Mills.

The principle of co-operation with private interests, mentioned above, has shown the broad-mindedness of the Quebec Government, and has marked a most interesting development. Instead of tying everything up with red tape and trying to run everything by Government departments, great public works, such as storage dams, bridges and roads have been built co-operatively, that is, the Government has contributed part of the cost, approved the plans, and allowed the works to be carried out by several private companies working together. Fire protection of forests is handled now almost entirely by cooperative associations of timberland holders and the government has placed its own lands under the protection of these associations.

#### Forest Fire Protection

Another most interesting phase of the sentiment for the proper utilization of the forests on the basis of a sustained yield in Canada has been the interest taken by the great pulp and paper companies. They realized that with their large investments in plants of a permanent character, with towns and villages and often whole districts dependent on them, they must look to the permanence of their supplies of raw material. The first step along these lines was made in 1908 when the Laurentide Co. established a fire protective association to safeguard the forests along the line of the National Transcontinental Railway then building. Two years later this expanded to the St. Maurice Forest Protection Association, which was later followed by the Ottawa, Laurentian and Southern St. Lawrence Associations, which cover nearly the whole of the province.

#### 5,000,000 Trees a Year

In 1908 the Laurentide Co. also commenced to plant trees and now has a nursery covering forty-six acres, is planting a million trees a year, and plans to plant five million per year by 1924. Its example has been followed by the Riordon Pulp & Paper Company, the Abitibi Company, and the Spanish River Company.

#### Air Craft for Pulpwood Limits

The Laurentide Co. was also the first to use air craft in forest patrol successfully, and for two seasons have carried on aerial reconnaissance and mapping of their timber holdings. Over a thousand square miles were photographically map-

ped last year, and plans for the coming year call for the mapping of twice that amount. Other companies have since adopted air-craft as part of their enterprise. The use of aircraft makes possible a rapid stocktaking of timber lands at a cost far below that of the same work on the ground. The wide-spread areas—several companies have five thousand square miles of forest—the utter lack of maps, the difficulties of transportation, have all hindered this work, which is of vital importance. Enormous areas have been burnt in the past, and until their size can be determined and a fairly accurate estimate of the amount of timber can be made, no intelligent plan of operation can be prepared.

#### Under Trained Foresters

Active steps are being taken by the Quebec Government to get the large companies to place their holdings under the management of trained foresters and to co-operate more closely with the Government in operating them for a sustained yield. The establishment of a school for forest rangers is under discussion and the Woodlands Section of the Canadian and American Pulp and Paper Associations are trying to establish an experiment station where new methods and machinery for reducing logging costs can be tried out co-operatively.

It will be seen by what has been said that the preservation and proper use of our forests is of vital importance to the country at large as well as to the provinces whose fortunes depend in large part on those of the pulp and paper industry and that these, in turn, depend upon the intelligent uses of our forests which the Canadian Forestry Association is doing so much to promote.

#### "PUSH THOSE CLOUDS AWAY."

Toronto, Ont.—Blunt criticism for business men "who sit down and wait for the clouds to roll by" was voiced by John O'Connor, general manager of the Murray-Kay, Limited, in the course of an address.

"Every business man today is confronted with the option of sitting down to wait for the clouds to roll by or to get up and push those clouds away," he said.

Mr. O'Connor made some pointed remarks about men "who put their spare money into tax-free bonds and then go out and play golf or something else, and think that is going to save the situation."

"Such a plan is so ephemeral, and so obviously not the solution to any country's financial problems that I am surprised that men who have built fortunes for themselves can become converts to it," he declared. "Capital cannot exist in a strong box. The only place that capital can keep its life is out in the open. Nothing would be more fatal to any community than the common adoption, by all who had savings, of such a plan."

# Timber of Siberia and the Russian Far-East

By Waldemar Toritch, in the Timberman

**A** BETTER idea of Siberia's size will be gained if it will be mentioned that, roughly speaking, the territory of Siberia is larger than the combined area of Alaska, Canada, the United States and Mexico that the distance between Vladivostok and Petrograd is about 6250 miles, almost the same as between London and San Francisco; that a train leaving Vladivostok for Petrograd would make this run, including all stops, in about ten days, averaging about 28 miles per hour, and that the Vladivostok-Petrograd line is not by far the longest distance across Siberia.

## Variations of Climates.

The climate of such a large country cannot be described without subdivision. The Trans-caspian district has all of the characteristics of the extreme South, with cotton, southern fruits, much sunshine, and, in places, very little water, with sand deserts and almost tropical flora. The central part of the country, the Siberia proper, is very much similar to the Inland Empire, and its northern part resembles the climate of Canada. The northeast and Kamchatka resembles some parts of Alaska, and the country to the south of the Amur River is similar to the northern Atlantic states and southern Canada.

Siberia is crossed by a number of mighty rivers. The Ob, Yenesev, Lena, Kalima and Amur are of Mississippi class, deep and navigable for boats of considerable draft for many hundreds and even thousands of miles. The source of most of these rivers and their tributaries lie in central and southern Siberia, some even in Mongolia and Manchuria. Many of them cross the Siberian and Chinese Eastern railroads and act as feeders for freight. The drawback of most of them is that they empty into the Arctic Sea and remain a considerable part of the year under ice. The Amur River is the only one of that class that discharges into the Pacific Ocean.

Navigation in the Arctic Sea has not yet developed to any large extent, but its beginning is already accomplished. The possibilities of bringing by water merchandise into the very heart of Siberia, and to exchange it for timber, grain, hides and other raw materials, has prompted European shippers to send steamers into the mouth of the Ob and Yenesev rivers. Fur, mammoth teeth, gold, are already attracting schooners to visit the Lena, Kalima and Anadir rivers and American traders are numerous in the Russian north-east.

## Rivers Serve Twofold Purpose.

The great Siberian river system forms, practically speaking, the main inland

ways of communication in the northern part of that country, even in winter, when the river beds are used as sledge-ways. A little study of their direction will show that all of these northern waterways can be easily connected to form a water route across the whole country. Long before the construction of the Siberian railroad, the Russian government had begun and had partly carried out the work on a new wonder of the world—a Pacific-Atlantic inland waterway across the wildest part of Asia and Europe, consisting of a combination of rivers and canals, connecting Nicolavsk and Vladivostok on the Pacific Ocean with Archangel on the White Sea, Astrakhan on the Caspian, Moscow via the Volga River, Petrograd and Riga on the Baltic Sea, and Odessa and Novorossiysk on the Black Sea. Probably the time will soon come when this work can be reopened, and one can easily foresee what influence a cheap, though slow, transportation of timber, grain, ore and other commodities from the interior of Siberia to the seven seas and industrial centres will have on the world's trade.

Siberia has no railroads of its own. The

Siberian, Amur, Ussuri and the Chinese Eastern railroads are only the eastern termini of the Russian European railroad net. They were built, not to serve Siberian needs, but chiefly the needs of Central Russia, and as an outlet of the European Russian railroad to the Pacific

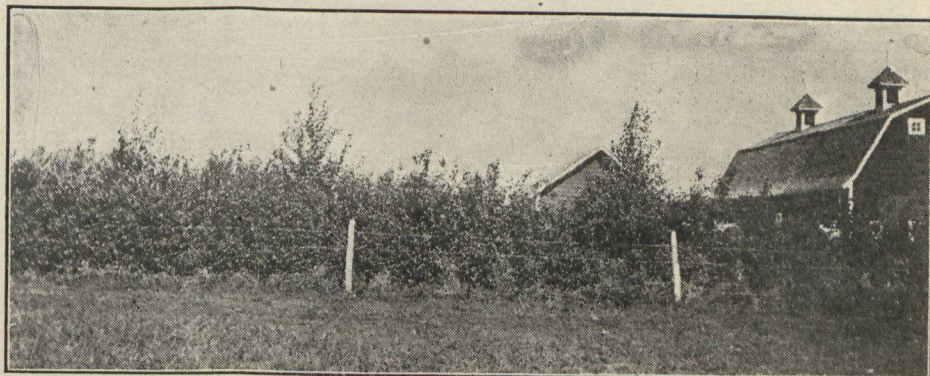
## Population Extremely Sparse.

Siberia is sparsely populated. The official figures state it to be less than five-tenths inhabitant per square mile, as compared with 30.9 inhabitants per square mile in the United States. The greater part of the population is concentrated along the old mail route and the railroads. The towns are situated either on the principal rivers, or along the railroads, and are small, having from 5,000 to 250,000 inhabitants, and often are far from being improved.

Siberia is a hilly and mountainous country. Flat lands are found in the west (the Tobolsk and Tomsk provinces), along the border of the Arctic Sea (marsh plains), and the river valleys. Valuable deposits of various metals and minerals are known and quite a number



No, this is not a scene of tropical vegetation. It was taken on the Clearwater Forest Reserve in the Province of Alberta.



"Let the prairie winds blow! My live stock is protected." One of the thriving shelter belts on the farm of Mr. A. Fletcher, Zealandia, Sask.

of mines have been worked to a considerable extent. Placer gold mining in Siberia is over 200 years old; Peter the Great established there the two first iron works; for decades convicts and private miners worked government and private gold, silver, copper, lead, zinc, coal, graphite and other mines. Oil is known to exist in several places; for instance, on the Sakhalin Island, in the Okhotsk region, and to the north of Kamchatka.

Siberia is rich in all kinds of valuable fur-bearing animals. Polar bear, northern deer and polar fox are replaced more to the south by sable, ermine, black and brown bear, rock-doe moose, red fox, etc., and tigers. Millions of birds inhabit and pass across the country twice each year. Rivers and coast waters are enormously rich in many varieties of fish; and the choicest kinds of salmon, herring, mackerel, cod, etc. Sea animals, such as whales, walrus and seals, live almost unmolested. Crustaceans of many kinds, oysters, clams, are hardly touched by the fishermen, and generally speaking, the whole Siberia does not utilize more than 1 or 2 per cent of its piscatorial resources.

#### Siberian Forests.

But the great wealth of Siberia lies in the immense Siberian forests. Siberia can be rightly called a timber land, the greatest forest reserve of the world.

It is impossible to give even approximate figures of the Siberian forest area. It surely runs into billions of acres. No exact figures are available, because up to the present time tens of thousands of square miles of Siberian forests have never been visited by a forester or by a surveyor. Siberia has not been properly mapped and many of its landmarks are registered either by eye-sketches, or even by heresay. Only forests in the close vicinity of commercial or industrial centers are known to some extent; the rest is guesswork or imagination.

As the main object of this article is to picture the timbering possibilities in the Russian Far East, it would be superfluous to go into any details in describing the Siberian forests in general. However, some information on the subject will be necessary, because even the far-away western forests are bound sooner or later to have a great effect on the world's timber trade, and in this way they might influence the American timber industry and timber export.

For almost two centuries the English were buying and exporting timber and lumber from northern Russia, from the White Sea (Archangel). Gradually the trade extended eastward to Chesskay Bay and to the mouth of the Petchora River. The next large timber river is the Ob, in Siberia, followed by the Yenesev. Years ago the attention of British traders had been called to the great possibilities of obtaining cheap and good pine (yellow

and white), fir, larch and spruce from the immense systems of these rivers. Several years before the world war British and Scandinavian steamers were making attempts to establish regular connection with these rivers. They found the floating ice fields of the Arctic to be the greatest obstacle in their achievement. At the present time a plan has been worked out to patrol the ice fields by hydroplanes, attached to the lighthouse on the Yamal peninsula, reaching out far into the Kara Sea; the lighthouse to report the position of ice to the steamers. Such a lighthouse is already erected, and is equipped with a powerful wireless station.

#### Woods Eventually Will Find Market.

The appearance of the western Siberian wood on the European market is bound to have an effect on American timber trade. Previous to the war Russian White and Baltic Sea timber was dominating the British timber trade. It does not make any particular difference as to what kind of government will be next and permanently established in Western Siberia. This government is bound to be poor and in need of money. The easiest way of obtaining it would be to sell timber, or by granting concessions. Britishers are already obtaining timber concessions in the northern part of European Russia. The Ob and Yenesev rivers are not far from British centres of timbering in the Russian north. They are also nearer to the European consuming centers than the American export ports, especially those on the Pacific. Siberia has always been noted for its cheap labor, and this cheapness, combined with the low royalties, no port dues or other taxes on the Ob and Yenesev, and cheap steamer freight on European waters, not only outbalance the difficulties of navigation in the Arctic, but also extend the market for this northern Siberia timber to Germany, France and the Mediterranean Sea. This trade will also be stimulated by the possibilities of obtaining Siberian raw products in exchange for manufactured goods.

#### Amur River Region.

The Amur River region is bound to become the center of Russian timbering. The Amur River system drains a territory of over 760,000 square miles, and affects economically almost twice this area. This river takes in the water from the greater part of Manchuria, of eastern Mongolia, of a considerable part of the Transbaikal province, the whole of the Amur province, and of the main part of the Maritime provinces.

The total length of the Amur and its tributaries is nearly 40,000 miles, of which over 11,300 miles are navigable for boats and steamers; over 14,970 miles are suitable for rafting purposes, and over 5,500 miles are smaller streams. These

figures are changeable. A great many streams are not classified as navigable, not because they are not such, but because there is nobody to navigate them. The same refers to streams suitable or unsuitable for rafting. A great number of them can easily be made to raft or float down timber.

#### Seventh Longest in World.

The Amur River is formed by the conflux of the Shilka and Argun rivers. From this point down to the Tartar Strait, the main stream is 1532 miles long. Together with the Argun River, it is the seventh longest river in the world. In its sources, the river has the character of a swift mountain stream, though navigable for a few hundred miles. Towards the Zea-Amur watershed it becomes a quiet broad river, at places as much as five and six miles wide, and runs through marshy lowlands at a speed of about four miles per hour, with an average depth of about ten feet, and from two to three feet of water on the numerous shallows. The fall of the river water level is as follows: At Pokrovka it is 1180 feet above the sea level; at Blagoveshtchensk, 360 feet, and at Habarovsk, 90 feet, a total fall of 1090 feet. The lower Amur, from Habarovsk to the mouth of the river, is 588 miles long. Its width at places is 1.5 to 2 miles. It forms many lakes and receives water from others. The current becomes slower; the average depth greater, with only a few shallows not less than 14 to 16 feet deep, and for some distance from its mouth the river is deep enough to accommodate the biggest ocean going vessels.

#### MAKE FORESTRY A PUBLIC ISSUE.

Mr. H. R. MacMillan, of the H. R. MacMillan Timber Export Co., Vancouver, in an address before the British Columbia Forestry Convention at Vancouver, declared that the timber industry was basic, and that the resources were being used up very rapidly, while very little attention was being paid to the necessity of reproduction.

"We must force upon our governments the necessity of a square deal to our forests," declared the speaker. "The policies of the government in regard to forest fire prevention, and more especially to the problems of conservation and reforestation are not aggressive. Immigration, railways and the problem of remaining in office engage their attention, while the greatest resources of the country are being rapidly consumed, or, at least, deteriorating in quality to such an extent that there is grave danger for the future."

# Climate and Tree Growth of Mackenzie River Oil Region

(From a Bulletin of Canadian Institute of Mining and Metallurgy, by Dr. E. M. Kindle.)

Although the new oil-district lies in the latitude of southern Baffinland and south Greenland, it has a far more genial climate than its latitude would suggest. The gardens at the trading posts in this part of the Mackenzie valley afford a good variety of the more hardy vegetables. Potatoes of excellent quality and good size are raised as far north in the Mackenzie valley as the Arctic circle. The nearly continuous sunshine of June is the great factor in the exceedingly rapid development of vegetation. Mr. Chas. Camsell, who has a more intimate knowledge of the climate on the Mackenzie valley as a whole than anyone else who has written on the subject, states that, "in general it may be said that any point in the Mackenzie basin has a milder climate than any corresponding point of the same latitude in Northern Manitoba, Ontario, or Quebec." The relatively warm summer-climate of the Mackenzie valley may be ascribed chiefly to its remoteness from the chilling influence of Hudson's bay, and to its low average elevation. Most of this great lowland is less than 500 feet above sea level, while much of the northern half of Alberta immediately south of it lies 2,000 feet or more above tidewater. Warm air-currents from the Pacific may also be a factor. Ripe red raspberries were seen on August 7th at Bear mountain, which is about 40 miles from the oil-well. Blueberries were a feature of the writer's camp fare from the first week in August to the end of the summer. The writer spent the latter part of August and the first ten days of September in 1919 in the Wrigley district. At river level the first frost came on September 1st. At Simpson the first notable freezing of the season of 1919 occurred on the night of September 25th.

## Physical Geography.

Both the Peace and the Athabasca rivers flow in valleys deeply incised in the nearly horizontal Cretaceous shales and sandstones of the Alberta plateau. The traveller taking the Peace river route to the new oilfield, passes for several miles along one stretch of the river between deep canyon-like walls of sandstone. In scenic beauty this canyon ranks with the great canyons of the continent.



Photo by courtesy Geographical Review.  
Winter travel on the Athabasca River

The sharp turns of the river, which has cut its valley from 700 to 800 feet through the sandstone and shales, always brings into view some new and striking combination of cliff, spruce-covered slope, and cloud-rimmed sky. Further down, the step walls of the river drop back and leave a broad, nearly level, valley bordering the river.

A heavy growth of spruce forest borders the Peace and Slave rivers everywhere. This forest extends northward to the delta of the Mackenzie. The timber, of course, decreases in size toward the north, but it is everywhere large enough for constructing cabins.

## FORESTRY AS A PUBLIC CAUSE.

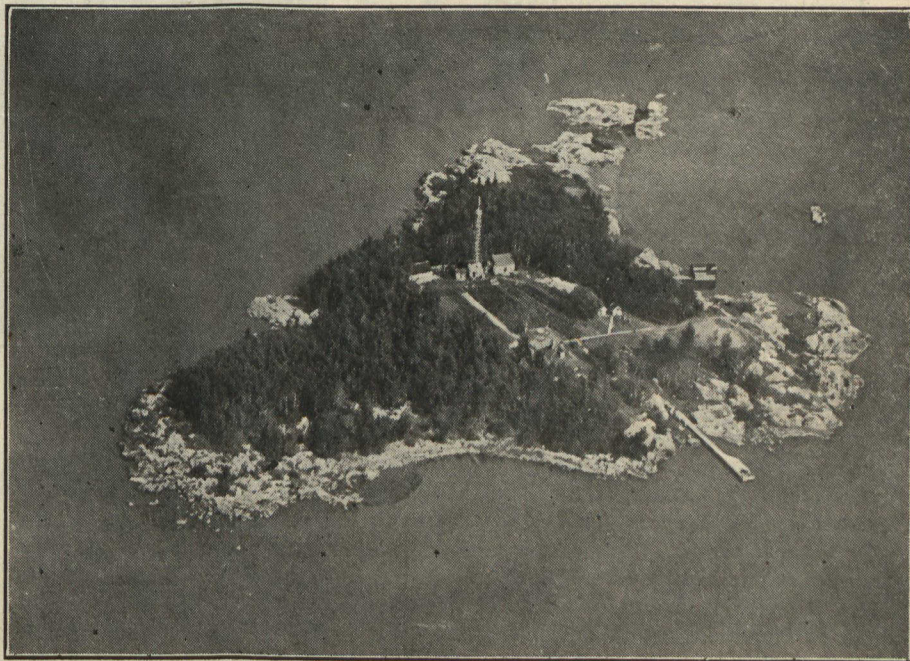
"I appreciate very much the new and attractive Forestry Magazine. I wish that my neighbors would take an interest and become members for the good of the cause."

EDWIN MOORE.

## ON PLANTING TREES.

"Only God can make a tree" said the poet. Yes, but almost anyone can plant a tree, and everyone who plants a tree of the right sort in the right place does a public service."

—"Regina Leader."



The "Movable Lookout Tower" soaring above the stationary Lookout Tower. A unique aerial photograph taken at Norway House, Lake Winnipeg, where the Dominion Forestry Branch has a forest patrol staff. Picture by courtesy, Dominion Air Board.

## The Use of Explosives in Planting Young Trees

The blasting of ground, where either fruit or shade trees are to be planted, has been extensively practised for several years in all parts of Canada.

Millions of trees of all varieties have been planted in ground prepared by the use of explosives, and there are hundreds of the best Orchardists who testify that the slight extra expenditure is repaid manifold in increased production.

### Directions for Use.

The soil should not be wet at the time blasting is done. Indeed the drier it is the better, because if the earth is quite damp, the explosion may cause it to pack and thus defeat the object in view.

For this reason the work is best done in the early Autumn, because then the subsoil is more likely to be dry. If the blasting is done in advance of the time of setting the trees, the ground is left without further attention until planting time.

The object is not to do away with the use of the spade, but to make the digging easy, to mellow the soil and to furnish

ample room for root development. The charge should not be placed and tamped in such a manner as to shatter the soil creating a porous water-absorbing condition in the subsoil that protects the tree against drought, which saves much loss during the subsoil that protects.

When the places for trees have been marked, punch or bore about 30 inches in depth. A satisfactory tool for this purpose is a heavy subsoil punch, which is made by sharpening one end of a 1½-inch steel bar, which should be from 3 feet to 3½ feet long.

The punch is driven to the desired depth with a sledge, and then, by hitting it one or two blows on either sides, it will be loosened and can be easily withdrawn. A 2-inch earth auger may be used, but of course this makes the work slower.

Next cut off a piece of fuse not less than 3 feet, and crimp a cap onto one end with a cap crimper. Insert the cap with the fuse into the explosives and tie securely. It will be well to experiment

with a few holes to determine the size of charge required, because in some soils half a stick of explosive will be ample, while in very hard subsoil a stick will not be too much—you can judge as to this fairly well by the use of a probing rod made from a light iron bar or by visible effect.

When the charge has been placed in the hole put in enough earth to cover the explosives 6 or 8 inches, tamping lightly, using a wooden tamping stick. Then ignite the fuse and retire to a safe distance.

When ready for planting remove the earth to sufficient depth to insure that no "pot-hole" is left from the explosion. If this should remain unfilled the earth might later on fall away from below the roots of the tree and thus injure or even destroy it.

In planting the trees they should be placed little, if any, lower than they were in the nursery rows, and the best of the soil should be saved to put immediately under and around the roots.

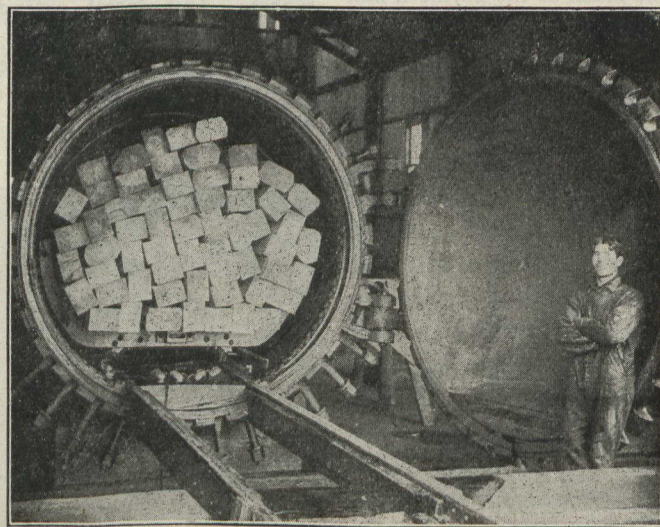
## The Battle Against Rot

How Creosoting Railway Ties gives Three to Five Times Longer Life at Double Cost. A Great Factor in Conservation of Wood Resources.

Canada's rapid railway growth—thirty thousand miles now, compared with half that amount twenty years ago—and the increasing cost and decreasing supply of good ties, has attracted the attention of the wood preserving industry to the Dominion. Forestry experts claim it takes sixty years to grow a tie, and that we place it in the track to rot out in from five to seven years, whereas it would give from eighteen to twenty-five years' service if preserved, or treated, before being used.

The recent completion of the new C.P.R. tie treating plant at Sudbury, Ontario, and the probability of a similar undertaking by the Canadian National in the near future gives special interest to the following article: The information and the picture are by courtesy of the Canada Creosoting Company.

On this continent in 1885 only 120,000 ties were treated out of a total of 50,000,000 used, while in 1912 about 30,000,000 were treated out of about 150,000,000 used. In other words, only about 1/400th part of the ties were preserved in 1885, while in 1912 1/5th of all the ties used were treated. In Canada alone in 1910 practically no treated ties were used. In 1911, 200,000 ties were pre-



A retort filled with railway ties ready to be treated with creosote under vacuum.

served before being placed in the road-bed. This was 1.4 per cent of the total number used. Last year about 2,500,000 ties were treated, or 10 per cent of the total number used. This shows that the Canadian railways have commenced the battle against rot.

Rot is the chief cause of failure of timbers such as ties, paving blocks, piles, etc. It is the breaking down of wood fibre that

is caused by the growth of small plants organisms known as fungi, which are usually carried by the wind, alight on timber and grow, sending microscopic threads or rootlets into the timber. These organisms live on the timber as food, causing the eating away or breaking down of the wood fibre.

Certain amounts of each of four things are absolutely essential to the existence of

these fungi; namely, air, moisture, heat and food. Take away entirely any one of these four, and the fungi cannot live. The timber cannot be protected from the air except in occasional instances, such as piles that are entirely submerged, in which case the timber needs no other protection from fungi, but may be exposed to teredo attacks.

It is also difficult, as a general rule, to protect the timber from moisture, but where it can be so protected the growth of the fungi is stopped. This is shown, for instance, by the excellent condition in which one often finds very old timber in interior construction.

If one could keep timber at or below the freezing point—say, in a cold storage plant—fungi could not live; but from the practical standpoint it is impossible to protect timber from heat.

#### Killing the Food Supply.

Therefore, the only thing that can be affected to destroy the growth of the fungi—the only one of the four essential conditions that can be removed—is food. The fungi have only the wood fibre for food, and if that food can be rendered poisonous, the wood will be preserved against their attacks. This is done by treating the wood with a highly antiseptic fluid.

To properly treat a tie in order to preserve it against decay requires a modern treating plant of considerable cost and complexity. In 1885 there were only three of these plants in operation on the continent, while there are now over one hundred such plants in existence, with an aggregate capacity of over 100,000,000 ties a year. In Canada we have but five of these plants, all built within the last four years, with an aggregate capacity of approximately 4,500,000 ties per annum. These plants are located at Sydney, N.S.; Fort Francis, Ont.; Trenton, Ont.; Transcona, Man., and Vancouver, B.C.

Up to the present only wood block and ties have been treated at Trenton, but it is expected to treat timber for station and outdoor platforms, switch ties, dimension timbers, decking, flooring for docks, bridges, fire halls, warehouses and heavy manufacturing plants, crossing planks, fence posts, signal poles, snow fences, piling, mine props, telegraph and telephone poles, cross arms, mine timbers, tie plugs, wooden pipe, and all material for breakwater and marine work.

The first ties ever treated in Eastern Canada from Canadian timber were creosoted at the Trenton plant recently for the Toronto, Hamilton and Buffalo Railway. The only woods used so far have been beech, birch and maple for ties, and southern yellow pine, and Norway pine for wood blocks, but spruce, tamarack, Montreal fir, hemlock and other woods will probably be treated later on.

Special attention will be given to the treatment of mine props, as timbers for use in mines decay very readily, owing to ideal conditions of moisture and temperature for fungus growth. Much of the failure of mine props now attributed to breaking and splitting is due primarily to rot. This can be prevented, and the original strength of the timber maintained, by creosoting or otherwise preserving it. The creosoting of mine timbers is not so expensive as some other forms of creosoting, because it is not necessary to obtain such great penetration. The uniformity of temperature and moisture in mines, and

the lack of exposure to the direct rays of the sun, result in no checking taking place, so that it is not necessary to get such deep penetration. And much lighter treatment than is given other timbers will therefore prove satisfactory. But this does not necessarily mean that any merely superficial treatment is sufficient.

#### Treated Ties Treble their Life.

The difference in strength between untreated and treated ties and timbers, except in the case of those treated with heavy oils which protect the timber from excessive moisture and add to its strength,

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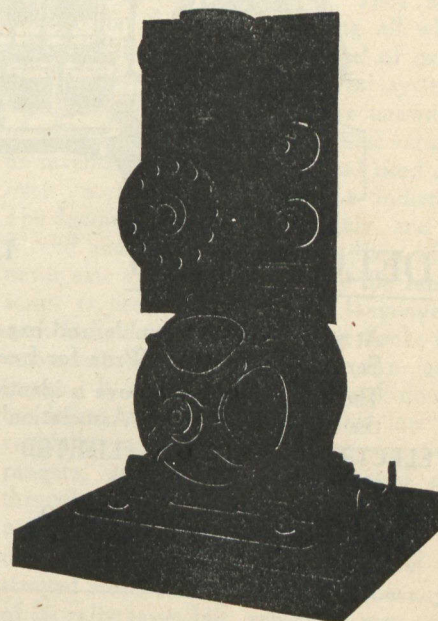
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THE BELT DRIVEN PLANT MAKES THE INSTALLATION OF ELECTRICITY IN THE VERY SMALLEST MILLS PRACTICAL AND ECONOMICAL

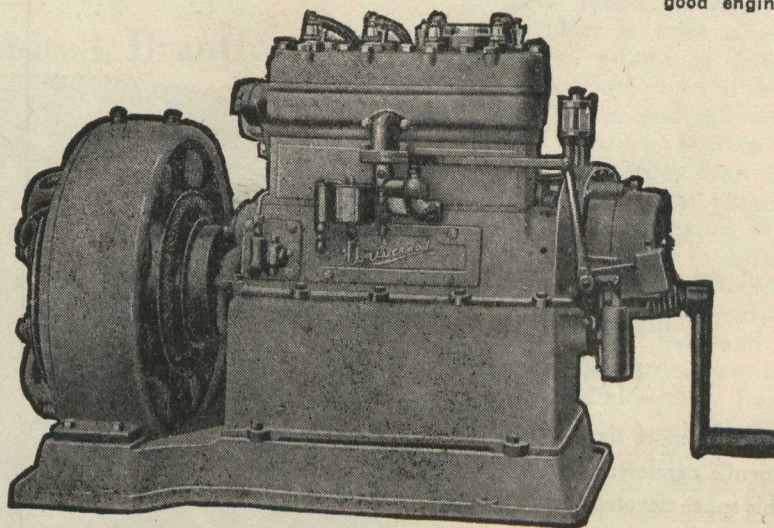
The belt connected unit illustrated can be driven from any power shaft. Twenty-four hour service is obtained by the use of 16 cells of TITAN storage battery.

The Plant is 32 volt and has a capacity of 32 lights direct from the generator or 67 lights for five hours when combined with TITAN 216 ampere hour battery.

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Belt connected Plant—operated from any good engine.



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is so slight as to be of no importance. This assumes that ties and timbers are properly treated and not injured by steaming or excessive heat during treatment. The drier that wood is kept, in ties and timbers, the stronger and better service they render.

The very great value derived from the treatment of wood is not only the prevention of the rot which makes the wood useless. The treatment maintains the original strength of the timber, especially in the case of ties treated with oil, and

causes it to resist mechanical abrasion and wear longer. Furthermore, when ties are properly seasoned before treatment and preserved with creosote oil, the oil resists moisture and prevents the ties from becoming soft and spongy.

The added life due to creosoting depends upon the quality of treatment, and upon the kind of timber and the manner in which it is used. It is only fair to say, however, that creosoted ties will last from three to five times as long as untreated ties, while the cost of treatment does not

double the cost of the tie. Therefore the great saving in the use of treated instead of untreated ties is apparent. This saving is even more pronounced in the case of other timbers.

## CIVIL AVIATION.

(Continued from p. 481.)

partment, showing that during 1920 close on to a thousand aeroplanes were turned out by French shops. The number of passengers carried in twelve months was 7,000, against 960 in 1919. Traffic in merchandise followed the same rate of progression, increasing 850 per cent within a year—although the period was really supposed to be one devoted to special study and reconstruction. The figures have been eclipsed this year.

### Flying Pigs a Reality.

Not only passengers are carried on these air lanes, which French planes have extended over most of Europe. Strange cargoes pass through the air these days. For instance, says the writer:

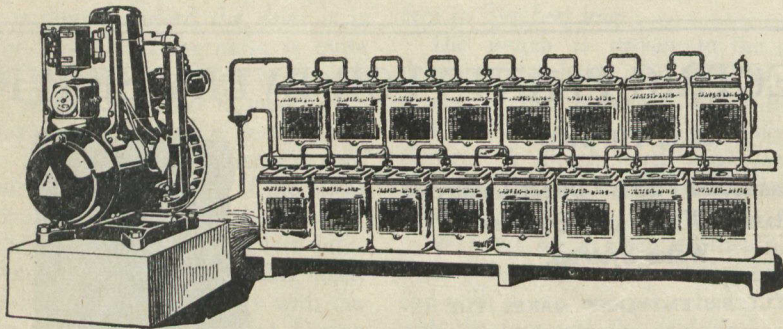
Flying pigs have now become an actuality, although they did not take kindly to the air. A crate of porkers was sent from the French capital to Croydon recently, where the distinguished travelers, the first of their race to realize the ambition to fly, were hustled into a taxicab and rolled to the national British stock show.

Millinery, a cargo of lobsters, boxes of early strawberries, trays of jewels and watches, and even cases of rare wines and champagne have been included at times among the freight shipments handled by air, for in addition to the fact that the fragile goods are less roughly handled in their flight by air than by train, there is also far less danger of theft than in the open baggage rooms of the railway station.

In the operation of all her airways, we are told, France uses every precaution of safety. While in December, 1918, the government controlled only four flying centers, and each one very incomplete—

There are now dozens of these air ports scattered over the country. Where formerly the pilot had to trust to luck when attempting a landing, he can now circle down over a field as level as a table, where he can be sure of landing his passengers and freight in absolute safety.

A large number of main air ports, fitted with hangars and workshops, control their chain of intermediate posts and aid stations. Flares visible at a distance of 25 miles are in use on the principal landing grounds, and two flares for which visibility at a distance of 94 miles is claimed, are being installed this year to guide airmen across the waters of the Mediterra-



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nean. A score of weather stations, located at these air posts, exchange reports four times daily, and a pilot before taking off knows well the weather to expect before effecting his next landing. In this way planes can be routed around, above or below storms that are known to exist along "the right of way."

As a result of these precautions fatal accidents have been few.

#### MONTREAL-QUEBEC RECORD.

Quebec.—Probably the fastest trip ever made by aeroplane between Montreal and Quebec was that recorded by Mr. J. H. St. Martin, one of the pilots for the Canadian Aerial Services, Limited, Montreal,

who flew one of their Curtiss machines from the aerodrome at St. Lazare, near Montreal, covering the 150 miles to Quebec in 100 minutes, or at an average speed of a mile and one-half a minute. On this record flight there were no passengers in the double-seater, and the pilot was assisted by a stiff breeze, which added materially to the speed of his machine. It is claimed by Mr. B. Daville, of the Canadian Aerial Services, Limited, that the flight easily made a new Canadian record for the distance, and one that is not likely to be duplicated for some time, owing to the unusually favorable circumstances. Mr. St. Martin was under contract to fly to Quebec in order to take a series of aerial photographs of that city

for a railway company. Owing to the amount of paraphernalia necessary for the aerial photographing work, the photographer did not join in the flight, but took the C.P.R. train to Quebec with his cameras and other outfit.

#### ROMANTIC TALE OF A FORESTRY POSTER.

The Forestry Branch of the Department of the Interior, issues fire warnings in about sixteen different languages and dialects. These notices are nailed to trees along trails and at camping places, and, according to all who have to do with the forests, they constitute one of the greatest factors in forest protection. They are always "on the job" reminding all who travel in the forest of the need of care of the existence of a wonderful system with fire. Many Canadians are unaware of writing known as Indian syllabic script, an invention of a missionary and used all over northern Canada by the Indians. The Indians learn it very quickly, and it is read and written by many Indians who never saw a white man. While the same script is used for all Indian languages, each Indian can read only those books or communications written in his own language. It is a misdemeanor to pull down or deface a fire notice and this law is carefully enforced by the Dominion fire rangers, and is generally observed all through our Canadian forests. Sometimes a porcupine will eat one for the glue it contains, and sometimes a moose or a strayed steer will lick off the ink because of its salty taste, but, generally, men and animals leave them alone. One conscientious ranger, however, recently had a problem to solve about posters. One poster, printed in Indian syllabic, was neither torn down or defaced, but it was partly detached and, on turning it over, the back was seen to be covered with syllabic writing done with the juice of some herb. The ranger could not read syllabic, and fearing this was a message inciting Indians to disregard fire laws, or making light of authority, he took down the poster and showed it to several leading men of the band of Indians, who smiled in a curious way but professed their inability to read it. Sure now that something was afoot, he sent the suspected document to Ottawa. The translator also smiled as he read it, and then translated the characters into a love letter and proposal of marriage from a bashful Indian swain, who being without writing materials had taken this means of addressing the object of his affections. The translation was duly returned to the conscientious fire ranger who, much relieved, danced at the wedding, and all lived happily ever after.

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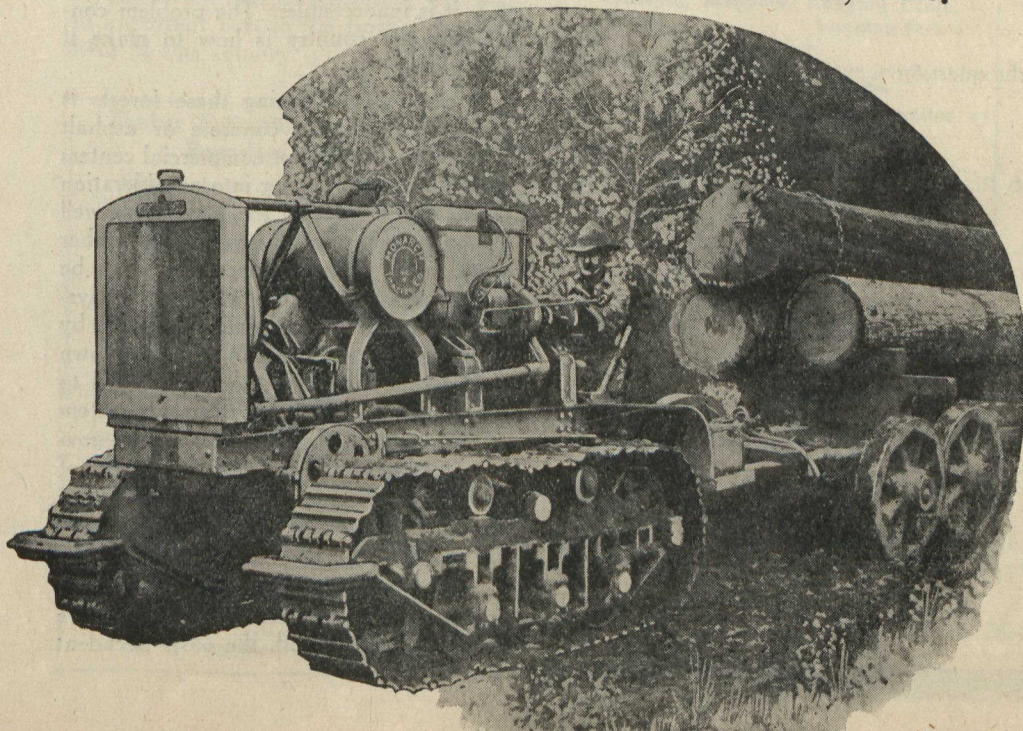
Out in the woods, where mechanics are scarce and spare parts hard to get, you will especially appreciate the sturdy, simple construction which enables them to give continuous, uninterrupted service.

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In addition **Monarch Tractors** furnish power for snaking or for any purpose for which a stationary engine is required.

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## The Motor Truck in Forest Operations

In a Substantial Bulletin on "Motor Truck Logging Methods" issued by the University of Washington, Mr. F. M. Knapp gives the following as his conclusions:

"At present, the possibilities for the use of the motor truck for logging are just beginning to be realized. What effect their use will have upon the future methods of logging remains to be seen. It is certain, however, that the advent of

motor truck transportation will have a marked effect upon the science of forestry and will bring about a closer utilization of our timber resources.

The motor truck and the portable band mill seem to furnish a combination which

will do away with the old wasteful circular mill because it supplies the cheapness and efficiency of railroad transportation and is applicable to small and scattered tracts and to stands of low-grade lumber. The fact that the portable band mill may be moved for a cut of a million feet assures adaptability. This is not only an industrial advance but also a silviculture advance in that it affords the possibility of cuttings at frequent intervals without greatly adding to the cost.

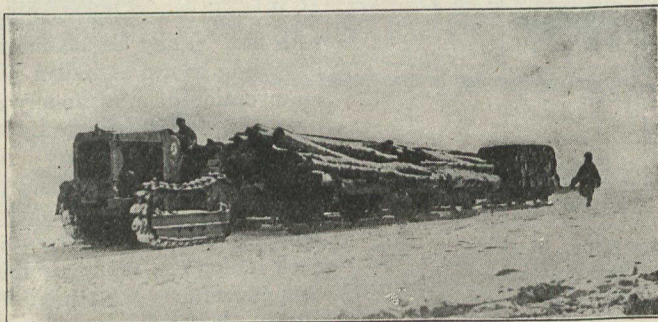
"A closer utilization of our present stands of timber may be practised by the use of the motor truck. In the northwest, only the larger material is taken from the forest, leaving a large amount of good timber on the ground in the form of poles and piling and chunks too short to be made into saw lumber but from which high grade ties can be made. The truck, in connection with a band mill, will furnish means of utilizing this present waste at a profit to the operator.

"The motor truck will be a valuable aid in the working out of a sound national forest policy for the proper use of our timber resources so that the timber will be utilized to the greatest possible extent and at the same time methods taken to provide for the perpetuation of the forest for future generations. This suggests a way of opening the timber for the market on some of our national forests. Most of the government owned forests are situated in more or less rugged country back from the regular routes of travel. The timber on a great many of these forests is over-mature and should be cut but at this time it is inaccessible. The problem confronting the country is how to make it accessible.

The plan for opening these forests is to build permanent concrete or asphalt roads from the nearest commercial centers thru these tracts taking into consideration the aesthetic value of the location as well as the possibilities of logging the timber from them. The timber, then, is to be taken out, under some silvicultural system and under government supervision, by motor truck operators who build their own roads from the nearest concrete road to the timber to be cut. Under this system of management, the state and federal governments pays a part of the expense of building the permanent road and the operator pays a sum for the use of the road by being taxed additional stumpage.

The system of management has many advantages. In the first place, the mature timber will be logged, the older decadent

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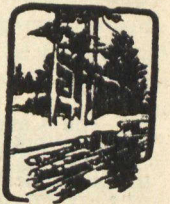
VANCOUVER,

NORTH BAY,

MONCTON.

material coming out first, in small bodies and at the same time care being taken to reproduce a new stand. The total area is divided so that as the timber is logged in rotation a continuous cutting will be assured. Due to the use of the trucks and on account of the timber being cut in rotation, the fire danger will be greatly lessened. In case a fire gets beyond control, the roads thru the forest make an excellent way to bring in men and supplies to fight the fire. In this way, a fire is readily accessible in a few hours where formerly it took perhaps several days to organize the fire fighting party and reach the scene of action. The concrete roads themselves make good fire lines. By means of the good roads, the forest is opened to campers and tourists each of whom pays a small sum as they enter the forest to help pay for the cost of building the roads and to provide funds for more extensive highways. In this way the forest is open for the timber, the best methods of utilization and forest regeneration are practised, fire hazard is reduced, and the area is opened as a recreational ground so that the greatest possible value is obtained from the tract.

"A great many other uses of the motor truck for logging and scientific forest utilization are being recognized, as example, for transporting pulpwood, veneer stock, cordwood, rosin and turpentine, and other forest products. Suffice it to say that this method of transportation has found a place in the industry and is here to stay. Its value has been recognized beyond doubt and in the future will play an important part in the further development of this country.



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# A Forest Policy For Canada

By Edward Beck, of the Canadian Pulp and Paper Association.

The Canadian forestry problem as it resolves itself into two divisions, the one Federal the other provincial. The Federal Government, as the owner of thirty-nine forest reserves in Western Canada, covering an area of nearly 35,000 square miles in British Columbia, Alberta, Saskatchewan and Manitoba, has a problem in forest administration all its own

to content with. The fact that the Western provinces have not relinquished hope of being able to persuade the Dominion to surrender control of their natural resources and to place them in this respect on a par with Eastern Canada, raises a question about the permanency of any forest policy that may be applied from Ottawa to the Western provinces and until

that issue is settled there must necessarily be some uncertainty no matter how pressing may be the need for a fixed and determined line of action.

Furthermore, in addition to its responsibilities as a forest-owner, the Federal Government, through its control of all matters affecting Canada's external trade, is in a position to regulate, to some extent, the rate at which our forests in general are being consumed. It can do this through the application of the tariff laws to exports of timber if it so desires. There are thoughtful students of economic conditions in Canada who believe that it would be a wise and prudent course, and eventually a very beneficial one, if an export duty were to be applied to all our outgoing timber, particularly pulpwood. They argue that such a tariff would help to preserve our forest resources, stimulate the industries dependent upon them for existence and enhance the value both of the wood and its products in our foreign markets.

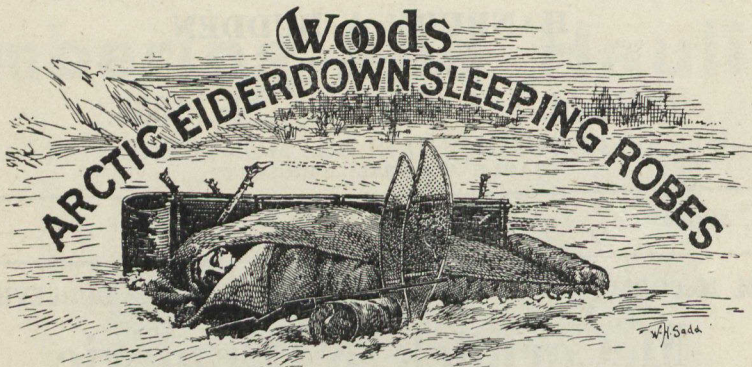
When it comes to the Eastern provinces, more particularly Ontario, Quebec and New Brunswick, a logical forest policy would appear to be more easily definable. In these provinces the Crown lands are controlled by the local governments whether they are under license or not. These provinces are in a position to adopt and apply whatever progressive policies they please to their holdings. Some of them have already made a good beginning. The foundation of successful forestry, as of all successful enterprises, is knowledge. What is needed in all of our provinces is first of all, an accurate and complete survey of their forest possessions. There is too much guesswork and too much broad generalization at the present time and no real progress can be expected until this vitally necessary work is accomplished.

Next in line should come a strengthening of our forest personnel. Canada, in comparison with Scandinavia, is pitifully weak in this respect. Not so much in point of quality, but in point of numbers. We have, without question, some of the most capable foresters in the world, men whose names carry authority in Europe as well as in America, but their staffs are inadequately manned. They are given insufficient support and are not permitted to organize their work on the scale necessary to ensure the best results.

Co-related to the question of an adequate forest service and perhaps preceding it in importance is that of forest education. We haven't nearly enough nor capable enough institutions for the training of forest engineers, rangers and forest

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workers generally, and until we do have them and until we make it an object for more of the right type of young men to adopt forestry as a profession we shall continue to lag behind other countries.

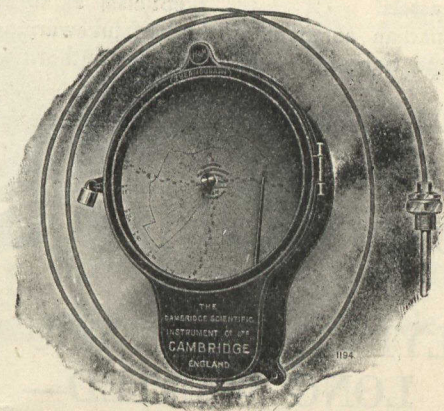
Given a knowledge of the fundamentals, an adequate forest service and the proper means of training forest workers, the other problems which confront us, such as fire protection, the application of proper cutting restrictions and the adoption of the best means for reforestation, would be in a fair way of being solved. Rational cutting regulations, upon which so much dependence is placed by the foresters of Sweden and Norway, are a matter for provincial consideration in each case. They certainly ought not to stop, as they now do, at the mere fixing of an arbitrary diameter limit for the felling of trees. They should take into account other factors which go to make up the problem of how to obtain a sustained yield from a given forest area. They should be adopted only after joint consideration by the authorities and by the licensees and, once agreed upon, they should be enforced with rigor and by the co-operative effort of all. It is here that adequate forest service would justify its cost.

When it comes to the question of dealing with cut-over woods and taking measures to ensure a regrowth, there is a diversity of opinion even among experts as to the best methods. It becomes, however, largely one of local conditions, timber species, natural reactions, nature of soil, etc. Artificial replanting may be advantageously applied in some instances, while in others it may be unnecessary or entirely impracticable, as in those cases where Nature can be depended upon to do the work unaided. A properly trained and adequately manned forest service should be able to deal with it, the adequacy of the service implying, necessarily, the maintenance of nurseries, experimental stations and other equipment on a reasonable scale. All this, of course, would cost much money. But it would be money well invested and would give good returns. Instead of the comparatively meagre provision they now make for forest purposes, the province of Quebec, Ontario and New Brunswick could well afford to set aside at least one-half of the revenues they derive from the Crown lands for the purpose of proper forest administration and development. In this way they would not only go on increasing their revenues from these sources indefinitely every year, but they would be building for the future, creating new capital for the State and contributing to the permanency of an industry in which Canada has an opportunity of leading the world.

In respect to privately-owned forests, these observations are also nearly all ap-

plicable. There are private forests in Scandinavia, particularly in Norway, which, as a result of careful cultivation in years gone by and at present, yield their owners a highly satisfactory income with all the regularity of a coupon-bearing government bond and without appreciable impairment of the original capital. Private forests over there have been de-

veloped along the line of securing a maximum annual yield from a given area without diminishing the extent of the original stock and many of the owners have achieved entire success. It costs money to carry on the operations, of course, but in spite of the heavy capital outlay the work is declared to be on an economically sound basis. It is a fact, too, that in



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MILLS AT IROQUOIS FALLS, ONT.

Scandinavia the banking interests in extending credit are inclined to give more consideration to the forest possessions back of an industrial plant and the way in which they are being exploited than they are to the physical plant itself or what may be the immediate demand for its products. In other words, the Scandinavian forests have as great or a greater potential credit value than buildings and plant, which are looked upon in this country as more tangible assets.

There are some Canadian companies, of course, that have the right idea and

are doing just as progressive work as is being done abroad, although most of it is of more recent origin. These are the companies which are carrying on their own reforestation programmes, building up forest reserves for the future and in as close proximity to their industrial operations as it is possible to get them. It has taken vision and much courage for these companies to adopt and carry out such a policy in the face of the prevailing skepticism as to its economic soundness and of lukewarmness on the part of the financial authorities. But I am confident,

from what I have seen abroad, that the future will amply reward their enterprise. When those who, having the opportunity, have made no provision for the future, are faced with the necessity of going great distances for their wood supplies and are obliged to pay famine prices for them, these far-seeing companies I have mentioned will be getting their wood at a cost and in such quantities as will not only give them a tremendous advantage in the competitive field but will yield them a handsome return on what at present some regard as merely a severe drain upon their resources.

Of course I am not suggesting that any company or any individual can afford to restock the Crown limits. That would be impractical and financially impossible. So long as the Crown retains the title to the lands and the power to dispose of them as it will, so long must the Crown assure responsibility for the perpetuation of the forests on them. This, however, does not bar co-operative effort on the part of the Crown and the licensees to that end.

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## WE AWAIT YOUR DECISION!

Members of the Canadian Forestry Association were requested in the September issue of the Canadian Forestry Magazine to inform the Association's Secretary, 224 Jackson Building, Ottawa, whether or not they approved of the plan, as announced, for an essay competition covering all of the school children of Canada on the subject of the farm wood-lot and what can be done to make it an asset to every Canadian farm. Many of the members have already written in expressing strong approval of the competition and of the plan of action that would naturally lead out of it, but we want to hear from every member. Will you not tear off the coupon below and send it in to the Association offices by the next mail.

### COUPON.

Canadian Forestry Association,  
Ottawa, Ont.

I approve of your essay competition as described in the September issue.

Suggestions: \_\_\_\_\_

**GREECE AWAKENS TO HER FOREST NEED.**

Much will have to be done in Greece as regards the restoration and rewooding of the mountains. On the slopes of many mountain chains there are huge stretches of formerly wooded ground which have been reduced to the condition of waste land or entirely denuded through abuses in exploitation or in grazing and through fires. The question of re-planting was the object of a special law, passed on May 3, 1918, which provides for the setting up in each commune and 4 members: officers or private owners. These commissions will be nominated to specify the areas where re-planting or protection is necessary. The protection of the ground may consist mostly in forbidding or regulating grazing and exploitation. The work of re-planting will be carried out either by the proprietors or by the State, after the purchase of the ground by agreement or by expropriation.

Two new laws passed by the Parliament December 26, 1918, will allow of several important improvements being realized soon.

The first of these laws regulates the method of management, as regards exploitation, of forests belonging to estates, communes, public and private establishments, as well as of those under litigation and unallotted, it revises and codifies the existing customs with regard to rights of usage; especially the gathering of firewood by the peasants, giving the local authorities the right of determining the enforcement of the provisions; and in connection with taxes, it slightly modifies some of the tariffs at present in force.

The second lays the foundation for a new forest service organization. At first the personnel will consist of 20 inspectors, 120 district inspectors, 50 chief rangers, 150 rangers and 850 guards. The staff will be recruited from the ranger schools. In order to fill the large number of vacancies which already exist, the law provides for the engaging of returned soldiers, preference being given to non-commissioned officers, who will be called probationers, and who will not receive promotion until they have taken a course at the ranger schools. A measure of this kind is not practicable in so far as the higher officials



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are concerned, and it will be some years before the Forestry School at Athens will be able to graduate enough men to properly equip the service.

**Trees to "Anchor" Sand**

(Correspondence in the Soudan Overseas Mail).

Sir,—In reply to Mr. James White, who writes from Ontario to "The Over-Seas Daily Mail" to ask whether any of its readers know of a tree or plant that will take firm root in sand to prevent it from drifting, I would like to say that the common bramble is used in Denmark for this

purpose, and the use must be of long standing, as there is a reference thereto in Boswell's "Johnson."

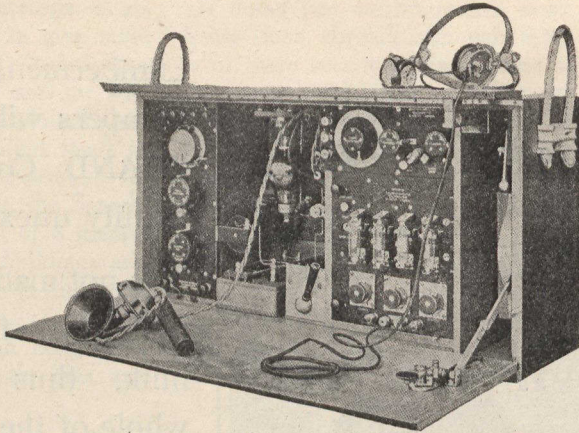
Penmaenmawr. Percy Thompson.

Sir,—May I point out that the difficulty with shifting sand mentioned by Mr.

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|--|--|
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**Aeroplane in Forestry.**

Ottawa.—The value of the aeroplane in forest fire prevention work and the need for greater activity along these lines were emphasized by Ellwood Wilson, M.C.S.F. E., manager forestry division, Laurentide Company, Ltd., Grand Mere, Que., who spoke at the luncheon of the Engineering Institute of Canada in the Chateau Laurier here. No development of recent years had rendered such aid to the work of the forestry engineer as had the aeroplane, and Mr. Wilson wished to express his appreciation of the work done by the Air Board in this regard. The work of the Air Board had been uniformly excellent.

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## A Test of Wooden Shingles as a "Fire Menace"

### A Resolution Passed at the Annual Meeting of the Dominion Fire Prevention Association.

Resolved,—That it is expedient an impartial committee be appointed by the chairman and secretary of this association to examine, test and report upon the various kinds of roof coverings ordinarily sold in Canada, with reference especially to:

- (a) Combustibility.
- (b) Qualities to communicate fire to other buildings.
- (c) Cost both for material as sold in bulk and for placing in position on roofs.
- (d) Durability and cost of maintenance.
- (e) Appearance on roofs.
- (f) What treatment could be applied to roofings ordinarily combustible, to render them fire resistive, both before placing on roof or subsequently when in position both to a new or old roof covering.
- (g) To fix standards and official names for each roofing reported upon.

Insofar as tests of wooden shingles are concerned it is expected they will be of shingles untreated, and of shingles treated with chemicals intended to make them fire resistive.

The committee to be empowered to make use of all available reports and impartial tests of roof coverings now available and to report to the Executive of this Association, it being understood the report of the committee will be at once transmitted to all members and others interested."

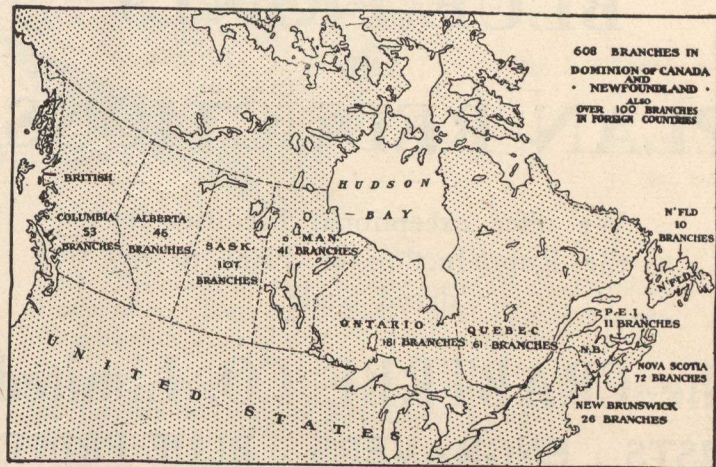
### MOTOR GAS FROM WOOD?

The much talked of gasoline fuel shortage may be offset by science. Fuel from forest trees and other vegetation may become the source of motive power for gas engines.

About fifty per cent of dry wood is composed of cellulose from which ethyl

alcohol can be made. Ethyl alcohol is what is properly known as "grain" alcohol, and might be substituted as fuel for gasoline in gas engines. Certain palms of the tropics also contain an appreciable amount of fermentable sugars from which ethyl alcohol can be prepared. The theoretical and chemical aspects of the production of alcohol from wood are known to be sound, but the practical side has not been worked out. Thought on the subject is comparatively new and the practicability of the manufacturing problem requires further study.

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**LUMBER OF ALL KINDS**

# Harmonizing Forestry and Grazing

By T. P. McKenzie, Grazing Commissioner of British Columbia

The suggestion that a relationship exists between grazing and forestry in the sense that the welfare of the one is influenced by the other was, for a long time, accepted by most foresters with reservation nor was it given the serious attention from grazing experts and stockmen that it deserved.

The forester was inclined to consider the presence of livestock on timbered areas, and particularly areas suitable for the production of merchantable timber,

a decided menace and the grazing man was reluctant to admit that all the restrictions required for the conservation of the forests and watersheds were altogether necessary where a full grazing use of the forests was apparently needed.

In the former case the forester was confronted with facts relating to the serious effects of grazing on the forested areas of the older countries and felt that he was justified in placing heavy restrictions on the grazing of livestock on all timbered

areas to insure proper protection to existing and future timber growth. The latter, on the other hand, had foremost in mind the protection of the livestock industry largely dependent for its existence on the grazing use of the summer ranges which, in the west, are generally the forested areas of the foot-hills and higher ranges.

When the Governments of the West assumed active administrative control of the forests they found those portions of the country were being used by stockmen operating ranches in the valleys and who were contending with each other for the possession of choice grazing ranges. Several things stood out which clearly showed the forester that unless harmony and regulation prevailed on the range the forests as well as his administration would suffer and it became his business to inquire into, particularly, the effect of unregulated grazing on areas of reproduction and on watersheds. He necessarily had to study and solve this problem with its various ramifications for he found that the livestock could not be excluded from the forests owing to the fact that the ranches, which are essentially livestock ranches, were dependent for their existence and development on the use during the open season of the succulent grasses and weeds growing under the timber and also the fact that it was impossible to separate areas suitable for grazing from the timber producing areas for beneath the timber cover is found the forage.

## Effect of Unregulated Grazing

This impossibility of divorcing the two interests naturally led to the study of methods whereby one should be regulated for the benefit of the other. In this dual management regulation developed upon grazing naturally; first because it was entirely unregulated and promiscuous, and unregulated grazing was destructive from the viewpoint of damage to reproduction and that of carelessness with fire on the part of those in attendance on the livestock using the range, secondly, because it soon developed that regulation of grazing was more needed for the protection of the range and the livestock industry than for the protection of the forests. General regulations for the protection of the timber, which are essentially lumber and trespass regulations, were provide for grazing damage separate grazing regulations were necessary on all areas in grazing use. Primary regulations were need, therefore, for the protection of the forest and range and secondary regulation for the protection of the stockman in his use of the range.

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It has developed that the early restriction for the protection of forested areas and watersheds were really restrictions in the interests of grazing so that now-a-days when a forester knows that livestock on a forested range are being handled in accordance with a good grazing plan he knows that his forest is reasonably safe and that protection rather than damage will follow the use of the area by livestock. Overgrazing will damage the forage growth of a range long before it will do any appreciable injury to timber growth and a correct grazing plan will provide against fire on the range since experience so far has disclosed the fact that it is generally injurious to the forage growth on forest range to allow fires to run over it.

Restrictions for the protection of reproduction, camping grounds, etc., which enclosed definite areas to grazing have generally been opposed by the grazing interests, the main reasons given being that grazing did no damage, that the monetary returns to the country from the livestock concerned was greater than that derived from the reservation of the areas of forest land involved. The more crowded the range and the greater the demand for grazing privileges the stronger was the opposition.

**Have Common Interests.**

It is very seldom, however crowded a range is, that the stock cannot be handled in accordance with an amendment to an existing range plan, and more particularly is this the case where no plan is in effect and unregulated grazing prevails. Experience has shown that sheep can be easily handled on a range in a way that will prevent wastage of forage that equals fifty per cent of the forage crop and which would be lost under the methods of grazing in use before control measures were exercised. Cattle ranges, supposedly fully used and rapidly deteriorating under regulated grazing, have easily increased in capacity three hundred per cent where range management plans were put into practice.

This shows that grazing can be regulated to protect reproduction, watersheds, to reserve areas for public recreation and for other purposes without the slightest detriment to the grazing interests and that what is beneficial for the forest results in benefit to the stock industry in that it promotes wise range management and control of the stock in its use of the range.

It is now conceded that regulated grazing is a protection to forests in that it disposes of the annual growth of grasses, weeds, etc., which, if left untouched, in the course of a year or two constitutes a serious menace in the spread of fire. It is also conceded that the regular and correct use of a forested area by livestock promotes the growth of reproduction by

breaking up debris and harrowing the seeds into the mineral soil. Many stockmen insist, however, that this growth of reproduction is a menace to the livestock industry in that it decreases the area of grazing range which they contend is a serious thing in crowded communities where ranches are dependent on the summer range. A serious restriction of the grazing interests in this respect demands the attention of the forester being turned to the question:

"Which is the most vital consider-

ation in the matter: The conservation of the timber or the perpetuation of the grazing industry."

Any investigation into a question of this kind entails an immense amount of serious study. The forester realizes that only on the areas of timber and potential timber land under his jurisdiction can timber be grown for the present and for the uncertain needs of the future; and on the other hand the stockman is reluctant to admit that his property can possibly, in a case of dire necessity, be put to an-



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other use than that of raising range cattle.

#### A Test Case

The intricacies of a question of this sort is really a subject for a separate paper but the mention of the two instances where grazing was apparently opposed to timber production will show the need for careful attention and study of all suggestion that forested lands be denuded of their cover by fire, or otherwise, to promote the growth of forage for live-stock.

The plateau of the Cariboo and Lillooet

grazing ranges of this Province are producing largely Jack-pine and lodge-pole pine of a general open character. Sixty or seventy years ago these ranges evidently produced the type of Douglas fir peculiar to the interior but numerous fires have resulted in a general Jack-pine and Lodge-pole stand with scattering areas and individual trees of Douglas fir. If proper protection were given it is possible the present stand may again be replaced by the Douglas fir.

When the control of grazing was first assured over this area there was in evi-

dence a general feeling that the existing timber was useless and should be cleared off. Two principal reasons were given; one, that the character of forage growing under the timber was inferior and unpalatable and that the removal of the timber was necessary to promote a better growth; and two, that in many instances the growth was so heavy that grazing was restricted. A third reason given, which is somewhat apart from the actual grazing use of the range, was the desire in some cases to destroy the timber to promote a rapid run-off into reservoirs and catch-basins.

The willingness on the part of the Government to consider the question of the highest use of the land led to an investigation which disclosed the fact that during the years 1919 and 1920 over \$300,000 worth of ties and bridge-timber alone were cut from an area extending about 100 miles along the line of the Pacific Great Eastern Railway. Apart from other matters, such as the fact that there is an abundance of unused range, making it necessary to burn to create range, and the fact that the forage growth in the timber is very palatable, the present and future value of timber, which in the past on like remote areas has been considered negligible will always be matters of most serious import in spite of the fact that existing grazing conditions and grazing needs may indicate that timber protection on such areas is a question of secondary importance.

Another event of tremendous importance to forestry and grazing interests of the west is the stand taken by the Prairie City Stock Association of Oregon, in the United States, in the matter of fire protection on the range. The attention of this Association is turned to the protection of the Malheur and Whitman National Forests, areas of forested range supporting during the summer approximately 20,000 cattle and horses and 130,000 head of sheep, and more particularly to the ranges occupied by members of the Association.

#### An Oregon Conclusion.

For years before the United States Forest Service assumed control of the forest range the general practice prevailed of burning out heavily timbered and brushy areas to provide new and better grazing grounds. In some instances tem-



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porary results were obtained but years of this sort of thing had not been well for the range. Fallen dead timber has prevented the grazing use of some areas. Further burns on such range destroyed the fertility of the soil. In other cases unpalatable browse and weeds has followed and in others heavy reproduction has made conditions worse for grazing than the original conditions. There has, therefore, grown up a steady and firm sentiment in favour of forest protection, from the stockman's viewpoint, primarily to protect the range. This sentiment has resulted in the passage of the following resolution.

Prairie City, Oregon,  
March 27, 1920

**Resolution adopted by the Prairie City Stock Association.**

**RESOLVED:**—We the Prairie City Stock Association, hereby pledge our hearty cooperation with the Forest Service, in protecting from fire the timber and forage crop on the Malheur and Whitman National Forests.

**1st.** All members of this Association are hereby instructed to report to some member of the Forest Service, all smokes or other signs of fire discovered by them within the bounds of the Malheur and Whitman forests or on lands adjacent thereto, at the earliest possible time after discovery, no matter what inconvenience it may cause the individual member, so long as there is no danger of bodily harm to the member in the performance of this duty.

**2nd.** The Ranger in charge of the Crane Prairie Ranger District is hereby authorized to use the employees of any member or members of this Association, or hire such additional help as he deems necessary to suppress any fire that may occur on either the Crane Prairie, Flag Prairie or the Logan Valley cattle and horse ranges during a given period, if it is possible to do so without the aid of our members at a busy time.

**4th.** Any expense incurred under the second and third clauses of this resolution shall be reported by the Ranger in charge to the Supervisor and he in turn shall report the bill to the Secretary of this Association. All bills thus reported shall be paid by the users of the range on which the expense was incurred.

**5th.** Any member of this association or any person holding a grazing permit on either the Crane Prairie, Flag Prairie or the Logan Valley cattle and horse ranges violating any section of the above resolution shall be deemed a trespasser and the Forest Supervisor is hereby asked to proceed accordingly.

The Secretary is hereby instructed to send a copy of this resolution to the Forest Supervisor of the Malheur Forest, and a copy to the ranger in charge of the grazing districts herein specified.

**THE PRAIRIE CITY STOCK ASSOCIATION.**

/s/ F. B. French, President.

Attest /s/ Walker Deardorff, Secretary.

The above resolution is evidence that forestry protective regulations are beneficial to the stock interests in the same way that range protective regulations benefit the forest.

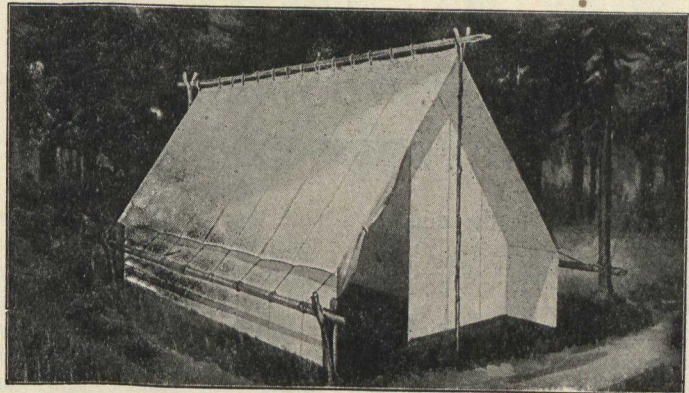
From the above it will be seen that the grazing use and timber protection on the same ground are so interrelated that one is dependent on the other in no small de-

gree and that plans for both must be cooperative in effect if the best interests of the two are to be served. Since timbered areas of the west embrace the summer grazing ranges for the adjacent dependent ranches the two interests cannot be divorced and since the primary protective regulations relating to both industries are interrelate and perpetuating regulations for both industries there should always exist in sections where this dual management prevails the best cooperative spirit between the forest and grazing interests. Each must deal broadly with all

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apparently opposing matters; the forester realizing the needs of the grazing industry and the grazing men and stockmen keeping in mind the fact that it takes a lifetime to produce a mature tree and what at the present time may appear to be a curse will possibly develop in the near future to be a blessing. The very fact that it takes so long to produce timber requires that the grazing man give the interest of the forest the benefit of every doubt and in this he is aided by the fact that there is generally an abundance of summer range for all if it is properly

used so, in consequence, if one area cannot be grazed for a while there is another available though perhaps more difficult to handle.

The annual growth of forage should be considered just as vital and important a product of the forest areas and potential forest lands as the timber and not only should foresters study the grazing use of such lands but grazing men should promote the protection of the timber for in doing so they protect the grazing resources. On many areas of the interior where generally inferior timber is produc-

ed and which are the main grazing lands of this Province the major activity for many years will be the range management work but, as shown in regard to the Cariboo-Lillooet plateau, there is always the possibility of important lumbering operations developing. It therefore behooves all grazing men to manage their range work to protect and to promote the growth of the timber being produced thereon.

As intimated before a true grazing plan is also a forest protection plan. It also behooves the forester to look kindly upon this grazing use of his forests for he will find that the one-time supposed menace can be and is a friendly aid to him in the protection of the timber resources of the country.

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CARDBOARD

### DID NOT PRACTICE FORESTRY.

Anatolia is the Turkish name for a large part of Asia Minor. Wood is so scarce in Anatolia that it is seized as rapaciously as if it were worth its weight in gold.

It is so scarce that carloads of vine-prunings, thistles, and briars are transported into the towns and villages for fuel. One who has made a fire of this nature of fuel on a country roadside is unpleasantly familiar with the endless task of feeding the flame to secure a very uncertain heat.

Firewood in Anatolia costs from \$15 to \$18 a ton when it can be had. The Nationalist Government has prohibited the Near-East Relief from buying wood in this district except on specially *vessikas* or orders. Tho one does not usually class fruit-trees, as fuel, even these have been cut down and burned, so desperate is the need for firewood.

It is this lack of wood that has hampered the Near-East Relief in a great measure in its provisions for the Armenians. There is not only the scarcity of fuel to combat, and the consequent suffering with the cold, but there has been no wood for making furniture nor, of course, for building purposes. The orphanages are built of mud, and as far as possible the gasoline can has supplanted wood in supplying household needs. It is beaten into chairs; every needed kitchen utensil once held gasoline; it becomes both a bathtub and the dipper that is used to fill it; it is the plate, the cup, and the spoon. Unfortunately, it can not be utilized as fuel.

But—there are no trees. And we of America, who can not turn to the left or to the right without the eyes resting on a beautiful tree—are spiritually exhausted after an hour's trip through Anatolia and are eager to return home.—Francis L. Garside.

**THE FOREST AS A PERPETUAL WOOD FACTORY.**

(Concluded from p. 474).

vegetable matter in the soil is dark colored and so readily absorbs heat; it is mostly carbon, and carbon when once warmed is one of the best conservators of heat. Therefore, soils containing large quantities of humus are warmer than otherwise.

**An Improver of the Soil.**

You see, the forest community reacts upon the soil by making it constantly richer in food materials, richer in moisture, richer in heat, at least more uniform in heat relations. You see what this means: A progressive change in the adaptability of the soil for various trees. This is one of the chief factors at the basis of the succession which we have already noted. You must have this conception before you can wisely direct and regulate wood production.

The forest community reacts upon the light conditions, so that they are different from those in any other community. And here also we find progressive changes, varying with the age of the community and usually improving as the community grows older. At each age class, if we put them 20 years or so apart, there are different light values beneath the forest. This gives the opportunity for the various species requiring different degrees of light-exposure to come in. This is another chief factor in succession leading to gradual changes in the forest complex.

At the Timagami (Ontario) camp we found a stand controlled by red pine with about 200 trees of that species per acre. There were also 67 white pine trees on the same area. These made a nearly complete crown cover. We could find no small trees of red pine or white pine, but there were 140 balsam, 120 cedar, 45 spruce, and 5 paper birch from 1 inch to 6 inches in diameter on the average acre. The red pine was 160 years old. It had at least 100 years in which to scatter its seed on the ground, but has not yet succeeded in establishing a single young tree to take the place of the now dominant trees as they pass away. Undisturbed by man, that stand of red pine will gradually die out. Single trees, as they fall, will be replaced by a group of shade-endurers already occupying the soil. In the end, the dominance of the intolerant pine will be supplanted by the tolerant balsam, cedar and spruce.

**Why Pine Dies Out.**

In Timagami, also, there are pure stands of white pine nearly 300 years old. They have been scattering seed on the forest floor for over 200 years, yet they have not succeeded in establishing any young to take their places in the

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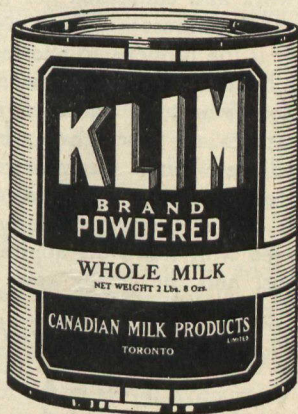
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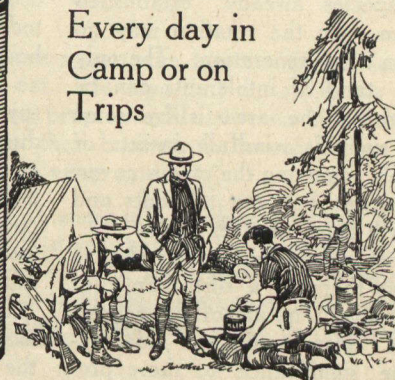
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forest, but there is a great abundance of balsam and spruce regeneration beneath the old pine trees and they will eventually displace the pine and control the stand.

Pure stands of light-demanding species cannot maintain themselves in competition with shade-endurers. When by the natural processes of elimination and decay the crown cover has been broken sufficiently to give overhead light to the forest floor, a condition in which light-demanders might establish themselves, the ground is too densely shaded by an advanced growth of shade-endurers. When they in turn have reached the dominant crown class, they have the next crop of their own species already established beneath them. So the rotation may go on generation after generation. The only way a pure stand of intolerants can be re-established on the area is by some catastrophe such as windfall, insects or fire completely removing the crown cover. Then the struggle between tolerants and intolerants will begin all over again.

Thus we see, when light values change in the forest there is a disturbance of equilibrium and the nature of the vegetation changes. Here again you must understand the significance of these progressive changes in light values, if you would successfully direct and regulate the

growth-energy resulting in wood production in the forest.

#### Nature a Poor "Business Manager."

Foresters are dealing with an individual, an organism whose development can be fashioned and guided into the lines which they desire and that desire is for the largest quantity of the best quality of wood, adapted for some particular purpose. Nature has no economic sense. The function of foresters is to improve upon nature as expressed in the forest and guide her into economic channels, just as the farmer has improved upon nature in his work and compelled her to serve his economic purposes. Where would we be today if the farmer had allowed nature to have her own way? Why, we would have no No. 1 wheat, no dent corn, no northern spy apples, no jersey cows. Having produced these things the farmer still has to control nature or otherwise his wheat fields would be full of tares, his corn covered with smut, his apples filled with worms, and the jersey cows filled with tuberculosis.

So as time goes on foresters will be more and more concerned in controlling the destructive forces in the forest, above all the fire demon and then the fungus and insect pests.

## How an American State Combats Forest Fires

**HARRISBURG, Pa.** — Pennsylvania now has a forest protective organization that surpasses all other State and National fire-fighting forces, according to a statement sent to Gifford Pinchot, the State's Chief Forester, by the U.S. Forest Service. Nowhere in the United States has so complete a plan been perfected for the prompt detection and extinction of fires, and for the inspection and elimination of hazards.

Forester Pinchot has devised a better method of fixing the legal and financial responsibility for all forest fires, and in his new organization men who combat fires will receive pay commensurate with services performed.

An appropriation of \$1,000,000 by the Legislature for forest protection has made it possible for the Department of Forestry to purchase and erect 50 steel forest fire observation towers. Most of these towers are sixty feet high, and they have been put up on the highest mountain tops in the State.

Eighteen other steel towers were previously erected, giving the Department of Forestry sixty-eight stations from which observers may detect and locate forest fires. Everyone of the towers is connected by telephone with men in nearby communities whose duty it is to respond with a crew of men to attack the flames when fire is discovered.

Roads and trails have been constructed in many of the State Forests, so that the remote sections are now more accessible to Foresters and their fire-fighting crews. Each forest district has been divided into blocks of forest land, extending from 50,000 to 150,000 acres. Each area is in charge of an inspector, each tower is manned by a towerman, fire bosses have been selected from the best fire wardens located at convenient points for the suppression of fire.

Fire crews have been organized, equipped and trained so that they are ready immediately to respond when calls come to the fire bosses from towermen or inspectors. Patrolmen and wardens are other units in the fire protective organization.

This organization, heading in the office of each District Forester, has given Pennsylvania a systematic plan for the prevention of forest fires that is far better than anything of a similar nature that has been attained in the United States.

The State's forest fire fighters this summer were equipped with modern appliances. The Department of Forestry has supplied them with 1,000 compressed air tanks, which will spray water onto flames. Four gasoline water pumps have been given to Foresters in districts where they can be used advantageously. For back-firing torches were provided, as well as

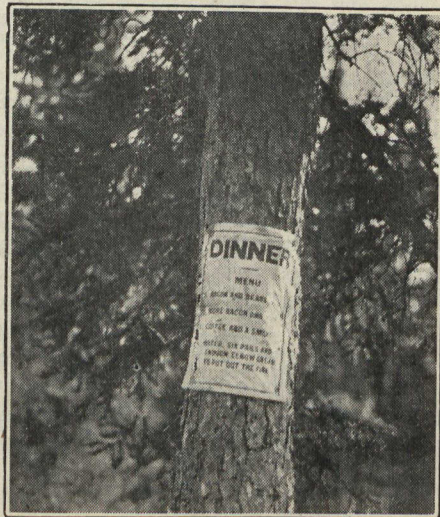
3,000 collapsible pails, 1,200 hand axes, 1,000 double-bitted axes, and 5,000 can-tees, and 5,000 specially constructed fire tools were distributed to the men who will protect forest lands from fires.

In the past the only equipment forest fire fighters had were the crude implements they took with them. Sometimes the men depended upon forked sticks, or branches of green pine or hemlock. Now the men are properly equipped with the best fire-fighting tools that can be provided.

In some of the State Forests, where conditions are favorable, strips of bare soil have been made through the centre of all woods, roads and trails. These strips of exposed mineral soil will permit rapid setting of back-fires, and, if a strong wind is not blowing, will also prevent surface fires from crossing trails. The strips were made with shovel plows, such as were used by the early settlers breaking new ground.

#### KONGO AIRPLANE SERVICE.

It is reported that the directors of the Borminiere Diamond Mines Company have suggested the inauguration of an air service by seaplane, which would operate between the mines at Djoko Punda, on the Kasai (a tributary of the Kongo) and Kinchassa, on the Kongo—from which latter point the railroad runs to Matadinoki, a steamer port on the lower Congo. The directors offer to defray the greater part of the initial cost of the scheme. In the meantime a survey of the route is being undertaken. The distance from Kinchassa to the mines is approximately 500 miles, which could be covered in two days, as contrasted with over a month by the existing river transport.



A strange invitation in the wilderness. The cotton sign tacked to the tree by a fire ranger of the Dominion Forestry Branch on Clearwater Forest Reserve, Alberta, reads: Dinner: menu: Bacon and beans; more bacon and beans; coffee and a smoke; water, six pails and enough elbow grease to put out the fire.



**IRRIGATION AND FORESTRY.**

**A Resolution passed by the Western Canada Irrigation Association.**

Moved by Peter Lund, Lethbridge, seconded by Lawrence Peterson, M.L.A., Taber,

Whereas this Association is fully apprised of the interlocking of forest conservation with the maintenance and extensions of irrigation farming, both directly in conserving water in the mountain and hill streams and lakes, and indirectly in maintaining suitable summer pastures for flocks and herds that can be wintered on the produce of irrigated lands, and

Whereas this association realizes the general economic and social benefits accruing from the extension of tree planting on the prairies,

Resolved,—That this Association records its appreciation of the continuous efforts for conservation of our National Forests and extension of tree-planting, both by the officers of the Forestry Service and Department of Agriculture, and by the direction of public interest to those important matters by the Canadian Forestry Association."

**Don't be a "Typhoid Mary" of Pessimism**

*(The American Magazine)*

**A** FEW years ago there was a mysterious outbreak of typhoid fever cases in New York City. For some time the health authorities were unable to trace them to the source of infection. Finally they ran them down to a woman employed as a cook, who was carrying around typhoid germs, to which she herself was immune but played havoc with other people. They named her "Typhoid Mary" and they separated her from her job as a cook, so that she could no longer infect others.

Too many of us are "Typhoid Marys" of pessimism. There is nothing really the matter with us. We are not even scared ourselves, but we go around talking as if we were, and all that we accomplish is to scatter germs of fear which infect others and do harm.

I have just had a talk with a business man who has traveled in forty-five out of forty-eight states since March 1st. He says that the condition of our country is wonderful. He says that if the people would shut their mouths talking about possible panics, and go on about their business we would "be in for" a period of prosperity the like of which we never saw.

He says that he has made a point of going into smoking cars and listening to men's conversation. And he adds that everywhere he has been he has found these carriers of pessimistic talk. Some of them are travelling men who have had trouble getting the goods with which to fill the orders they have taken—so they wander about the country saying that things are "going to the demnition bow-wows."

Stop going around like a "Typhoid Mary"—not sick yourself, yet spreading the germs of fear!

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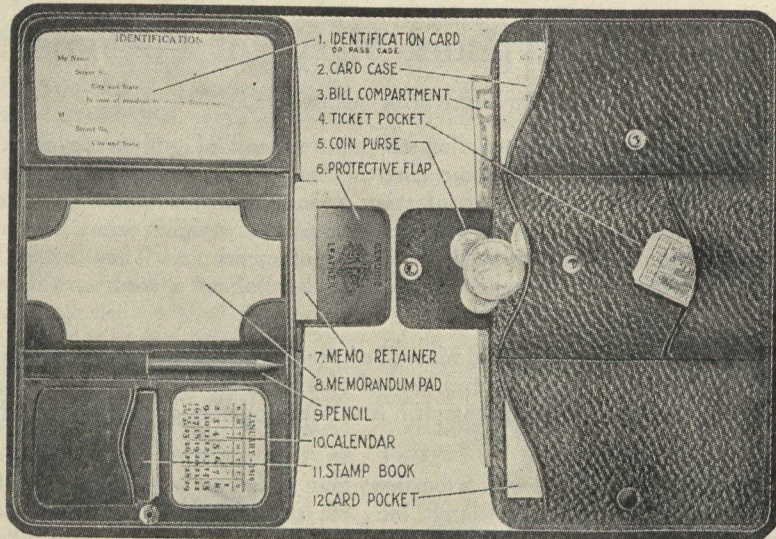
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4. Pocket for street car or other small tickets.
5. Coin purse with snap fastener flap.
6. Protective flap for memo pocket.
7. Memorandum retainer.
8. Pad of blank memo paper slips.
9. Pencil ready for use.
10. Calendar for current year.
11. Postage stamp book with oiled paper dividing leaves.
12. Pocket for visiting cards or railroad tickets.

#### FOR THE PUBLIC TO CHOOSE!

"When the questions of the extension of suffrage to women, of tariff, of taxation, of coinage and currency, which are all merely incidents, shall have sunk into the background, the question of the economy of the resources which constitute and sustain the political, commercial, and social power of the nation, long neglected, will still claim attention; for only those nations who develop their national resources economically, and avoid the waste of that which they produce, can maintain their power or even secure the continuance of their separate existence. A nation may cease to exist as well by the decay of its resources as by the extinction of its patriotic spirit."—Dr. Bernard E. Fernow, Director of the Canadian Forestry Association.

#### SAYS THE GRAIN GROWER'S GUIDE.

"This year for the first time the demonstration car of the Canadian Forestry Association was attached to the Better Farming Train. This car is touring the east and the west in the interests of more trees and better trees. In charge of it is Archibald Mitchell, a man of wide experience in the planting and care of trees, who is assisted by A. G. Cooch. These two men give up all their home life for months at a time in order to spread the gospel of more trees for breaking the winds and for beautifying farm homes. Mr. Mitchell is the most enthusiastic forester I have seen anywhere, for he is not satisfied with appealing to the men who are to do the planting, but he gives interesting talks to the women and children whom he urges to remind the men of their duty in tree planting."

#### MY LOVE DWELT IN A NORTHERN LAND.

My love dwelt in a Northern land,  
A dim tower in a forest green  
Was his, and far away the sand  
And the gray wash of the waves were seen  
The woven forest boughs between:

And thro the Northern summer night  
The sunset slowly, slowly died away,  
And herds of strange deer, silver white,  
Came gleaming through the forest gray,  
And fled like ghosts before the day:

And oft that month we watch'd the moon  
Wax great and white o'er wood and lawn,  
And wane, with waning of the June,  
Till like a brand for battle drawn  
She fell, and flamed in a wild dawn.

I know not if the forst green  
Still girdles round that castle gray,  
I know not if the boughs between  
The white deer vanish ere the day:  
The grass above my love is green,  
His heart is colder than the clay.

—By Andrew Lang.



## BUREAU OF CANADIAN INFORMATION

The Canadian Pacific Railway has established a Bureau of Canadian Information as a branch of its Department of Colonization and Development, with the object of disseminating reliable and up-to-date information as to agricultural and industrial openings in all parts of Canada.

### WESTERN CANADA FARM LANDS

The Company has yet for sale several million acres of choice farm lands in Western Canada, at low prices and on long terms of payment. In certain districts lands will be sold without settlement restrictions, but the Company is prepared to grant special concessions to those who will settle upon and develop their farms.

### IRRIGATED FARM LANDS

In its irrigation districts in Alberta, the Company has irrigated lands for sale at reasonable prices and on terms extending over twenty years. Under certain conditions, loans for improvements will be granted purchasers of irrigated lands in amounts up to two thousand dollars, to be repaid with land instalments.

### EASTERN CANADA FARM LANDS

Lists of selected improved farms, available for settlement in Ontario, Quebec and the Maritime Provinces, with the names and addresses of their owners, may be obtained on application at any office of the Department.

### INDUSTRIAL INVESTIGATION AND RESEARCH

Investigations, looking to the utilization of undeveloped natural resources and waste products and new industrial processes, are being carried on by the Research Section of the Department. Inquiries as to promising fields for investigation in this connection are invited.

### INDUSTRIAL OPENINGS

Reliable information as to sites for new industries in all parts of Canada, and of special business openings in the growing towns and cities along the lines of the Canadian Pacific Railway in both Eastern and Western Canada, will be gladly furnished on request.

### CANADIAN INTELLIGENCE SERVICE

Well equipped Canadian reference libraries have been established by the Department at Montreal, New York, Chicago, and London, England. These libraries contain the fullest information on all matters relating to Canada and her undeveloped resources, and are kept supplied with the latest information pertaining to new developments through the medium of a news service organized through the co-operation of the other departments of the Company's service. The information on hand in these libraries is available without charge to those interested, and inquiries addressed to any office of the Department will receive prompt attention.

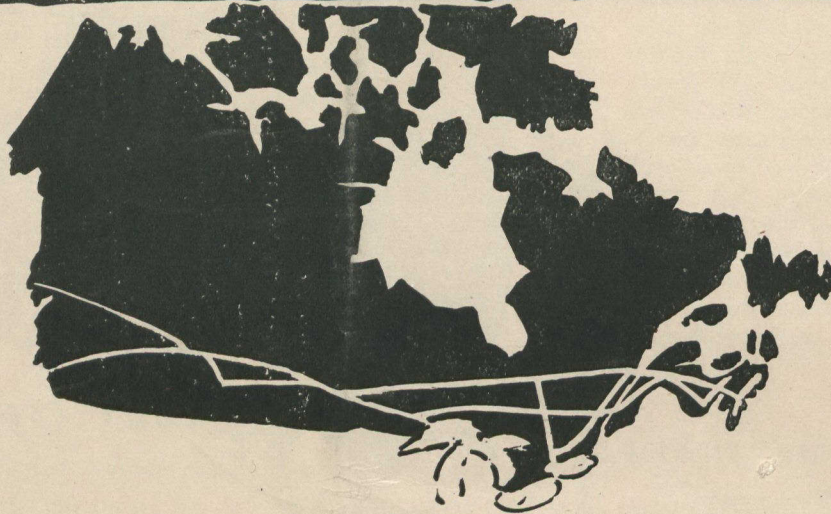
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CALGARY: M. E. Thornton, Supt. U.S. Agencies, Dept. of Natural Resources Building.  
NEW YORK: C.P.R. Bureau of Canadian Information, Wilson Building, 1270 Broadway.  
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**Minerals.** Practical information on the mineral resources of Canada, and opportunities for development.

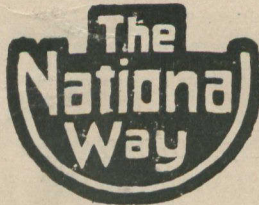
**Intelligence Service.** The Industrial and Resources Department of the Canadian National Railways has the widest range of information on Canada, and which is available to the public.

Correspondence is invited from manufacturers, mining men, trade representatives, chemical engineers and others desiring information on Canadian conditions, resources, and industrial opportunities.

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