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Illustrated Canadian Forestry Magazine

"BROKEN SILENCES."

A unique photograph of a flying boat used by the Spanish River Pulp and Paper Mills, Sault Ste. Marie, Ontario.



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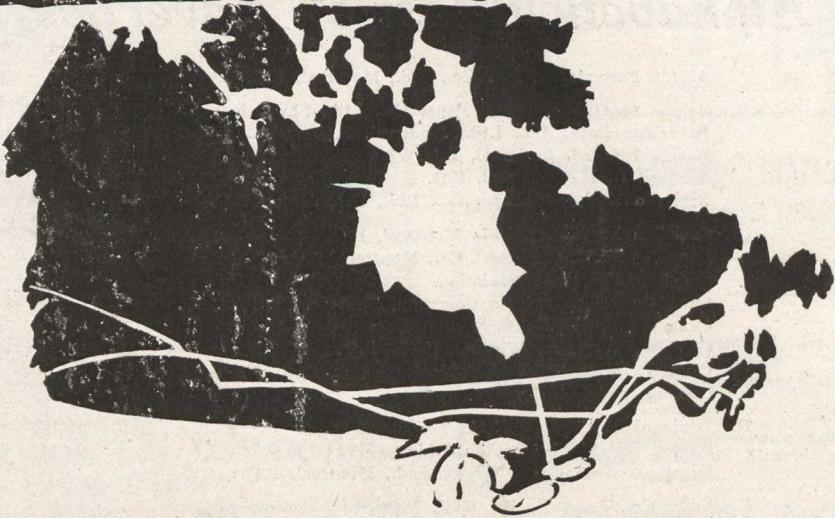
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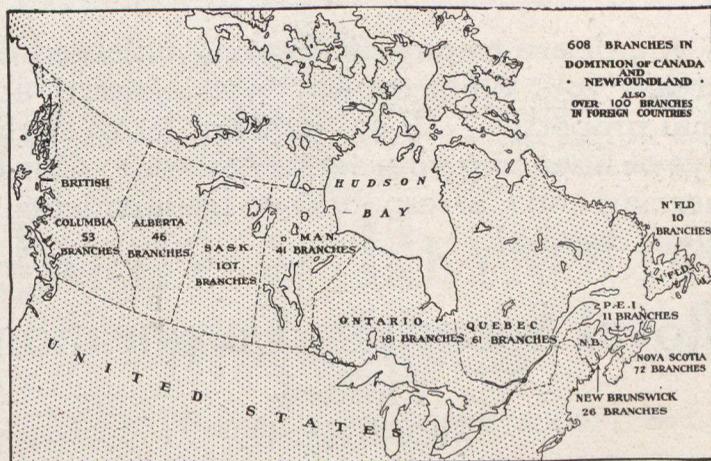
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A mile of trees "shorn" to allow of the passage of wires. As thousands of stubs have been left, nearly every tree will die. In winter the effect of "shearing" is horrible. Co-operation will largely prevent such mutilation in the future.



Trees dehorned (headed back) to allow of the passage of wires. So mutilated they will die. Observe the stubs!



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No. 3

Address all communications to Suite 224, Jackson Building, Ottawa.

Ontario Will Stop Tree Butchery Along Roads

By Henry J. Moore

Forester, Public Highways of Ontario

*Stringing of wires causing ruin of trees is now
under control*



NEVER before was there such a real desire to save the valuable shade trees of our roads and streets as there is to-day. The ruthless manner in which they have been butchered, in nearly every case where wires have been strung has aroused a feeling of resentment in the hearts of all lovers of trees, and as an outcome of this feeling steps are being taken to forever end the butchery.

Along many of our residential streets, once beautified by magnificent trees, now mere stubs remain, these slowly dying tell their pitiful tale to the passer by, until the day when they will of necessity have to be removed as dead things and be consumed in the furnace or stove as the case may be.

Many of these trees 75 or more years of age, gave of their shade and beauty before the oldest living resident was born, and the pity of it is that still in the vigour of youth and in the fullness of their glory they were sacrificed. Things which should have been revered were mutilated to finally die, and give way to a line of unsightly wooden poles.

What is the reason of this mutilation?

Public demand for telephone, telegraph, electric light, and power service. These demands made it imperative that wires be strung along tree lined roads and streets, and as all of the aforementioned companies know, interference from branches of trees cannot be tolerated, as the service under such condition will cause annoyance to customer and company alike, short circuits, and loss of current always do. These are common results of interference from branches. It is thus necessary that when new lines are strung good clearance from trees is essential, and so every branch and even twig in the way must be eliminated. In the case of high voltage electric lines several feet of clearance is necessary in all cases where branches are likely to bend with the weight of snow or sleet, or to be blown against the cables, thus the work of clearing the lines is a problem which all companies have seriously to face.

Control of Company Cutting.

There are but two solutions of the problem—the companies will either have to place their lines on private right of ways, or expert supervision over the



Tree in foreground pruned to allow of the passage of wires. No mutilation. Note the branches on the road. This tree will live and continue to be a thing of beauty.

pruning of trees will have to be exercised, wherever tree growth exists along their lines. When such conditions prevail much cutting of branches has invariably been necessary, and it is the manner in which these have been removed which has kept the indignation of all tree lovers at boiling point. It is unfortunate that generally the men who cut the trees and the public do not realize that when stubs are left upon the trees the doom of the latter is usually sealed, and that decay, which slowly and insidiously enters the wounds, will eventually cause the death of the subjects.

A real national effort should be made to interest county and city councils and other municipalities in the welfare of the shade trees. Unfortunately, in the past few people have been sufficiently interested to take steps to end the evil of

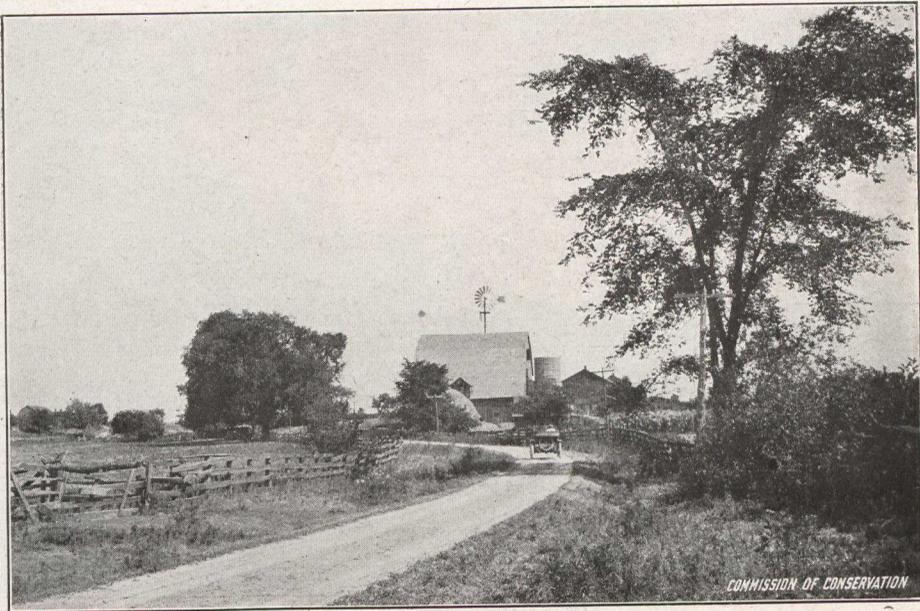
mutilation. Thus the burden has been left to a few citizens, or a few organizations, such as Horticultural Societies, and Chambers of Commerce.

The care of the trees in our municipalities should be entrusted to the Parks Board, where such exists, and the actual work of pruning should be supervised by the Parks Superintendent or Forester, or by men under the control of these officials. The pruning has been done largely without supervision, and in some cases the authorities have not interested themselves in the past. Thus it would seem that the various companies are not solely responsible for the injury to the trees.

Are our God-given shade trees to be mutilated and slaughtered forever? What would be the appearance of our streets and roads without these? Municipal Councils, shake off your apathy! Interest yourselves in the trees. Should a little money for the appointment of men qualified to care for them be withheld. You spend lots of money for purposes less worthy than this. Early this year, start a movement for the preservation of the trees and you will give to the next generation a heritage of beauty. Your towns and cities will then vie with each other for all will be beautiful, even in your own time much can be done to make them more attractive. Nothing can more eloquently express the intelligence of Municipal Councils than well planted streets on which the trees are preserved and protected from injury.

What Ontario is Doing.

It may be of interest to readers to know that the Department of Public Highways of the Province of Ontario has called a halt to the mutilation of trees along the highways under its jurisdiction. No person or company may, without permission, cut or remove branches from the trees, and in all cases where such permission is granted, the work may only be done under the supervision of the Forester, or such person whom he may appoint. The various companies pay for all the pruning, which is usually done by men in their employ-



The monotony and discomfort of travel along a dusty road in summer is much relieved by the frequent elm or the cool cluster of bushes.



A suburban driveway made beautiful by trees planted at frequent intervals.



UGLY AND DANGEROUS SLUM CONDITIONS ADJOINING A RAILWAY.
 A few ornamental shade trees would improve the appearance of this locality beyond recognition.



BOULEVARD PARALLELING THE RAILWAY.
 Trees give to this neighborhood beauty and health. Contrast the two photographs. The care which has been taken to preserve the trees along this highway has been a great factor in attracting residents.

It is well within the bounds of possibility, however, that the larger companies, whose cables and wires are strung along our highways and streets, will appoint expert tree pruners, with the result that in future the trees will be pruned without mutilation, and to the satisfaction of all concerned.

Trees for Planting in Ontario

By Arthur Herbert Richardson, Ontario Forestry Branch

THE Ontario Government, through the Provincial Forestry Branch, desires to assist land owners in Ontario to improve their woodlots and reforest waste portions of their holdings. It is preferred that besides supplementing the existing wooded areas on farms, areas such as steep hillsides, sandy, rocky or gravelly spots, swamp land, portions of farms cut off by streams, etc., should receive first attention. Planting of evergreen belts about open borders of woodlots is encouraged, but trees for hedges, ornamental planting, city or park purposes, will not be supplied. The material sent out is meant primarily for forest plantations.

What Forestry Branch Will Do.

In so far as is possible, the Forestry Branch will assist in the growing of forest plantations or woodlots by giving advice, through one of its officers, as to preparation of soil, species to plant, manner of planting and care after planting. It will also supply a limited number of trees for this work, free of charge.

It is suggested that persons contemplating waste land planting make a start of one acre the first season. Two acres will be the largest area for which the Department will undertake to furnish planting material in any one year. Larger areas may be planted by arranging to continue the work throughout successive seasons.

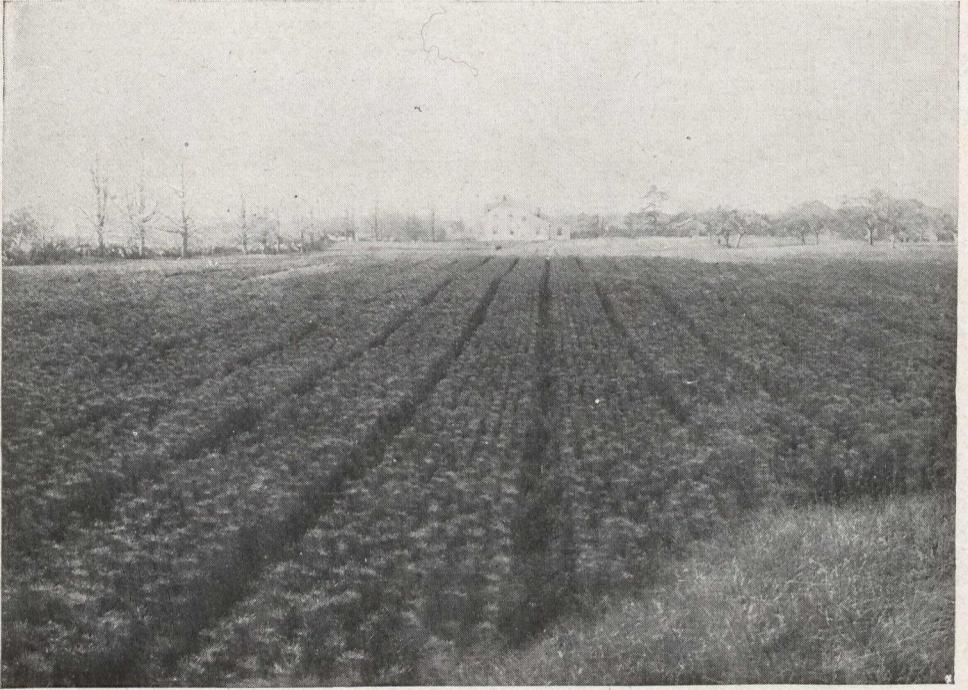
What Prospective Planters Must Do.

Persons wishing to take advantage of this co-operative plan of forest tree distribution should secure an application from the Branch; fill it out and return promptly. They will be informed when the trees are being shipped.

As stated above, trees are supplied free of charge, but the person receiving such material shall pay the cost of transportation by express to his nearest express office. One thousand to two thousand plants will range from 100 to 300 lbs. in weight. This season the trees will be shipped by Canadian Express from St. Williams, Norfolk County. If the applicant desires to know about what the express charges will be he should find out from his local express agent, the rate per 100 lbs. from the above shipping point. It is not considered safe to ship these plants by freight, and the Forestry Branch cannot receive money to prepay transportation charges.

Some Other Considerations.

Applications for trees will be received and filled as long as the stock is available and it is not too late in the season for planting. Applications should all be received early in April. If, however, an applicant is unable to receive stock in



Many hundreds of thousands of young pine seedlings growing at St. Williams, Ontario, in the Provincial Government Nursery. These trees will be ready this spring for permanent planting on waste lands. See accompanying article by Mr. Richardson.

a certain year, owing to the supply having been exhausted, his disappointment should not be too great, as his application may be held over, if he so desires, until the following year—and after all, a year in the life of a tree is not a great deal.

For the last few years the supply of planting material has not been equal to the demand. This is because it takes three years at least to grow a tree ready for permanent planting, and world events of recent years has seriously interfered with all such work. But the Branch soon hopes to exceed any past records in nursery stock output.

A list of trees, with their soil preference, available for distribution this spring, is here subtended:

Suited to thin soils on limestone ridges: Scotch Pine.

Suited to very poor sand: Scotch Pine.

Suited to light, sandy soil: Scotch Pine.

Suited to sandy loam: Scotch Pine, White Ash, Red Oak and Black Locust.

Suited to loam: White Ash, White Elm, Sugar Maple, Black Locust, Walnut, Butternut and Red Oak.

Suited to clay: Soft Maple, White Elm.

Suited to wet soils: Soft Maple, White Elm.

Address all communications to ONTARIO FORESTRY BRANCH, Parliament Buildings, Toronto.

Greece Pays Penalty of Deforestation

By Dr. B. E. Fernow

Dean Emeritus, Faculty of Forestry, Toronto



“Infertile sand and dreary rock waste remain” as legacy of the golden age



THE history of Greece has been so unfortunate and political conditions so unsettled that only lately efforts at improvement in economic conditions could hope to receive attention. For centuries after Greece had become a Roman province (146 B.C.) it changed rulers, Romans, Byzantines, Franks, Venetians, following each other, until between 1460 and 1473, it came under the Turkish yoke. As a result of an insurrection started in 1821, freedom, but no settled order as yet, was attained in 1829 through the assistance of Great Britain, France and Russia.

By the time this new era had arrived there was probably little valuable forest worthy of the name left, except in the inaccessible mountain districts.

Forest Conditions.

Although certain districts, like Attica, were already practically denuded in Plato's time, there is little doubt that originally the whole of Greece with small exceptions was a continuous forest. The destruction of the forest, protected by thousands of gods and nymphs in holy groves, proceeded slowly under the regime of the ancient Greeks, until the fanaticism of the Christian religion led to a war against these pagan strongholds, and the holy groves were reduced by axe and fire. Turkish misrule for centuries, over-taxation, reckless cutting, extensive herding of goats and sheep, and fires have reduced the forest area until now it occupies only 12 or 14 per cent. of the land area (25,000 square miles). In 1854, a survey developed about 2 million acres of wood-

lands (probably an excessive figure) for the now 2.5 million people, while 67 per cent. of the surface is a useless waste, and only 20 per cent. under cultivation, so that the general aspect of the country is desolate. The many islands are entirely deforested, and so are the seashores.

“Where in olden times dense shade poplars stood, now only infertile sand and dreary rock waste remain.”

The forest in northern and middle Greece is confined to the two rugged mountain ranges with numerous spurs which run parallel, north and south, with Mt. Olympus (nearly 9,000 feet) and Mt. Pindus (6,000 feet) the highest elevations. The large fertile plains of Thessaly and Boeotia are forestless. So is the large Arcadian plateau of the Peloponnesus, and the other smaller, hot but fertile plains and plateaus. The most valuable conifer forest is found on the higher ranges between the 2,500 and 5,000 foot level, below the snow-clad mountain tops, where especially two species of fir, *Abies Apollinis* and *Abies reginiae Amaliae* (a species remarkable for its sprouting habit), with other firs and several species of Juniperus and Cupressus, form sometimes extensive forests. Other common trees are chestnut, sycamore, several species of oak and poplar, and, on the coast, *Pinus halepensis*.

The firs occupy about 35 per cent. of the forest area, oaks and deciduous forest 45 per cent. Among the forest products which are exported, we find galls, vermilion and sumach prominent.

A Land of Lost Fertility.

It is believed that Greece in ancient times was more fertile than it is now, and that the deterioration is due to deforestation. Undoubtedly soil conditions favored such deterioration, for, with the exception of the Pindus range, which is composed of metamorphic rock, a poor, dry limestone is characteristic of the country except where fertile, alluvial and diluvial deposits cover it in valleys along the coast. The climate is, however, so favorable that even the poor soil would readily reclothe itself if left alone. The winters are short, hardly three months, and with hardly any snow or ice except on the high mountains, making the vegetative period nine months; and, with temperature ranging from 20 to 106 degrees F.; rainfall average 400 mm.; the summers, to be sure, rainless and dry, but the other seasons humid, somewhat less than in middle Europe, rapid growth is the result of these conditions. But the continued pasturing of goats and sheep some six million—prevents any natural reforestation. Increased taxation on this industry has had no effect, and the practice of permitting the people to gather dry wood by setting fires, which also serve to improve the pasture; perhaps nowhere are forest fires more frequent, in spite of heavy penalties. That a baneful influence on the water condition and river flow has been the result is historically demonstrated by Chloros.

In the mountains some fine and quite extensive bodies of fir still exist, lack of transportation having preserved them. Elsewhere the rights of user, and the herding of goats are so well established that reforms appear, indeed, difficult.

Firewood, 3 loads for each person supposed to be taken from the dead or otherwise useless trees, and small dimension material is free to all. For the right to cut workwood, the government charges a tax of 20 to 30 per cent. of the value of the material, the price for this being annually determined. On the material cut in private forests, the government also levies a tax

of from 12 to 18 per cent. of its value. This pernicious system of promiscuous cutting leads to the most wasteful use imaginable, not only high stumps, but large amounts of good material are left in the woods, so that it is estimated that hardly 50 per cent. of what is cut is really utilized. The cut, as far as the tax gives a clue to it, amounts to round 2.7 million cubic feet workwood, but with the firewood included it was estimated that near 90 million cubic feet are cut annually. Importation to the amount of 1.5 million dollars, mostly from Austria and Roumania, makes up the deficit in work material, especially for the box factories which manufacture the packages for the large export of currants, some 2 million boxes. The tax during the decade from 1862 to 1871 produced an annual income of \$600,000, a little less in 1895.

The forest has been from olden times, and is now almost entirely State property (some 80 or 90 per cent.) and in nearly all the remaining, private, communal and cloister property the State has a partial ownership or supervision. The waste land of probably 3 million acres extent also belongs to the State, the whole State property covering over 30 per cent. of the land area.

Development of Forest Policies.

A first definite attempt to regulate matters was made by King Otho of Bavaria, who took a personal interest in this forest property, and instituted for each province forest inspectors under one chief inspector, with forest guards, to prevent devastation by fire and theft. The mistake was made of employing in these positions superannuated Bavarian army officers, who were merely a burden on the treasury. No management or even regular fellings were attempted. The population could, as before, supply its needs upon permits, always granted, from the governor of the province, one of the forest guards being supposed to visit these, and to see that the wood was properly employed, not, however, to supervise the cutting.

In 1877, further legislation was had, instituting in the Ministry of Finance, a forest inspector, technically trained, with two assistant inspectors, also technically trained, to superintend the outside work. A forest survey was begun in 1879, but interrupted in 1880 for lack of funds and personnel. The same law placed the duty of guarding the State property in the hands of the general police or gendarmerie, 50 officers and some 340 guards, and during the fire danger (June to October) 110 more, being detailed for this service under direction of the Minister of War. The pernicious permit system, however, was continued.

Dr. Chloros, who obtained his education in Germany, became finally Forest Director and was responsible for securing further legislation in 1888, the object of which was, as a first step towards improvement, to survey and delimit and round off the State property. It provided that enclaves, and all absolute forest soil was to be expropriated. If no amicable agreement with the owner could be reached, the price was to be determined by the net yield which had been obtained from the property during the last five years, capitalized at 5 per cent. No attempts, however, at an efficient organization or change of the destructive permit system were made.

Private Forestry Discouraged.

By general law, the State has the right to surveillance of private property, although the extent of this right is not fully defined. The government may take for its own use, by paying for it, upwards of one-sixth of the annual cut; it collects a tax of 12 to 18 per cent. for all woodwork cut; it forbids the pasturing of woods that have been burned within 10 years, and obliges all owners of over 1,200 acres to employ forest guards. This and other interference with property rights naturally acts as deterrent to private forest management. A notable exception is the small private royal forest property near Athens, which, since 1872 under a Danish forester, appears to have been managed under forestry principles.

A thorough re-organization of the forest service was effected in 1893, when 20 district foresters were employed, the number of forest inspectors was increased to four, and a regular Division of Forestry was instituted in the Finance Department. The general police or gendarmerie was continued as forest guards. Until a native personnel could be educated, foreigners were to be employed for the making of working plans.

Reforms Came Slowly.

Yet in 1896, the then Director of the Forest Department, a lawyer, still complains of the absence of a proper organization and of any personnel with forestry knowledge. Apparently no progress had been made. In that year, however, the gendarmerie was to be replaced by forest guards (52 superior and 298 subaltern), who were to be appointed from graduates of a special secondary school, which had been instituted at Vytina some two years before. This replacement could, of course, not be effected at once, since hardly more than 25 men could be graduated annually; hence even this improvement in the lower class police would not be completed for six or eight years. No steps had been taken to educate officers for the higher grades, and in this direction, propositions merely were discussed.

In 1899, a change in the permit system was made, but hardly for the better, justices of the peace being empowered, under certain conditions, to issue such permits. Nor do we find in 1901 anything more than expressions of good wishes, and desire for further legislation, besides some attempts at popular education through the formation of tree-planting associations under the patronage of the Crown Princess. In 1905 no change in conditions were reported. Forest fires still continue as a common occurrence.

While the government makes efforts to improve conditions, the indifference of the people and the long established abuses prevent rapid progress at reform.



Mr. Stevenson's teaching of Prairie tree planting is usually accomplished by successful examples. The photograph shows what he has been able to do with native white spruce, Scotch pine and jack pine under Prairie conditions. These trees are eight years from their seedling stage

Evergreen Growing on the Prairie

By M. J. Stevenson, Morris, Manitoba

(A practical farmer who has made a striking success of tree planting)

IT has always been a mystery to me why more prairie farmers do not plant trees. I am sure there can be no comparison between a well treed prairie home and one situated out in the open and unprotected. Take a home out on the bleak prairie in winter, bombarded by every storm that blows, it is to say the least the picture of desolation.

Time and again we have seen the bleak, bare farmstead transformed into a thing of beauty by the judicious planting of trees. And yet a great many farmers in the western provinces are without a tree or shrub of any kind. Time was (away back in the early eighties) when tree planting on the prairies was a good deal of an experiment. But this stage has long since been passed, as beautiful planted groves in almost every district shows. While it is always best at first to plant some hardy, quick-growing, deciduous trees on the bare prairie;

yet there is nothing like the evergreens either summer or winter.

Surround a piece of land with some of the hardy, quick-growing deciduous varieties, preferably willows, and when these have become somewhat of a shelter, then plant your evergreens in the centre.

One objection to the planting of conifers on the prairie is they have always been regarded as very slow growing. This is a mistake. We must remember their system of growth is the very opposite of the deciduous varieties. Take the Manitoba Maple for instance. It makes most of its rapid growth during the first ten years, growing more slowly year by year till it is twenty-five or thirty when in this climate, and on the upland prairie it comes practically to a standstill. Not so with the native white spruce. After it gets its root system established, which takes from two to four years after transplanting, it will grow from one foot



A REAL MENACE IN THE TREELESS WEST.

This picture may puzzle the Eastern reader, but is only too intelligible to the prairie farmer living in districts where soil drifting has become a serious consideration. The photograph was taken last summer by the Western Lecturer of the Canadian Forestry Association near Nobleford, Alberta, on the Alderside Division of the Canadian Pacific Railway. Because of unobstructed gales the fine top soil of many farms was blown across the country and heaped so high in places as to obscure fence posts and to bury the railway tracks. In the area shown here the farmer had placed three successive sets of posts, one on the top of the other, as the drift grew deeper. At one place steam shovels were used to remove the soil from the tracks. The general adoption of tree planting in the form of thick shelter belts will almost certainly obviate this serious menace to western farming.

to two feet a year, and in twenty or twenty-five years will be away taller than the maple, and will still be in the fullness of its glory when two or three generations of maples have grown to maturity, died and been consigned to the woodpile.

White Spruce His Favorite.

I have twenty-six varieties of conifers growing on my farm here, but in my experience covering over thirty years in tree growing in Manitoba. I give the native white spruce first place. It is indeed a marvel. It is the one tree the good Lord invented to clothe desolation with beauty and comfort on the bare, bald prairie. In my experience here I find it makes a great difference from what locality we get our seed trees. In all cases we must try to get our seed or trees from a country with a climate similar to our own. For instance, white spruce grown here from eastern seed, al-

though of the same species, is not hardy. The same holds good with the Rocky Mountain varieties.

In 1907, I procured seed of the Western Yellow Pine (*Pinus Ponderosa*) from Colorado. The trees from this seed were not hardy; but later I secured seed of this species from the bad lands of Dakota and these have been entirely hardy here.

Of the twelve or thirteen varieties of conifers growing on the east slope of the Rockies, all can be made to grow on our prairies if we are careful to procure our seed or trees as far north as possible.

The question of tree-planting and forest conservation is a vital one in Canada already, as the country settles up we will require vastly more supplies such as lumber and other forest products, and the end of these commodities is already in sight.



GETTING READY FOR THE PRAIRIE TOUR.

Once more the Canadian Forestry Association will send into Manitoba, Saskatchewan and Alberta this Spring its "Tree Planting Car" which achieved such notable success in 1920. This year the interior will be equipped in a rather unique manner so that special seating will be constructed on a sloping floor, thus giving all present an unobstructed view of the motion pictures and the lecturer. As many as 125 people have been accommodated in this car at one time, although the normal seating capacity is for 72.



THE EFFECT OF TREE PLANTING ON THE PRAIRIES.

This interesting photograph was taken in Assiniboine Park, Winnipeg, and illustrates the profuse growth of trees and shrubs on what is essentially prairie soil. By a little effort and relatively small expense, almost any prairie town can achieve results quite as attractive.



A young shelter belt on Mr. Sovez's farm near Alsask, Alta. Russian poplar trees four to five years old with Mr. Sovez standing on left.



'Islands' of trees, planted by Mr. Archibald Mitchell on the Canadian Pacific Railway Company's farm at Strathmore, Alberta.

School Children and Grown Ups.

The Canadian Forestry Association sends to hundreds of schools Travelling Lecture Sets, consisting of 60 lantern slides and an entertaining manuscript. The following letter is typical of the reception given to this branch of our educational work:

Brussels, Ont., Feb. 8, 1921.

Canadian Forestry Association:

The slides on Forest Conservation were shown to High and Public school students and teachers yesterday afternoon and lecture read. The pupils were greatly interested and expressed their approval of them by hearty applause.

In the evening they were shown gratis to adults of the community at Family Theatre. Hall was packed—movies were shown as well. Many expressed to me their pleasure in viewing the beautifully colored scenes and their appreciation of the instruction given through lecture.

We used some slides to point out to our Lower school students character of glaciers exhibited, and in similar manner used the slide on lumbering industry in Nova Scotia and New Brunswick to emphasize that industry as presented in their geography lessons.

Very much indebted for use of same.

Yours truly,

BENJ. S. SCOTT,

Principal.

From a Commercial Nursery

Prairie Nurseries, Ltd.,

Estevan, Sask.

We find the Canadian Forestry Magazine to be of much help to us and are pleased to note the high plane upon which your work is carried on.

Yours very truly,

T. TORGESON,

Managing Director.

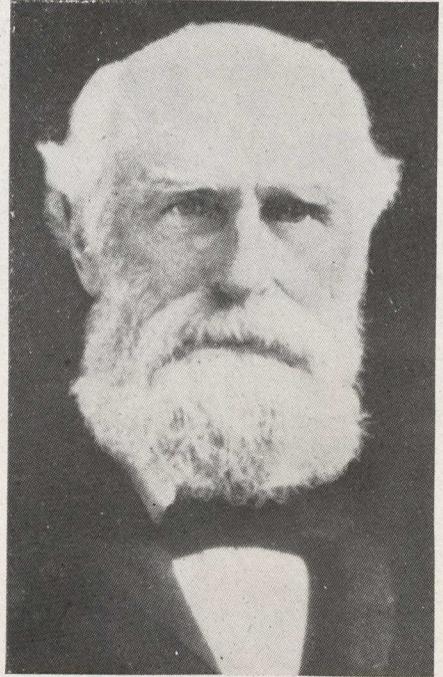
The average cost of forest fire prevention in the United States is $2\frac{1}{2}$ ¢ per acre.

It is claimed that laboratory studies in the United States have resulted in saving \$1,000,000 a year in box industry alone and that research is capable of saving \$5,000,000, annual loss in pulp decay.

Pennsylvania estimates that its lack of forests costs the people of the State \$100,000,000 yearly.

Fires and destructive logging cost the American people \$25,000,000 a year.

A True Servant of His Country.



WILLIAM LITTLE.

According to the Constitution of the Canadian Forestry Association, the Board of Directors shall include the past presidents who have held office since 1909-10. Under such a regulation, the Association would have lost from its Board this year Mr. William Little, who since the founding of the institution twenty-one years ago has devoted to its service his financial means and a truly intense interest in its aims and methods.

During the past month, the Directors of the Association have voted unanimously that in view of the great services and sacrifices in the interests of the Canadian Forestry Association which have distinguished Mr. Little's career, special provision be made in respect to him so that his name may be retained at the head of the list of past presidents who are, ex officio, directors of the Association.

Where Our Waste Paper Goes

By G. Gerald Blyth.

Many readers may have wondered where the waste paper they donated to some charitable organization or sold to the rag-picker went, and how it was finally converted once more into a new commodity. Every year a very large quantity of waste paper is made over into cardboard of various thicknesses, qualities and colors. In 1919, 64,078 tons of waste paper were used chiefly for this purpose in the pulp and paper mills of Canada, having a total value of \$1,782,070.

Cardboard is made up of a "filler" and a "liner." The "filler" is the centre stratum of the finished product, and it is in the making of the "filler" that waste paper of all descriptions is employed.

In the cardboard mills of J. R. Booth, Ottawa, the average daily consumption of waste paper for the manufacture of "fillers" is in the neighborhood of 40 tons.

The outside strata are known as the "liners," and a mixture of sulphite and

ground wood in varying proportions is used in their manufacture. For heavy cardboard of high grade, approximately 30% sulphite is added to 70% ground wood. The addition of sulphite gives strength and pliability to the product as the sulphite fibre is longer and less brittle. No waste paper is used in the manufacture of the "liners."

There is a very steady demand for clean waste paper—that is, paper free from foreign substances. In spite of this constant demand for waste paper with our usual prodigality, a very large amount of old or waste paper is needlessly burned or otherwise destroyed every year when it might be put to valuable service once more.

Vancouver, British Columbia.—Twenty-five thousand dollars has been loaned to the Douglas Fir Turpentine Company by the provincial government, as an aid to establishment. The company, which will engage in the extraction of turpentine from the Douglas fir, has a plant in operation on False Creek, and has completed extensive and successful experiments in tapping the trees.



ANOTHER CHAPTER ON "THE LOST BALLOONISTS."

The picture reproduced herewith shows the three Ontario fire rangers who made a record trip over the frozen Missinabi River at night when they brought the news of the American trio, Lieutenants Kloor, Farrow and Hinton. The rangers' journey covered 55 miles and was made without a stop in one day on snow shoes. From left to right the figures are:—B. Roney, Chief Ranger, W. R. Clark and Earl Trousse. These men have made a reputation for their speed on snow shoes through the North Country. The two dogs used on the journey are regarded as the best sled dogs in the district.

Relation of Foresters to the Logging Department

By B. F. Avery, Forester, Spanish River Pulp^{and} Paper Mills^{and} Ltd.

HERE is no doubt but that every forester has decided views regarding the relationship of foresters to logging operations. Although all foresters may see eye to eye with respect to the aims of the profession of forestry, variation in conditions under which each is practising as well as variations in the character of the individual, has resulted and will result in varied conceptions of the means by which the aim is to be realized. No one can lay down a set of rules for all to follow saying "Do this and your desire shall be fulfilled." The conditions under which we are all working are so different that the relationship of each to the woods operations must also differ. The complexity of the element of personnel is sufficiently evident to impress us with this fact.

We may, however, through an interchange of ideas upon this subject evolve certain principles which will serve to guide us all in the formation of our working policies.

The Aim of Foresters.

Let us start from a point upon which we are all agreed, the aim of the practice of forestry. Briefly expressed, it is the continuous production of merchantable woods products upon all land chiefly valuable for growing trees. To obtain this end two courses of endeavor are apparent. One leads towards research, the establishment of certain silvicultural truths. The other toward industrial practice, the application of the established truth to a given forest problem. The members of one group, free from the trammels of commercialism, carry on purely scientific work. Members of the other group spend their efforts in making the practice of forestry pay in industry. The distinction between the two groups is definite. It has been through confusion of the two in minds of foresters themselves as well as in the minds of the public that has made the foresters' path so difficult.

In a regrettable number of cases where foresters are employed by wood-using industries the relationship between the foresters and the logging operations is like that between the Rocky Mountains and a mule, there may be contact but no relationship. True relationship must be based upon interdependence, when the aims of both are one and each is dependent upon the other for the attainment of the common end there is a basis for an ideal relationship.

At this point foresters cease to see eye to eye. Each one has his opinion of the ideal relationship that ought to exist, and, backed by the condition he knows, his opinion is doubtless sound.

But I believe we can agree on yet another point. When the chief of logging operations and the forester are the same person, the conditions for the practice of forestry are ideal. The conditions are ideal, for, in shouldering the responsibility of the operator to furnish the required supply of raw material to the plant annually, he will practise those principles of continuous production, and only those, that he is able to practise without increasing his present costs prohibitively. He will do that which we are all desirous of doing, practise as much of ideal forestry as the economic conditions and the financial position of his company allows.

Personal Relationships.

In the absence of such a situation, i.e., that of a forester in charge of woods operation, there may exist any of a great variety of situations. But whatever the relationship between the logging department and the forester should be, it is what the policy of the company permits it to be. Personal enmity between individuals is often a means of preventing the establishment of a proper relationship, even when a comprehensive policy in regard to the handling of woodlands has been expressed. The factor of personal enmity is entirely outside of the scope of this paper, but I mention it because, when all other conditions for co-operation are favorable, this factor may cause failure. Progress in forestry practice cannot be made until the trouble has been eradicated.

For a moment let us consider the aim of logging departments in order to ascertain how that aim differs from the aim of the profession of forestry, and therefore of the forester. The woods department, or logging department, is established in order to cut and deliver to a wood-using plant, sufficient raw material to supply the annual needs of that plant. The aim of the logging department, then, is the cutting and delivery of sufficient wood each year (at a minimum cost), to supply the annual demands of the plant for which that department exists. The logging department is the "harvester." It is not anything else. It was established for no other purpose. But, if we add the word "continuously" after the word "plant," so that the aim reads thus—"The cutting and delivery of

sufficient wood each year (at a minimum cost) to supply the annual demands of the plant continuously," we have an aim that a forester may accept as a basis for a constructive policy of woods management. There are companies which have expressed such a policy. Under this condition the forester and the logging department are interdependent, and there is established a basis for the proper relationship.

There exist wood-using industries that cry continually for a constant supply of raw material. They may, and generally do have a forester employed, but their policy of management does not include the principles which permit the forester to practise the fundamentals of continuous yield. They insinuate, if they do not state definitely, that the forester cannot solve the problem of a future wood supply, and turning their backs to the solution, continue to cry for wood. The best hope of the forester in such a position is the example of companies, which, by a comprehensive policy, have made it possible for forestry to be practised upon their limits. By means of such examples, he may succeed in establishing relationship as well as contact with his logging department.

The Appetite For Logs.

We must remember, at all times, that present needs are paramount in industry. In a properly administered industry preparation is made for future contingencies, but, without present operation, the industry has no future. The logging department fulfills a present need. It harvests and delivers the raw material that supplies the plant. In the case of an established mill, it is present when the forester comes. Forestry includes logging operations within its scope. In fact to the industrial forester, logging is the "sine qua non" of forestry practice. Since this is true, why should not the forester be put in charge of the woods department? The answer is obvious. Few foresters have sufficient knowledge and experience in actual operations to successfully manage the work without a certain period spent in the study of existing local conditions. If he is not capable of management at once, what is his position to be? How is he to function?

Let us assume a case. The management of the company has incorporated in its policy the principle of continuous yield from its timber limits. There must be centralized control of the woods department. If the forester is not fitted, or is not allowed to manage the woods department, he must come in under the jurisdiction of the man who is the head of the department. The management, it has been assumed, has expressed the desire to establish continuous production upon the limits of the company. The forester has been employed to assist the management in carrying out this policy. It is the function of the forester to study conditions, and,



Mr. H. R. Christie (M.C.), formerly Assistant Chief Forester of British Columbia, who has accepted the important post of Dean of the Forest School of the University of British Columbia. Mr. Christie's high qualifications are recognized by all Canadian foresters.

based upon observations, judgement, and the truth established by the research group, submit to his chief, means by which the desired result may be obtained. If the forester uses judgment, and the management is sincere, the progress toward the ideal will be continuous. It will not be revolutionary, but it will be continuous. The management, as the meeting point of logging department and forester, receives suggestions from the forester and puts the suggestions into practice through the logging operation. In the eye of the management, the forester is an instrument, as the logging department is an instrument in the carrying out of his policy. In the eye of the logging department, the forester is a partner, loyal to the same head, and a potential guarantee of the extended life of the operation. In the eye of the forester, the logging department is a co-worker in the industry and the direct means of carrying out one of the three steps in his forestry practice.

By mutual consideration for the problems of the other man; by constant personal contact between the members of the logging department and the forester, there will exist a relationship that cannot fail to bring progress in woods management and to hasten the fulfillment of the aim of the profession of forestry.

Old Giants Windthrown

Port Angels, Wash.—Timber valued at nearly \$100,000,000 was uprooted in a storm which swept the Olympic Peninsula of Washington between January 20 and 30, Charles Morganroth, assistant federal forest supervisor estimates sixty per cent. of the timber can be salvaged with prompt action, Mr. Morganroth said. He added that some of the trees destroyed were standing 500 years before Columbus discovered America.

Fredericton, N.B.—Estimates received from scalers reaching the Department of Lands and Mines indicate a cut of approximately 200,000,000 feet of lumber upon the crown lands of New Brunswick this year. Last year the cut of lumber upon New Brunswick's Crown lands was about 360,000,000 feet.

"Forestry for the Private Owner."

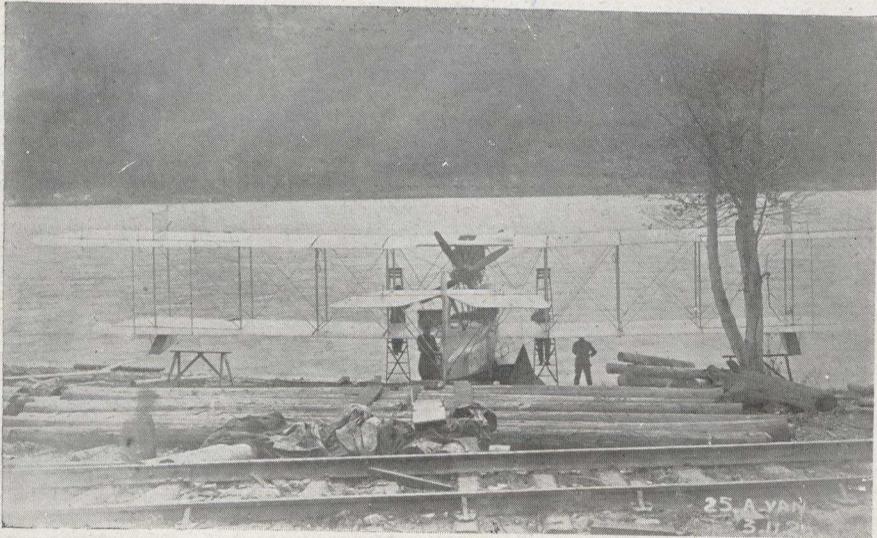
This is the title of a most interesting and helpful book just issued by the New York State College of Forestry and bearing the authorship of Professor F. F. Moon and Professor Harold C. Bel-yea.

The town of Iroquois Falls, Ontario, is the home of the Abitibi Power and Paper Company. A few years ago, the area now dominated by huge mills and beautifully arranged streets of residences was part of the dreary wilderness of forest and river. Today from the single square mile now occupied by the municipality, there is a wage distribution of close to four million dollars a year.

Such is the typical service of the Canadian forest. The story of Iroquois Falls lends force to the reiterated argument of the Canadian Forestry Association's propaganda that "a live forest means live jobs; dead forests drive out population."

The Lesson Driven Home.

If any reader doubts the extent of deforestation in the eastern United States, consider the situation of New York and Pennsylvania, formerly exporters of timber which to-day import 80 to 90% of the timber they use. Certain other states of the American Union import 97% of domestic timber requirements.



FOREST PROTECTION OPERATIONS IN THE AIR.

A flying boat of the Dominion Air Board ready to be launched at its base on Mara Lake, Sicamous, B.C.

The Common Problem

By R. S. Kellogg

Sec. Newsprint Service Bureau, N.Y.

REGARDLESS of necessary differences in local conditions and political organization, the fundamental features of the forestry problem are alike on both sides of the International Boundary. The pulp and paper industry of North America is conspicuously an international industry with an interlocking financial basis and largely common markets. There are also many other undertakings in which citizens of the United States and Canada are mutually interested.

In some respects, Canadian forest policies, because more recent, have heretofore been more far-sighted than those of the United States. In other respects, possibly the movement in the United

States has gone further than it has in Canada. In neither country has the problem yet been tackled in the thorough-going fashion it must be, in order that our great industries and the very life of the people may be sustained in the future upon the basis on which they have been organized and built up.

Foresters have every reason to think that the year 1921 will be the best year they have yet seen for the widespread acceptance of the gospel they have been preaching for many years, and I hazard the prediction that many seeds, which they supposed fell upon stony ground, really lodged in fertile soil and will develop into lusty saplings in the near future.

An Embargo on Pulpwood Export Proposed

MR. Frank J. D. Barnjum, of Annapolis Royal, N.S., has added a new bulletin to the many valuable contributions he has made to the subject of forest conservation along practical lines. It bears the title "An Immediate Export Tax for Embargo on Canada's Fee Land Pulpwood is now Imperative." After detailing the enormous losses of standing timber through the ravages of the budworm in recent years, Mr. Barnjum comes to the conclusion that the simplest way to reckon this loss through forest disease is to assume that one cord per acre on the 75 million acres of timber lands in Quebec has been done away with. In other words, the spruce budworm in the province of Quebec, according to Mr. Barnjum's statement, has caused a depreciation of 75 million cords. The author proceeds to show that the loss from fire has been equally appalling, and quoted a recent estimate that fire damage along just one line of railways, between LaTuque and Cochrane, amounts to 20 million cords,

sufficient wood to have kept the paper mills of Quebec running for ten years.

"There is one compensation, poor as it may seem, with relation to our future wood supply, and that is that the money value of what land and wood we still have left has more than doubled on account of the short supply remaining, and this fact we must not forget in considering present prices for pulp, paper, lumber, and wood.

The newspapers are asking for lower prices for paper, while as a matter of fact the manufacturer of paper and lumber is faced with increasing costs in connection with the protection of his forests from fire and bugs, and the only way this can be met is with higher prices. The bud-worm has destroyed such tremendous areas of standing fir and spruce that the fire hazard has been increased a hundred fold owing to the very large areas of dry dead trees in the woods, entailing a greatly increased fire patrol.

Higher prices for land, pulpwood,

lumber, and paper is the only practical conservation that I can see, as it will have the effect of preventing waste in these commodities and will enable the land owner to set aside something to spend for increased fire protection, burning of slash, selective cutting, and reforestation.

The time is now here when a careful burning of slash and debris must be practised as a measure of protection against insect pests and also as a fire preventive measure.

When timberlands in the East attain a value of \$50 per acre, which is less than one-half of what it will cost to re-produce, then and only then will there probably be some check in the enormous waste that is going on in the woods in connection with logging operations.

When paper, which has the distinction of being manufactured from the most rapidly disappearing raw material of any of our manufactured products, attains a price commensurate with its real value, which before this product was manufactured out of wood was about twenty cents per pound, then and probably not till then will the present enormous waste in paper be curtailed.

The Public Stands the Cost.

It matters not to the publishers what the price of paper is, so long as they all pay practically the same, as the cost will simply be passed along to the consumer in any event. The interests of the newspaper publishers and the newsprint manufacturers are one, as they are both dependent on the conservation of our forests.

If this partial picture of destruction is not sufficient to cause our Government to put a heavy export tax or embargo on our fee land wood, then the complete story will have to be told.

In the past the only argument against this procedure has been that it would be a hardship to the farmer or fee land owner, as it would prevent him from obtaining the best price for his wood; but this does not apply now, for with Canada's more than one hundred pulp and paper mills, and more building, the home market, with its shorter rail haul makes the more durable mar-

ket, both for the wood as well as for farm produce. With the enormous loss of wood that our mills have suffered we can now afford to pay just as much for wood as the mills of the United States. As a matter of fact, wood is selling in Quebec as high as it is in Maine. The home market for our farm produce has now also become more important than ever, on account of the customs duties which the United States is piling up against us.

How Business Will Gain.

Every mill erected in Canada means another town and just so much more demand for the product of the farm as well as more freight for our railroads, as every car of wood hauled to a paper mill means four additional cars of other material and supplies, which would increase the income of our railroads enormously. It would mean the haulage of five hundred thousand additional carloads of freight if the million and a quarter cords of fee land wood now exported to the States was manufactured in Canada.'

In addition to all of the above facts, the item of the difference in exchange is a very important one. When we ship out a cord of wood, there is only a matter of twenty-five dollars left in Canada, while if this cord of wood is manufactured into paper it would leave with us nearly three times as much, or seventy-five dollars. In other words the million and a quarter cords of wood we shipped out last year left in this country only a matter of thirty-two million dollars, and I am afraid much less. If manufactured into paper this would have enriched Canada to the extent of approximately one hundred million dollars. This means that we have suffered a direct loss of more than seventy million dollars, while the indirect loss has probably been much more. This would reduce our trade balance to a very material extent.



A flying boat of the Dominion Air Board making a landing at Shuswap Lake, near Sicamous, British Columbia. Courtesy Western Lumberman.

Possibly even more important still, especially in times of unemployment like the present, the additional annual employment of the ten thousand men necessary to turn this million and a quarter cords of wood into paper would mean a city of fifty thousand people, or twenty-five new towns of two thousand population each; although, with the enormous expansion we have had and are now having in the pulp and paper industry, we have but a very short supply for many of our present mills and Canada is already over-developed in so far as pulp and paper are concerned. At

least some measure of protection must be afforded to mills already built.

No country, no matter how friendly its relations may be, will consent to the closing of one of its own most important industries for the sake of supplying raw material to the mills of another country.

This time has now arrived. With the tremendous loss in our available wood supply it is now no longer a question for international negotiations, but it is simply a question of life or death for our pulp and paper industry.

The Management of Pulp Lands in Eastern Canada

By E. F. McCarthy

Forest Research Specialist, Commission of Conservation

THE time has arrived when cut-over pulpwood lands have a recognized potential value. This fact is so obvious that it has given rise to inquiry by the owners of such land as to the best method of handling for a second cutting. I would suggest to the owner of these lands as the first step, that he should put his land holdings on the same business basis as he now considers his mills and logging operations. If then the owner considers his capital as invested for a period of years only and does not look to the future to yield him continuous crops of timber, I would further advise that he be sure in discarding cut-over land that he is not throwing away a growing asset.

Since proximity to manufacturing centers is a prominent factor in the woods business and the accessible supply of wild forest is a known and acute element to many established operators, the operator should make intelligent inquiry into the character and value of his cut-over lands, put the whole mass of facts on a simple balance sheet and decide whether his business can proceed continuously on his present holdings or whether, if unable to add to these holdings, he must face a cessation of that business after a period of years.

There is no secret formula for the recreation of our forest resources, and if it were possible to prescribe to-day a simple method which would cover Canada with a growing forest, the state would profit but the individual would not. It is a fact known to all of us that large profits have been made for the fortunate few who have possessed timber when the general supply has waned. The truth about forest conditions will inflict the same penalty or reward on one operator as on another and success will be achieved by business insight operating in the light of complete information as to assets and liabilities.

The First Inquiry.

The first step, therefore, is a careful inquiry into the character of timber land holdings. This must be made for the individual tract. Growth in the forests of white spruce will vary from that in the red and black spruce mixtures. The mixture of tolerant hardwoods with the most desirable softwoods creates a different and more difficult problem than that presented in mixtures of softwood with aspen and paper birch. Climate, soil, insects and disease, fire risk, proximity to market and even social conditions are all dominant

factors in the establishment of a forest business, and any one may cause the success or failure of the enterprise.

Many of these are easily calculated and in others, causes and effects are unknown. We are rather too prone to ask why the forest fails or succeeds rather than to limit ourselves to the simple determination of how a specific area of forest will act when cut over. Cut-over land is a mystery to many of us, and even more so to the average operator who never sees it close up after the timber crop has been removed, and if he does find cause to traverse cut-over land, sees a given area but once, and because he has not a mental picture of its original condition he has no measure by which to judge what has taken place there.

Casual observation from a train, an automobile or even a travelled tote road gives a poor average impression of the general character of cut-over land, because along these roads conditions have been established which are usually different from the average character of the logged area. Cut-over land must be investigated intelligently and systematically at the expense of considerable effort and much torn clothing, if the history of the area is to be thoroughly understood. A study carefully made, systematically covering logged-over land by some well known method such as our strip method, can be made to yield accurate information of the following character and extent:

Exact Information Needed.

- (1) The live growing capital stock of timber, young advanced growth and reproduction.
- (2) The loss of capital stock by cutting.
- (3) The loss of capital stock by wind and other natural agencies.
- (4) The net volume increment since the cutting and probable net increment for the immediate future.
- (5) The fire risk and natural conditions controlling it.
- (6) The period of years to the next cut and amount of that next cut.
- (7) The acreage that is productive and that which is not, thereby allowing for adjustment.

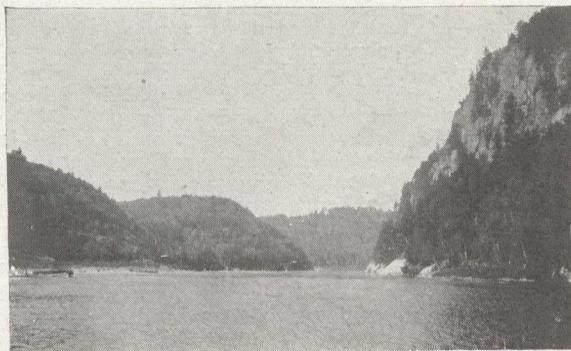
In addition this study will show what material now exists on the land, which is not now of value to the industry, but has potential value for other purposes; this constitutes the by-product of the industry and calls for market development.

The other important but less certain yield of a study of this kind is an intimate knowledge of the forest through which alone the laws that control its composition and life can be learned. By such means we will eventually be able to produce the forest we want to grow in place of the forest which the present natural agencies will produce. Forest improvement is the second step and cannot wisely be made to take precedence without allowing first for inquiry as to what is the gift of nature.

I have prefaced the description of the subject assigned me in this manner to emphasize the importance of placing timber land management upon a sound business basis. At the same time, I feel that it was expected in the assignment that the problem would be taken up in its details, consequently I shall present to you facts which I have come to believe concerning the various types of forests in eastern Canada.

Softwood Types.

Spruce and balsam can, in most instances, be cut by a selection system without jeopardizing the dominance or succession of softwoods. This is especially true where the trees are not subject to heavy windfall or other calamity and where the stand has a good representation of all size classes. It is not true where the timber is uniform in size, has reached a mature age and is growing slowly because of its density, for any disturbance will result in heavy mortality. Such stands are found on swamp lands and in rare instances on moist flat lands. The heavy mortality of medium sized classes makes it advisable to cut such dense stands to as low a size as is commercially feasible. This will not result in clear cut in the true sense of the word, but will leave a very considerable stand of trees below 5 inches in diameter. To carry on the growth, reproduction on the moist soil will add considerably to the stand immediately follow-



Interesting views taken during a trip through the Mississaga Forest Reserve of Ontario by K. S. Clarke of Coniston, Ontario. "Some of the shores were burned many years ago, but other parts have beautiful stands of white and red pine and large spruce," writes Mr. Clarke to the Forestry Magazine.

ing the cutting. In all softwood stands there is usually enough moisture in the soil to produce a crop of seedlings following the logging operation, but if the soil is covered by a heavy humus and the cutting is heavy, the reproduction will not succeed because of excessive drying out of this humus soil cover. Furthermore, if the stand has not been dense enough to keep out the undergrowth of wood shrubs, the success of the second crop will be impaired by the shade of the resultant mat of released shrubbery.

Controlling the Brush.

In any case the immediate success of cut-over spruce and balsam lands is dependent on the number, size and distribution of the advance growth, which will produce the next and probably the second cut. One fire will destroy advance growth and retard production for an extended period of years or destroy it altogether. It is on softwood lands that fire is most prevalent and hardest to control. Another fact influencing the advanced growth and reproduction is the matting of brush left following logging operations. In dense stands this is very heavy, and must be controlled to prevent the covering up and killing of existing young trees and prevention of seeding. The method of slash disposal will be determined by local logging conditions, the density of the brush and danger of fire. In light stands it may be possible to scatter the brush in such a manner that no danger will be done to young growing trees.

The rate of growth on cut-over land of the white spruce and balsam type is quite remarkable when protected from fire. A study of such type was made by the Commission of Conservation during the past year on limits of the Spanish River Pulp and Paper Mills, Limited, and shows diameter growth at an average rate of one inch in five years for white spruce and balsam. It can be readily seen that the actual volume increment per acre is dependent on the number and size of such trees per acre. We have been lax in impressing the fact upon timber land owners that volume production is not a question of investment of soil capital alone, but also of wood capital up to the point of loss of growth by crowding.

I have emphasized the use of a selection system as being most feasible at this time, and want to object to confusion of that with the use of a diameter limit regulation which is selection done with the eyes shut. However needful it may have been in the past, it can be improved by the introduction of trained human judgment.

On the whole, the outlook for future production of timber on spruce and balsam lands is hopeful in so far as there is a good representation of the lower diameter classes and ample advanced growth, if this growth is protected in cutting and protected from fire.

Paper Birch-Softwood Mixture.

There is another type composed of a mixture of paper birch and aspen with spruce and balsam which may be treated much as the pure softwood type of pulp species, though the rate of growth will be reduced somewhat by the shade of the birch and aspen where the overhead stand is dense. The younger the stand, the greater the chance of successful management. There may be a confident outlook toward early utilization of these hardwoods which will bring about an increase in the percentage of softwoods in the stand. The acreage of this type is large and its management will not be difficult.

The Tolerant Hardwoods.

Beech, the two species of maple and yellow birch, complicate the present management of the mixed type of Eastern Canada. Their presence is due to the following characteristics more or less common to the four:

- (1) Ability to endure shade.
- (2) Large crops of seed, annually, very motile in all except the beech and able to take root through hardwood leaf litter.
- (3) Fast growth in early life. (Twice as fast in height as the red spruce from one to ten feet high.)
- (4) Long life and ability to recover.
- (5) Spreading crowns.
- (6) Greater present value of the softwoods and difficulty in logging and transportation of hardwoods.
- (7) Ability of hardwoods to sprout.
- (8) A hardwood leaf crop which prohibits softwood seeding.
- (9) Preference of hardwoods for the better sites.

Keeping in mind these advantages which the hardwoods possess in competition for space in the mixed forest type, we must not expect that the cutting of softwoods in any way, while the hardwoods are left intact, will result in an increase of percentage of softwood in the stand. It is now possible to find in the eastern portion of the northern forests, where this type is prominent, areas that have been cut in almost every conceivable way and in none of them is there any sign of success in the elimination of hardwood competition. In diameter limit cuts where softwood alone is removed, a second cut of softwood has been obtained with very slow growth during the period elapsing between the two cuts, while the latter effect of cutting the large-crowned hardwoods is merely delayed.

The operator must expect, therefore, to face the logging of hardwoods from these lands and in many places can now do it at a profit. Where hardwoods have thus been removed, it is found that a complete growth of young hardwood seedlings is established which quickly overshadows the advance growth and seedlings so that the operator is thus not only faced with the

removal of the virgin stand but also with the removal in the future of the pole stand of hardwoods established following his first logging operation.

It is my belief that where it is possible to remove the hardwoods and retain as large a percentage of softwoods as can be retained without serious loss by breakage in logging or by windfall, there will be established, along with the second growth hardwood, a considerable stand of softwood. This young growth of softwood can then be fostered in the later cutting of the hardwood second growth and will doubtless lead to an improvement of the softwood percentage in the stand. This, however, involves practices which are not now economically feasible.

Jack Pine Lands.

We may look forward hopefully to the possibility of the utilization of jack pine for pulp purposes, and we are especially favoured by the ease with which it regenerates on cut-over land where there have been light fires. It will be necessary, however, to carefully preserve the first crop of seedlings since a second will not be available after the destruction of the seed trees and seed in the soil. Very little regulation except proper protection of young trees will probably be needed in the management of this type.

Hardwood Ridges.

The ridges of pure maple, which are found throughout portions of Eastern Canada, have a certain value as barriers against fire, but offer nothing to the pulp operator since conversion from the pure hardwood stand to a softwood stand involves nothing short of clean cutting, burning and planting.

Burned Lands.

There are numerous areas of small acreage throughout Canada which have been burned while the virgin stand remained about them and now have throughout, young pole stands of paper birch and aspen. I feel confident that there will be a market for these stands of timber and the fact that spruce and balsam, and in some cases white pine, are coming in plentifully, points hopefully to the reclamation of these small areas.

This summarizes the prevailing types of forest lands in Eastern Canada and such advice as I have to offer concerning their management. I want to emphasize that each area has its own particular problems which can be covered by no general rules and that the first essential to management is an accurate stocktaking of the area involved; that there are more possibilities in the protection of the young timber standing on the ground than we have previously believed, and that the protection of this from fire must be recognized as a vital element in Canada's future forest policy.

Western Lumbermen on Right Track

THE Western Retail Lumbermen's Association, of which Mr. Theodore A. Sparks is President, Mr. R. Skov, Vice-President, and Mr. Fred Lamar, Secretary (until his recent resignation to enter business), is generally regarded as one of the most wideawake and progressive bodies in the Dominion. On forestry matters the western retail lumbermen can be relied upon for a maximum of intelligent action. At the recent annual convention an important resolution was unanimously passed expressing strong convictions upon forest conservation.

It read as follows:

WHEREAS the Statistical Branch of the Forestry Department shows that nearly two-thirds of the total forest area of Canada has been destroyed through various sources during the past seventy-five years, and that at the present rate

of consumption the forest supply of the Prairie Provinces will be depleted in twenty-five years, and that of Canada in fifty years, unless further means are taken to protect our forests, with its serious result not only from a lumber standpoint, but also from the standpoint of the loss to the country, through the protection afforded to the source of moisture by the present forest area.

BE IT THEREFORE RESOLVED THAT, the Western Retail Lumbermen's Association realize that Reforestation, and the greatest possible protection of our present forests is absolutely necessary if the lumber industry is to continue on the present large scale:

THAT, Forest protection is a matter of vital interest, not only to the lumbermen, but to every citizen of Canada:

We, therefore, place ourselves on record as fully sympathizing with, and

supporting the work of Forestry in Canada, and are of the opinion that the work of the Forest Service in Canada should be greatly extended, particularly in the case of FIRE PREVENTION:

THAT, the present staff of the FIRE RANGING SERVICE BE LARGELY INCREASED, and that the Service be equipped with every modern appliance for Forest Fire fighting, in order that our Forests will be given the maximum protection:

THAT, Provincial Fire Prevention

Laws be made more severe, and that they be rigidly enforced:

THAT greater efforts be made in educating the public to fully realize the enormous damage caused by FIRE, and demanding their assistance in its Prevention, and that the Members of this Association personally assist in arousing the public interest:

THAT, copies of this resolution be forwarded to the Western Premiers, the Minister of the Interior, the Director of Forestry, the Secretary of the Canadian Forestry Association, and to the Press.

The Distillation of Wood

By Dr. Alfred E. Macintyre, Ottawa

(Article No. 3)

THE ultimate yield of the prime products obtained by the distillation of wood depends upon the quantity of the respective substances produced by the carbonization of the raw material in the retort. This operation is most important, as a low yield of acid and alcohol in the retorting process means a corresponding output of the prime products. It is therefore necessary that the carbonization in the retort be conducted in as scientific a manner as possible. The operation should not be carried out by "rule of thumb" methods, but with every degree of precaution and control, in order that a maximum yield of the crude products be obtained. Therefore the carbonization of wood should be controlled by persons familiar with the conditions which must be applied to attain the greatest quantity of valuable commercial products.

As a rule there is no scientific control in any part of the Canadian factories producing the prime products—acetate of lime and methyl alcohol. The operations are generally in charge of men who apply empirical methods based upon "rule of thumb" observations, and as will be observed later, these are often productive of low yields of both acid and alcohol.

Carbonization of the Wood

The following is a short description of the process employed for obtaining acetate of lime, wood alcohol and charcoal. The wood is introduced into the hot retort and the doors sealed. The first phase of the pyrolytic distillation is the conversion of the natural moisture of the wood into aqueous vapor and latter's condensation into water in the condenser. There is very

little decomposition of the wood under 300° F., which is reached after four hours' firing. When the temperature in the retort approaches 340° F., a yellowish aqueous liquor containing acid commences to flow from the condenser, and the quantitative volume rapidly increases during the next four hours. If proper control has been maintained in heating the retort, the temperature, at this stage, should be 485° F., and there should be a strong flow of pyroligneous acid having isolated reddish-brown spots and streaks. The wood within the retort has undergone a change, and a certain portion of it, particularly the exterior layers, has been converted into charcoal of a dark walnut colour.

After about ten hours' heating, the so-called critical temperature, or exothermic point, is reached. The liquor flowing from the condenser has a decided reddish color, due to the so-called soluble oils and tars, and, at this stage, great care has to be exercised in applying heat to the retort. The exothermic point lies at 515-535 °F. The temperature for the next two or three hours should be maintained between 515-535 °F.

The maximum flow of crude liquor is reached after twelve hours, and the pyroligneous acid is dark red in colour, caused by the presence of thin tar. From the fifteenth hour, there is a steady decline in the flow of liquor, and it is of a viscid tarry character. The greater portion of the wood in the retort is converted into charcoal after seventeen hours proper firing, and the temperature of the exit gases, from the retort, is between 575-675 °F. The flow of tarry liquor is very small at the twentieth hour, and the temperature is

about 575 °F. All the volatile condensable constituents of the wood pass over before the twenty-fourth hour. The carbonization is complete, and the charcoal drawn out and placed in the coolers, and these sealed.

Uncondensable gas begins to form when the temperature is about 325 °F., and the flow is most pronounced at the exothermic point, 515-535 °F. If the firing and temperature is not controlled at this stage, the quantity of gas may become excessive, due, in part, to the partial decomposition of the acid and alcohol vapours in the retort, resulting in a considerable loss, with the production of increased quantities of oil in the crude liquor. The gas is employed for heating the retort or under the boiler.

The quantity of crude pyrolygineous acid produced will vary according to the species of wood employed, the percentage of moisture which it contained, and the conditions adopted in the carbonization.

Purification of Acid Liquor

The acid liquor passes from the condenser to the settling tanks, where the specifically heavier tar separates to the bottom. The acid liquor from the tanks is purified by being distilled from a copper still, heated by indirect steam, and the associated tar remains behind. The tars are freed of acid and volatile oils by distillation, with steam, in the tar still. The distillates from the stills pass to their respective settling tanks where the oils separate out at the top and bottom, according to density, while the acid liquor lies between. The latter is run into the liming tank, and neutralised with lime, the acid being converted into an aqueous solution of acetate of lime associated with other volatile constituents. The quantity of lime necessary to neutralize the acid is generally determined when the addition produces a permanent port wine colour. This coloration is due to the presence, in the distilled liquor, of a compound formed in small quantity during the carbonization process. It is probable that the substance is a methyl ether of pyrogallol, and the reaction due to traces of iron present in the lime employed.

The "Lime Lee" Still

The neutralised liquor is distilled in what is termed the "lime lee" still. A volatile aqueous mixture of crude methyl alcohol, acetone, oils, etc., distils over, while a portion of the aldehydic constituents is resinified, and methyl acetate present hydrolysed. The distillate passes to the crude alcohol tank to settle, and the hot aqueous acetate of lime is run off through filter bags into the evaporating apparatus. The solution is evaporated until the acetate crystallizes out as a thick mush, which

contains 40-50 per cent. water, and is then placed upon the drying floors and dried. The gray acetate produced contains from 80-84 per cent. of anhydrous lime compounds of organic acids, principally acetic, the latter being associated with small quantities of propionic, butyric, etc., acids as lime compounds. The other substances present in the acetate are moisture, water of crystallisation and a small percentage of impurities. Acetate of lime is principally employed for making acetic acid and its derivatives, and acetone.

Wood Alcohol

The crude wood alcohol distillate, from the "lime lee" still, upon standing, divides into three layers—heavy oils, crude alcohol and light oils. The crude alcohol is rectified in a fractionating still similar to those used in alcohol distilleries. The wood alcohol is obtained as 95 per cent. spirit and shipped (in tank cars) to the refinery for further purification to free it from acetone, oils and other impurities. It is sold under different names for various purposes, and employed for the making of methylated spirits and formaldehyde.

The oils, which separate in the settling tanks for the purified acid, tar and crude alcohol distillates, are divided into light, heavy and acid oils, and were formerly employed as fuel at the factories. These are generally termed creosote oils. The tar which, except the charcoal, is the principal quantitative product derived from the carbonization of the wood, is burned as fuel under the retort or boiler.

There are a number of processes for the carbonization of wood and purification of the crude products, but it is the intention to touch upon one, which is of interest on account of economy of fuel and apparatus.

Meyer, of Hannover, introduced a method by which the distillation of the crude liquor is eliminated. This is done by bubbling the hot gases, as they leave the retort, through layers of hot tars, by which the tar of the pyrolygineous acid is removed and the distillate obtained ready for neutralization. This saves the crude acid settling tanks, acid still, condenser and fuel necessary for distillation. The pressure of the tar upon the bubbles of gas is proportional to the height of the tar above the initial gas bubble and the specific gravity of the tar, therefore this method causes a back pressure upon the retort. To overcome this difficulty suction fans have been introduced into the system, but, notwithstanding this, the result is not perfectly satisfactory. From a chemical viewpoint the passage of the gases, at a high temperature, through the hot aromatic tars is not desirable, owing to the possibility of interaction between the volatile gases and certain constituents of the tars.

Yield of Products

Statistical returns in America are generally based upon the yield per cord of wood. The cord is not a constant in all parts of this continent, and varies a great deal, and is therefore an unsatisfactory basis for the calculation of comparative yields. Generally speaking a cord of air-dried wood weighs about 3,800-4,000 lbs., and contains, variable percentages of moisture. In order to obtain comparative figures regarding the yields of the various substances all the data employed have been recalculated to the basis of 4,000 pounds of absolutely dry wood. The statistics are based upon actual production in certain factories, unless otherwise specified, and those for Canada taken from statements of the principal manufacturers.

Table Showing Yield of Products

Acetate of Lime—	European factory	307.5 lbs.
"	Laboratory experimental	
"	retort	351.7 "
"	Canadian factory	250.0 "
Wood Alcohol—	European factory	10.0 gals.
"	Commercial experimental, controlled	11.6 "
"	Laboratory experimental retort	11.96 "
"	Canadian factory	10.00 "
Charcoal—	European factory	14.20 lbs.
"	Commercial experiment, controlled	14.75 "
"	Canadian factory	12.50 "

The tar varies between 18-30 gals. according to the species of wood and process of carbonization and the oils from 1.5-4.0 gals.

In the concluding communication some attention will be given the above data and possibilities of improving the wood distillation industries, with a short account of the European practice of distilling soft woods.

"The University in Overalls."

The Canadian Forestry Magazine is in receipt of a most readable book published by the Rverson Press, Toronto, at two dollars. The title, "The University in Overalls," happily characterizes a narrative of human reclamation in the lumber, mining and railway camps of the Dominion. The author, Rev. Alfred Fitzpatrick, in 1900, founded the Reading Camp Association, which grew into the Frontier College, an institution which almost unaided and all too meagrely encouraged by the orthodox bodies, has reached out a helping hand to the handicapped Canadian worker at the frontier posts of civilization. It has been a splendid work all through. Mr. Fitzpatrick in his very interesting book does not hesitate to criticize a system of

education which provides the maximum of advantages for the fortunate few in the great centres and wholly abandons the tens of thousands working in the wilderness. The reader cannot fail to see the force of the argument that where masses of uneducated men crammed together in poor quarters are denied healthful companionship and ennobling incentives, moral and physical degradation may be looked for as the common dividends. Perhaps in all the talk of conserving the natural resources, we are rather too apt to neglect the warning of Emerson: "I would not have the laborer sacrificed to the result. Let there be worse cotton and better men."

Mr. Edward W. Connors, of the James W. Sewall forest engineering office, Old Town, Maine, and Washington, D.C., is in New York and Boston making calls on land owners and operators in the interests of the Sewall organization. Mr. Connors reports that general sentiment is optimistic for the future in both pulpwood and lumber, although present conditions are quiet. Another of Mr. Sewall's men who recently returned from an extended trip through the south reports much the same quiet confidence in a coming well-sustained business.

Victoria, British Columbia.—An added impetus to the clearing of land by settlers is contained in the announcement that a stump using industry is to be established in the province. Small portable mills are being sent to various districts which cut up the stumps, securing on an average 200 slabs an inch thick from each root. The wood takes a good polish and will be used for chairs and other furniture. As much as \$1,800 has been obtained for a sliced stump.

Heavy Enrolment of Students.

The enrolment of students in the Faculty of Forestry at the University of Toronto this year exceeded by a small margin the previous records. Fifty-four students were enrolled; the highest previous record was in 1914-15, when fifty-one students were on hand.

PROGRESS IN PAPER COMPANY'S TREE PLANTING

The Spanish River Pulp and Paper Mills, Ltd., has established a forest nursery. Seed beds, expected to yield 250,000 plants, were sown in October, 1920. An equal number of beds will be sown in the Spring of 1921 to increase the capacity of the nursery to 500,000 plants. This stock will be ready to plant in the field in the Spring of 1925. Some of the stock may be ready for planting in the Spring of 1924.

Planting will be done on burned-over land where there is no hope of natural regeneration, and on cut over lands where the advance growth of spruce and balsam is not sufficiently dense to produce a second cut.

The Company does not plan to purchase any nursery stock for forest planting. The present nursery will be enlarged to meet the requirements of the present planting plans.



Rt. Hon. Arthur Meighen, Premier of Canada, just before an aerial flight taken at Kamloops, British Columbia, with Major MacLaurin of the Dominion Air Board.

The Economic Significance of Forestry

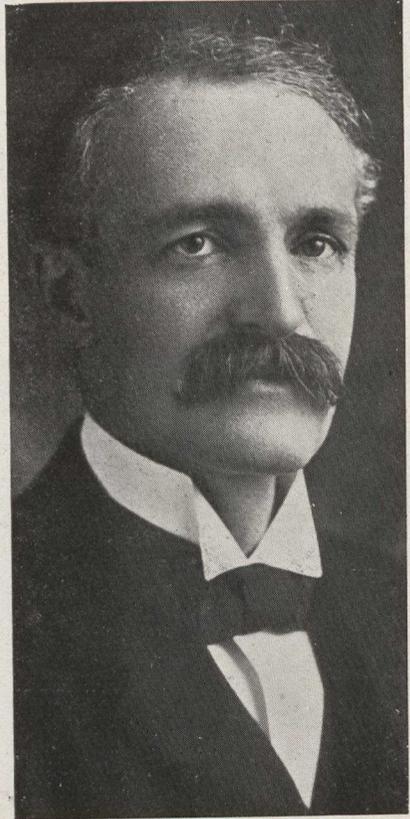
By Gifford Pinchot, formerly Chief Forester of the United States

IN the matter of our supplies for forest products, we Americans are faced by a set of facts and a problem which, in gravity and far-reaching control over our immediate and remoter future, take their place fairly alongside the issues which centre about the League of Nations. The essential fact is that we are not only destroying our forest supplies far more rapidly than they are being reproduced, but also—what is much more to the point—that we are using up the productive capacity of our forest lands. Not only is there less wood year by year and day by day in the United States, but there is less land growing wood. We are living beyond our income and destroying our invested capital at the same time.

We are nearly bankrupt, and do not know it. Because there has always been wood enough to go round, we have placidly assumed that there always would be. Unfortunately, the facts are against us.

It is true that we have made progress. Forestry in America has come to mean something more than the planting of trees in yards, streets, and school-grounds. It is true that we are leaving behind that phase of public opinion which believed that we could somehow compensate for the destruction of the forests on thousands or millions of acres by the planting of trees on tens or hundreds. We hear less of the influence of the forest on climate and health, and more of the need for work. Even the discussion of the effect of the forest in producing rain, and controlling the flow of springs and streams, has been largely replaced by more immediate and practical considerations. Forestry has become a problem to be taken seriously, but as yet its real economic significance is little appreciated and less understood.

We are coming to realize that wood is the most universal of all materials, that without wood all production would



GIFFORD PINCHOT

be impossible, transportation a dream, and business dead.

Iron, coal, oil and wood are the four basic materials upon which modern civilization rests, and of these the most widely employed and undoubtedly the most indispensable is wood. So far as wood is concerned, the human race is still very much in the same position it has occupied since before the dawn of recorded history. No need of body or mind can be met, no instant of our lives can be passed in comfort or well being, without something that only the forest can supply. Nothing we eat or use or wear can be produced, transported, or consumed without the help of the forest.

We never could and cannot now get on without it.

This statement is true, notwithstanding the fact that National Forests to the extent of 150 million acres, and State forests to the extent of less than five million, have been set aside and their power to produce has been saved for good. Public forests contain but one-fifth of our timber, and can never be expected to yield much more than one-fifth of our necessary supplies.

Want of Substitutes?

Before proceeding to touch upon the actual situation of our timber and timbered lands, it may be well to say a word about wood substitutes. In the first place, the use of a substitute almost invariably means the employment of a less satisfactory material at a higher price. In the second place, the increase of our population and industry more than keeps pace with the development of substitutes, so that, for example, more wood is used in building construction than when all houses were built of wood, more for shipbuilding than when there were no iron ships. The use of substitutes does not decrease the consumption of wood in any great line of industry.

The essential facts in our forest situation are these: Three-fifths of the timber we once had in the United States is gone. Over two-thirds of our original forest area has been culled, cut-over, or burned. Of our virgin forests, one-sixth remains. Out of about 825 million acres of original forest, we have left to-day less than 140 million acres of virgin timber, about 110 million acres of cull and second growth timber big enough to saw, and about 130 million acres partly stocked with smaller growth. More than eighty million acres have been devastated, and, so far as production is concerned, are practically desert.

Of the merchantable timber yearly cut or destroyed, about three-quarters is taken from the virgin forests which still remain—about one-quarter from second growth. The cut of every class of timber exceeds the growth. Even the young

trees too small for the saw are being cut three and one-half times faster than they are being reproduced. Taken together, we are cutting wood of all kinds from our forests more than four times faster than it is being replaced by growth.

The foregoing are official figures presented in reply to a resolution of the Senate by the United States Forest Service on June 1, 1920.

The United States must grow its own timber, or go without. Within a time perilously short in the life of a nation, and well within the active life of men now in affairs, the timber supply of the United States threatens to reach such a point of exhaustion as to compel the abandonment or reorganization of a controlling proportion of our industries, including manufacture, transportation, mining and agriculture. The change may be calamitous and substantially complete, unless we can secure from elsewhere the wood absolutely indispensable to our present methods of doing business, and which our own forests will no longer be able to yield.

(To be Continued.)

Laboratories Reorganized.

Important changes have been made through the re-organization of the Forest Products Laboratories of Canada which were established by the Department of the Interior in co-operation with McGill University. The laboratories have suffered from the withdrawal from their technical staff of men attracted by the larger financial remuneration of the pulp and paper industry. A number of new appointments have been made, Mr. William Kynoch being the new superintendent. Chiefs have been found for the three divisions: Timber physics, wood preservation and timber tests and the staff of the latter division has been increased. The branch laboratory at Vancouver has also been reorganized and is continuing the work of testing western woods.

Bark Beetle Combated

By J. M. Swaine, Entomological Branch, Dominion Department of Agriculture

ABOUT twelve years ago, bark-beetle outbreaks developed in the yellow pine stands of southern British Columbia, particularly in the Similkameen and Nicola districts. The earlier outbreaks have extended and new infestations appeared, until practically the whole yellow pine area shows serious bark-beetle injury. In the valleys about Princeton, more than 150 million feet of yellow pine have been so killed since 1913, and about the same amount in neighboring valleys is threatened with destruction.

The same injury has been developing rapidly since 1918 in heavily timbered valleys lying northwest of Merritt. Judging from our knowledge of the Princeton outbreak, all this timber, estimated to be worth more than six million dollars, is practically certain to be utterly ruined within the next five or six years. This timber was being administered by the Provincial Forest Branch, the Dominion Forestry Branch, the Dominion Department of Indian Affairs and the Nicola Pine Mills, Ltd.

In the winter of 1919-1920, an attempt was made to save this timber through extensive control operations. An arrangement was made whereby the easily available commercial timber in the worst part of the infestation was sold to the lumber company on the understanding that the timber would be cut within two years and the logging slash burned. Much of this commercial timber was cut last winter and the remainder, including the infested trees, will be removed according to this plan. The two forest branches, Provincial and Dominion, provided funds and men for direct control operations on the higher land and in the less accessible valleys where lumbering normally would not be carried on for years.

The planning and supervision of the control methods were undertaken by the Division of Forest Insects, Entomological Branch, Dominion Department

of Agriculture, in co-operation with the various interests affected. Control operations consisted in marking, cutting and burning the infested timber so as to destroy the broods of beetles overwintering in the bark and thus prevent further spread of the injury. This work was conducted over many square miles of territory in the Coldwater, Indian Meadows, Middy, and Spius valleys. Altogether more than 6,000 infested trees were cut and burned sufficiently to destroy the beetle broods contained in the bark. The work was done in the late winter and early spring of 1920. The result seems at this date to have been remarkably effective. Whereas there would otherwise have been thousands of freshly infested trees on that area last summer, there are actually only a few hundreds to be found. Without any doubt, a moderate amount of control work on the same area next spring will stop the further spread of the injury, and save the main stand of timber. It is planned to extend the control work to other infested valleys during the coming spring.

The entire Princeton-Merritt-Kamloops forest, throughout the greater part of which the bark beetle injury is evident, has been estimated by the Commission of Conservation to contain more than two billion board feet of yellow pine, which would be worth to the country in manufactured value between twenty and forty millions of dollars. The bark-beetle outbreaks threaten the destruction of the greater part of this timber before it can be used commercially. Control operations such as those just described, together with the burning of pine logging slash, afford our only hope of checking the injury and saving the remaining timber. Fortunately these promise to be effective.

Similar outbreaks occur in western white pine and in lodgepole pine throughout the southern part of the province, but control work in these species has not yet been attempted.

Forest Insects of British Isles

Review of Bulletin No. 2, Survey of Forest Insect Conditions in the British Isles, 1919,

by J. W. Munro, Entomologist to the Forestry Commission.

35 pages, 18 text figures, 3 full page plates and a map.

THIS bulletin has just been received. It gives a very concise and clear account of the important forest insect injuries in the British Isles, and while none of the insect species with which it deals are found in Canada, many of our native species are so closely allied to those of Britain and attack the timber in so similar a way that the results of Mr. Munro's study are of great interest to us.

The bulletin contains 35 pages, and is well illustrated with 18 text figures, 3 plates and one map. The first part deals with the method of inspection, the present forest insect conditions in England, Wales, Scotland and Ireland, biological considerations, and forest practice in relation to insect attacks; the second part, or appendix, gives a short account of the more destructive forest insect species of Britain, together with a statement of their habits, the injury they cause, and the suggested methods for control.

In the summary of the general conditions it is stated that, "The preliminary survey of forest insect conditions in Great Britain and Ireland shows that our coniferous woods generally are in an unhealthy condition. Scots pine woods, and young coniferous plantations on the site of or near felled areas of Scots pine are suffering most. Pure larch, spruce, Douglas fir and Corsican pine woods are comparatively free of injurious insects and do not form centres of dispersal." The Scots pine supports the most destructive forest insects and those concerned in our forest nurseries will be interested in the statement, "It is also a question whether Scots pine is not planted too extensively, both pure and in mixture with other coniferous species. From the entomological point of view this is undoubtedly the case, and statistics as to the rate of growth of timber support the contention."

Perhaps the most important conclusion derived from this study considered in relation to our Canadian conditions, is that the large amount of neglected slash, left from the extensive cuttings made in Britain during war times, has been considered responsible for the extensive injury to green timber caused by various bark and wood boring beetles. The abundant food supply furnished by the slash enabled the beetles to breed rapidly to immense numbers so that they successfully attacked and killed the living trees. "Proper cleaning and thinning of woods are most important factors in insect control. Dying, suppressed and fallen branches, and dying and sickly stems, all serve as breeding ground for insects. Such branches and trees are for the most part removed in thinning operations, but it is essential to see, if they are not removed, that they are rendered useless as breeding ground for bark-beetles by removal and burning of the bark. The effects of careless or neglected thinnings are to be seen in most pine woods in Britain."

It should be noted here that the same relation between neglected slash and insect injuries exist in our Canadian forests. The Division of Forest Insects at Ottawa has repeatedly demonstrated that slash from pine, spruce and balsam cuttings is a dangerous breeding ground for injurious boring beetles, which increase rapidly in the slash and spread from the slash into the green timber, and by killing mature, weakened and unhealthy trees, sometimes in very large numbers, cause a constant and serious drain upon the forest.

J. M. SWAINE,
Entomologist in Charge of Forest
Insect Investigations, Ottawa.

AIRCRAFT manufacturers and others in Europe who are interested in the development of civil aviation, have their eyes on Canada and are just awaiting a sufficient development of aerial travel to justify them in making investments here for the purpose of competing for aircraft business. This was the statement of Col. J. C. Scott, controller of civil aviation of the Air Board, Ottawa who has returned from a tour of Britain and France, where he was studying air travel developments, particularly from the commercial flying viewpoint.

Col. Scott stated that there had been great development in commercial aerial navigation in these countries, and comparatively speaking, Canada was holding her own as far as aerial development was concerned. In England and France there are well-equipped aerial termini with all facilities for the care of machines and those who travel in them.

Airplane manufacturers are turning toward metal construction as regards metal fuselage and wings, Col. Scott stated, and commercial machines now are generally either single engine type carrying eight passengers or double engine planes with capacity of 16 persons. Machines are now being made with all the comforts possible for passengers.

Aerial navigation is being developed



Moonlight reflections on the Ottawa River.

and special courses for pilots and navigators are conducted so that they can be properly trained. Research work in meteorology is also being carried out, weather conditions being reported by wireless, telegraph and telephone to all interested in flying. Development of meteorological information in Canada is looked upon as an essential part of any preparation for commercial flying.

Timber Areas of the World Outside Canada

A SYNOPTICAL review of the forest areas of the world and the genera or species of trees under various conditions of temperature, elevation and rainfall, is of practical use to the exporter and importer of lumber of all kinds for structural, cabinet and decorative work, to the maker of mill machinery and also to those whose interest lies in the application of any method by which the enormous waste of wood may be saved as raw material for chemical and other by-products. The importance of the last point may be realised when we note that official statements of the U.S.A. Government declare that out of a total output of 9,500 million cubic feet in 1906 no less than 5,407 million cubic feet were wasted, and, of this, 2,858 were wasted at the mills, and 2,560 in the woods.

Such a sketch will bring into relief the localities where sawn logs and manufactured timber would naturally form an industry and where mills would be abundant, the district, again, from which rough hewn logs are carried overseas unsawn, and those in which the reserves of timber are at present unexploited.

Now that most countries are reaching out for trade in inner recesses of the world and for return cargoes, and now that aerial photography is about to bring true accounts of timber limits from untrodden regions, the general reader should not be unaware that there are other trees besides pine and fir, beech and oak, and other timber areas outside of northern Europe and north America.

Taking the equator as a starting line for this sketch the general statement may be made that in the tropics lying between $22\frac{1}{2}$ N. lat. and $22\frac{1}{2}$ S. lat. there is a belt of dense forest covering a very considerable portion of the land. In this belt lie the forests of Central Africa, which include those of the West Coast, the Congos and East Africa; the forests of Burma, the Malay peninsula and Siam, N. Borneo and the Philippines; and those of Central America, Ecuador, the Amazon, Venezuela and the Guianas.

In large spaces of this belt the rubber is the tree of most immediate value, being indigenous in the back country of Guiana and Venezuela, in Burma, the Malay States and through Central Africa as far as Abyssinia, but it hardly comes within our purview, not being, as is the sugar maple, marketable lumber as well as a fountain of juice. The most valuable hardwoods of the world are within these latitudes.

We associate "elephants a 'pilin' teak" with Burmah, but this timber and its varieties are abundant in India, in Siam, where

the important industry is in British hands, in the Malay Archipelago, Nigeria and the Gold Coast and other parts of Central Africa. Large areas in Java and the Philippines are also being systematically developed. For 2,000 years, at least, India has drawn on its teak forests, and the Indian Government has for many years been carefully conserving them. For the timber of temples it has always been in demand, and beams are known to have been in a structure for 1,000 years. Teak is greatly used now for "steamship liners" and for railway cars.

Mahogany and Rosewood.

The most expensive of all widely used timbers is, however, mahogany. It is indigenous to Central America and the West Indies, especially in Honduras, Nicaragua, Costa Rica and Jamaica, but it has been long planted in Bengal and Ceylon. This "Spanish" mahogany, which is of special use for aeroplane propellers, is distinct from untrue varieties such as "African," or from the W. Australian jarrah or everlasting wood, which is also termed "Mahogany." Another well known tropical wood is "rosewood," which is a name given to several varieties of tree timber. The best known and finest quality of rosewood is an export from Bahia and Rio in Brazil and from Honduras and Jamaica. Squared logs of rosewood are not found, as the heart of the tree of any size is unsound. The so-called "East Indian Rosewood" or blackwood is a native of East India and Ceylon.

Another tree indigenous to the last named places and S. Japan is the ebony. This black wood is the heart of the tree which underlies a covering of white wood. Other varieties of ebony grow in Mauritius, and in the countries about the Gulf or Guinea. "Jamaica ebony" is an article of export. The general term "ironwood" is applied to woods of very different families having their habitats in Africa and Mauritius, Jamaica, Ceylon, India, Burma, N. Borneo. In Australia and Tasmania the name is given even to varieties of acacia and eucalyptus. A timber known as "false ironwood" is Brazilian. This tropical belt besides furnishing the above timbers produces also many kinds of cedar, logwood and fustic dyewoods, the camphor trees which are useful for woodwork as well as for distillation, and the mora and greenheart of B. Guiana, which are important ship timbers. Ecuador has a virgin forest of 90,000 sq. miles rich in dyewoods, cinchona and other valuable woods. At the recent exhibition of Empire timbers the

new decorative woods from India, especially the "Indian silver greywood," attracted attention.

A map of the world shows that south of the broad tropical belt the land area is comparatively small, the only considerable countries being S. America below Rio de Janeiro, the S. African Union, three-quarters of Australia, Tasmania and New Zealand.

The timber of these countries is not of great importance. New Zealand, it is true, was at one time covered half over with a dense evergreen forest, of which two-fifths or all but 17 million acres have disappeared by reckless destruction. What remains is mainly the Kauri (damara Australiensis), the New Zealand white pine, the Kakikatea (a tough wooded tree of the yew family), the Rimu or red pine and beech, with other hardwood. The important export, kauri gum, is a resin found in lumps where the kauri grows. New Zealand timber is exported almost entirely to Australia.

In Australia.

In Australia there are 70 million acres of timber of more or less commercial value, the largest areas being in W. Australia and N.S. Wales. The chief forest tree is the eucalyptus with its two hundred native species, one variety growing in Victoria to a height of 380 feet. In W. Australia there are two other important varieties, the Jarrah, of special use for pil-ing, and the karri for wood paving. The acacias or Australian wattles are an important genus, and with the eucalypti have been successfully planted in S. Africa. In Tasmania, which is more thickly wooded than the mainland, a special tree is the Huon pine, which is almost indestructible in water.

S. Africa has little indigenous forest (450,000 acres). What there is lies within 200 miles of the south and south-east coasts. In the Transvaal the so-called teak and mahogany, scattered over 10,000 square miles, supply the timber for mine props.

In the parts of S. America below the tropics, excepting the Araucaria in Brazil, which is mostly in the highlands of the tropical belt, and which is suited for all purposes for which pine is used, the timber is confined to about forty million acres in the zone of the higher Andes in Chile. Below Concepcion there are ten million acres of heavily timbered forest, and in spite of ruthless burning and the absence of forest laws there is still a great supply of trees suitable for pulp. Among these are the cypress and Chilean pine (araucaria) and the other conifers "alerce" and "coihu," the tallest trees in the country. The forests of Chile have been considerably exploited, and luma and cypress find markets in England.

The northern hemisphere is the great region of conifers of which a very broad band extends, except for a few intervals in thickly inhabited western Europe, right round the surface of the globe through Siberia, Northern Russia, the Caucasus, northern and central Europe and N. America. Speaking generally, the hardwoods, beech, birch, oak or maple, shade into this from the south, elevation being a great factor in their growth. Elevation also accounts for the southerly extensions of the northern forest down a part of the Pacific slope and into northern India.

This broad conifer belt and the hardwoods merging into it are too well known to detain us. The pines, firs, hemlocks and spruces of Finland, Scandinavia, Russia, Canada and the north-eastern and north-western forests of the United States are common knowledge, but certain features of the timber lying between the tropical belt and the wide band of northern forest may be noted.

The Forests of Africa.

In Africa, north of the Sahara, on the Atlas range and the elevations along the Mediterranean littoral, are found the Atlas cedar and the cork forests that extend into Spain and Portugal. Above these limits as we approach the Pyrenees and the Alps the hardwoods predominate but yield gradually to the conifers of the north. The forests of the new republic of Czecho-Slovakia, though part of the northern belt, may be specially noted. They extend through Bohemia and a part of the Carpathians; of this whole territory 22% is woodland, consisting of pine, fir and hardwoods. The great forests of what remains of Austria and Hungary are a southerly fringe of the great northern belt.

At the eastern end of the Mediterranean are the remnants of the "cedars of Lebanon" and the forests of the Taurus mountain—survivals of the once heavily timbered Asia Minor, whose magnificent water powers and hundreds of populous cities have, owing to the destruction of the forests and many centuries of misgovernment, given place to desert and ruins.

The term cedar has spread from Lebanon to deodars, junipers, cypresses and thuyas, and covers the deodars of the Himalayas and Afghanistan, the indigenous Japanese cedar (cryptomeria), which has been used and replanted for centuries, the white and yellow and the western cedars of N. America and, most fragrant of all, the red cedar (Juniperus Virginiana). Only a few important varieties of these cedars are found in the northern forest belt.

In India the elevation of the Himalayas and their westerly extensions, no parts of which are actually within the tropics, makes the range of timber rather vertical than horizontal. Also, the great variation of

average rainfall from 400 inches to single figures greatly affects the vast forests that extend over the mountains above the valleys of the Ganges and Brahmapootra to the great plateau of Tibet.

The zone of which we are speaking contains most of the great deserts, Gobi, the Indian and Arabian, part of the Sahara and others, and, as a consequence, the forest timbers are found only on elevated ranges or on lands affected by the neighborhood of oceans. How far reforestation will affect the climate and partly restore the

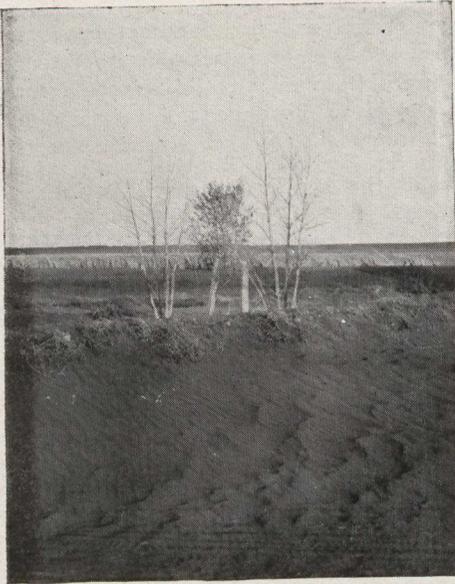
ravages of axe and fire does not concern us here, but the 150-square-mile-arboretum of pinus pinaster planted in France from the Gironde to Bayonne and replacing a sandy swamp shows what scientific forestry can do. In the United States the centre of the lumber industry has in recent years shifted in the direction of this midway zone. Louisiana, Mississippi and Texas are now respectively second, fourth and fifth of the States in point of lumber production.

Planting Nut-Bearing Trees

A good deal of advice is going the rounds of Canadian newspapers about planting nut-bearing trees along roadsides in preference to trees like elms and maples which do not bear nuts. Many of these newspaper items come from the United States, where the conditions are not the same as in Canada. The advice is good in principle but in detail it is to be received with caution. The fact that a tree grows well in Indiana is not a reason for planting it in New Brunswick or Manitoba. Canada has as fine native trees as any country in the world. Her great trees are pines, spruces, firs, cedars, larches, maples, birches, elms, etc., and in these, no other country equals her. In different parts of Canada, walnuts, butternuts, chestnuts, beeches, and hickories thrive, also oaks, black cherries, basswood, etc. What those who are about to plant a few roadside or lawn trees should do is to find out what kind of trees are native to their district and make a selection from these. This is not to say that enterprising citizens should not experiment with desirable trees which are not native to their districts, because in this way advances are made; but it is to say that the practice which has too often prevailed in the past of spending considerable sums of money in planting, say, catalpa,

pecans, and soft-shelled walnuts in different parts of Canada on the advice of gentlemen living in California or Virginia is not necessarily good business. Our Canadian foresters know more about tree-growing in Canada than any person outside. The Dominion Forestry Branch has issued two bulletins on this subject for different parts of Canada. Bulletin No. 1, "Tree-Planting on the Prairies," is devoted to the Prairie Provinces, while Bulletin No. 69, "Care of the Woodlot," covers the conditions in the rest of Canada. Either bulletin may be had free upon application to the Director of Forestry, Ottawa.

There is only one way of making the Canadian Forestry Association a fighting power in forest protection: If your membership fee of \$2 is unpaid for 1921, put your cheque in the post box to-day. The Association wages its campaigns entirely on voluntary subscriptions.



Soil drifting has become a real problem in portions of the Canadian west where trees are scarce or wholly absent. Unobstructed winds have destroyed many valuable areas.

Reforestry in Adirondacks

THE largest privately owned tree nursery in the United States is that of the Delaware and Hudson Railway Company, located at Bluff Point, where each year thousands of Scotch Pine, Norway Pine, Douglas Fir, Norway Spruce, Red Spruce, Poplar, Ash and White Cedar are grown for transplanting on waste lands in the Adirondacks. The industry gives employment to many girls, women and men during all seasons of the year and at wages which provides those employed with more than a comfortable living. This nursery is one of the most interesting spots in this part of the State, showing as it does the growing of the trees from time the tiny trees, only a few inches in height, are carefully taken from the transplant beds and shipped to the planting fields in the Mountains.

The reforestation project was first undertaken by the Delaware & Hudson Company in 1907, and the following year the Company secured from the Federal Government sufficient trees for the planting of 15 acres in the vicinity of Wolf Pond, there being 18,000 trees set out that year.

In October of that year the Delaware & Hudson Company placed H. R. Bristol, a trained forester, in charge of their reforesting operations and immediately enlarged upon their programme until to-day they have the largest forestry programme in the country. In October, 1908, extensive forest fires in the Northern Adirondacks played havoc with the forests of the Adirondacks, but the then new superintendent of the operations was not to be discouraged by this set back, and under his guidance the Company continued their reforestry work with renewed energy, the result being that in the few years which have elapsed between that time and the present the Delaware and Hudson Company's reforestation operations have been enlarged from the modest fifteen acres of 1907 to over 9,000 acres at the present time.

The nursery at Bluff Point is to the novice the most interesting part of the reforestation operations. There are trees are grown from the seed. The nursery contains seventeen and a half acres, and has at the present time over 200 seed beds. Each of these beds are

twelve feet in length and four feet in width and at the time of germination each bed contains upwards of 14,000 seedlings. These are watched and cared for with the tenderness that a mother bestows upon her first born. Each bed has a covering of the finest wire to prevent the birds from picking at the tender plants as they appear above the ground. Each bed is daily inspected by an expert to see that injurious worms or diseases which might destroy the tiny trees do not find their way into the specially prepared earth in which they are planted. As time passes the weaklings in the bed die out and at the proper time the remaining plants are removed to the transplant beds, where they have more space in which to grow and develop. Here they are cultivated with the greatest care, and scores of women and girls are kept busy during the summer season removing weeds which might retard their growth.

The trees are left in the nursery until they are from two to three years of age, depending upon species, when they are removed to the scene of the reforestation operations. These operations are begun during the early part of April, and are continued about two months, during which time the field gangs under direction of trained foremen plant hundreds of thousands of the trees in soil which will bring the best results. During the past season over a million young trees were planted by the Company, and Superintendent Gristol has arranged a planting schedule covering the next three years which will add several million to the number of trees which will be set out each year on land which was nothing more than waste land until the Delaware and Hudson Company took up and developed their forestry work.

The reforestation of the upper Adirondacks is adding future wealth to this section, for the great cry of the present time is the rapidly growing shortage of timber, and with the present operation of the Company continued for a few years longer this section will increase in value.

ONE of the curious epistles sometimes received from Chinese laborers in the lumber mills of British Columbia has reached the hands of a well-known manager.

"dear Sir,—We would like you to Perform your Previous Promise of increasing our wages. We Remember that you Promised us before, that you will increase the wage as soon as other mill do that same to our Party. Now information have reach us, that all other mill, etc., such as Frasier mill, shall mill, and etc., have made a raise in our Chinese workers already; consequently we respectfully give you the request, dear sir, we do this by compulsion, you know the expense of living now a day has been awfully vast. Take rice instance, we have to pay \$7 for a sack of rice, sir, you can imagine how hard we are living. Hoping you approve our request and expect you answard as soon as possible, very Truly your—

Sawyer, packer and the others."

Application has been made to the Quebec Legislature to incorporate forest engineers as one of the closed professions. One of the conditions of admission to this body would bet a diploma from the Forest School of Laval University. The executive would have power to draw up a tariff of fees which would have all the force of law before the courts. None others than members of the Association could term themselves Forestry Engineers under penalty of fine or imprisonment. A protest was registered against the proposed act by Dean Adams of McGill University, who objected to membership in the Association being made conditional upon securing a diploma of only one Forest School.

What the forests of Northern Ontario mean to the maintenance of the Temiskaming and Northern Ontario Railway may be judged from the fact that during the past year 703,000 tons of freight out of a total tonnage of 1,361,000 tons represented the products of the forests. Pulpwood taken from free-holding lands and largely destined for United States mills represented 329,000 tons.

Ontario's Forestry Problem

THE opportunity for the beginning of a new era in the forestry situation in Ontario was created by the recent announcement of the Provincial Government that henceforth the timber administration on Crown lands will be under the Provincial Forestry Branch, instead of comprising a separate organization, in which no foresters were employed. This is the most important development which has yet taken place in the forestry situation in Ontario.

By this action, assuming that its logical consequences will follow, Ontario aligns herself with the Provinces of Quebec, British Columbia and New Brunswick, which had already recognized the necessity for taking thought for the future by making foresters responsible for the technical administration of Crown timber lands. A partial example had been set by the Dominion Government at a still earlier date, when the Dominion Forestry Branch was placed in charge of the timber administration on Dominion forest reserves in the west, exclusive of licensed lands or timber limits.

Nova Scotia has almost no Crown timber lands, nearly all her forests having passed into private ownership many years ago. The need for a provincial forest service there is based upon the opportunity for the development of better forestry practice on these privately-owned timber lands, and upon the urgent need for a greatly intensified system of forest protection, to cover all the forested area of the province.

Prince Edward Island is not a forest province, her land area being very largely under cultivation.

Ontario is then the last of the forest provinces to recognize the necessary and logical connection between forestry and foresters. The recent action should and no doubt will mark the beginning of an era in which the fullest practicable consideration will be given to so regulating the methods of cutting on Crown lands as to leave them in a condition to produce another crop of valuable timber species. It has been thoroughly established that logging operations in which cutting is

not regulated with an eye to future productivity are generally destructive to the quality and quantity of the future growth. Each area requires to be carefully studied in advance of cutting, so that the method of treatment to be prescribed may be adapted to local conditions and at the same time be practicable from the operator's viewpoint, to say nothing of being reasonable from the viewpoint of additional cost involved.

Ontario is to be congratulated upon the progressive action taken in thus far recognizing the need for a technical administration of Crown timber lands. The Provincial Forestry Branch has a great responsibility and a great opportunity for public service in the prospective addition to its previous work of forest protection, of the inauguration of forestry practice upon the great areas of Crown lands which have now come under its jurisdiction. Progress will necessarily be slow; economic conditions must be fully recognized; and it will take time to develop the kind of organization required for so large a task. Public sentiment, is now undoubtedly fully ripe for the development of this situation along the most modern lines. It must, however, make itself actively felt, in support of a really progressive forest policy.—Clyde Leavitt, in Conservation.

Forestry in the British Isles

The annual value of the imports of timber and timber products into the British Isles previous to the war was about £40,000,000, and about 80 or 90 per cent. of timber imported was coniferous. A considerable proportion of this might be grown in the British Isles, where huge tracts of land could be more economically occupied in growing trees than as at present, and healthy occupation thereby provided for a much larger rural population, of whom a proportion would be small-holders, reaping the benefits of both forestry and agriculture.

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JT TRACTOR HAULING LOAD OF 24 TONS
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It will snake logs when teams are out of the question.

The **JT** will turn in a radius of 6 ft., its width over all is 60 inches, and it has a caterpillar traction area of 1,628 sq. inches.

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"Into The Tribune's great mill at Thorold, Ontario, go hundreds of thousands of electric horsepower from Niagara Falls, millions of gallons of water from the Welland Canal, trainloads of coal, shiploads of logs, cars of sulphur and limestone and clay—and out of 600 to 1,000 feet per minute from each of five machines.

"The sheets delivered from the

various machines range from 150 to 187 inches wide. This means that the product is the equivalent of a strip of paper one foot wide and five miles long every sixty seconds.

"To produce the newsprint used in an average issue of The Sunday Tribune our paper mill consumes:

"Fifty-four acres of timber.

"Twenty-one tons of sulphur.

"Six hundred and sixty-five tons of coal.

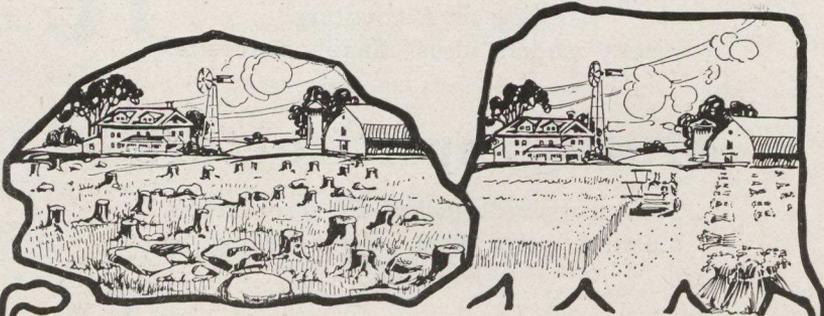
"Sixty-three thousand electric h.p.

"Eighteen million two hundred thousand gallons of water.

"This great mill represents an investment of millions of dollars, and employs 650 men."

Blast the Boulders

Blow up the stumps



PUT your unproductive land on a paying basis. Reap the added profits that CXL stumping powder will clear the way for you to make.

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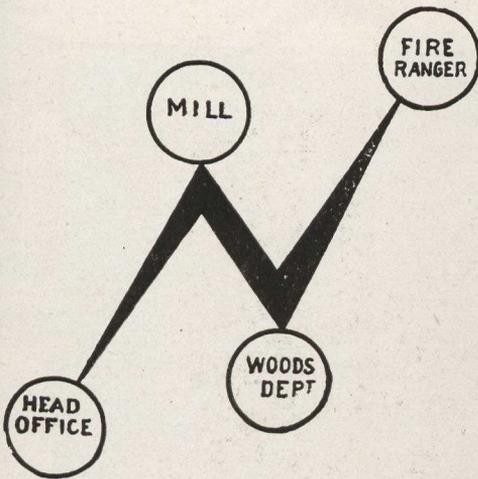
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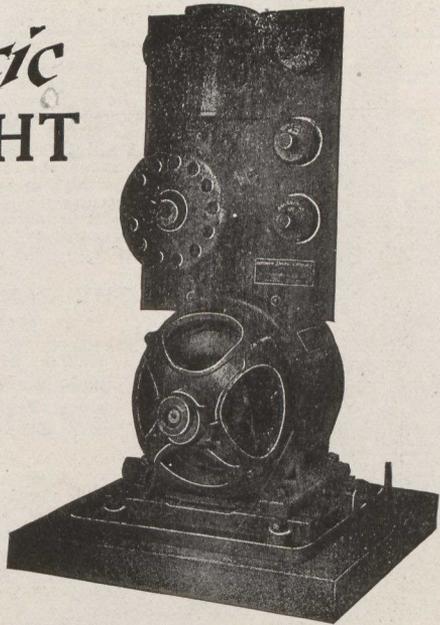
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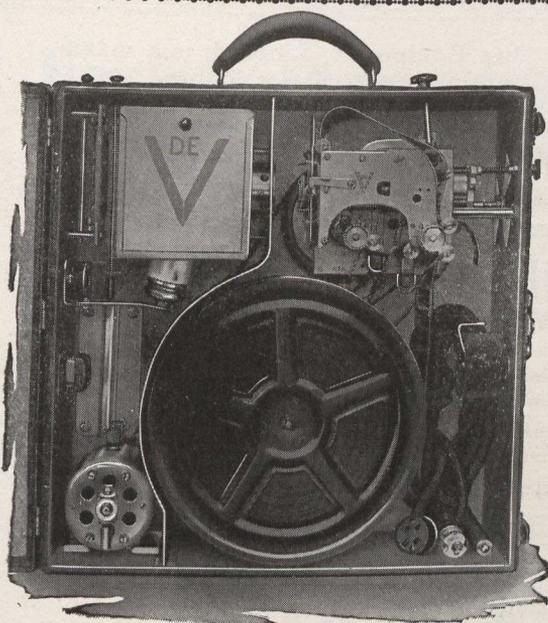
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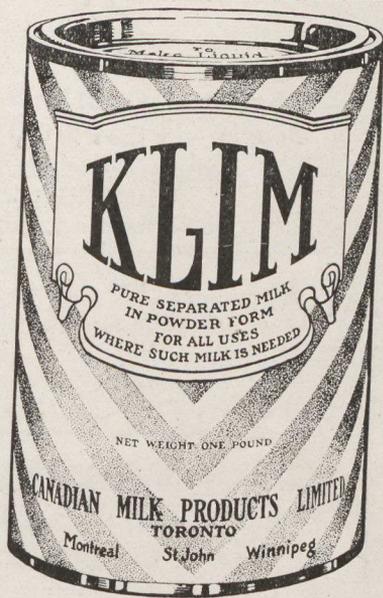
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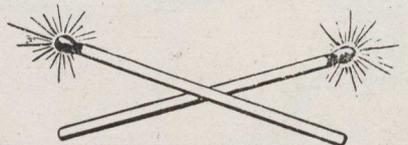


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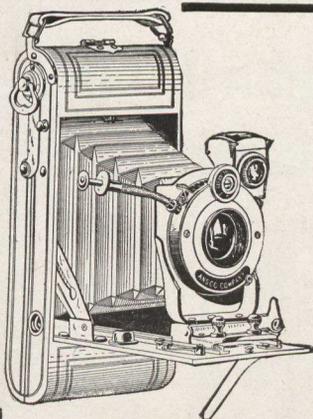
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