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1920



Illustrated
Canadian Forestry
Magazine



Bureau of Canadian Information

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

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

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

CANADIAN INTELLIGENCE SERVICE

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

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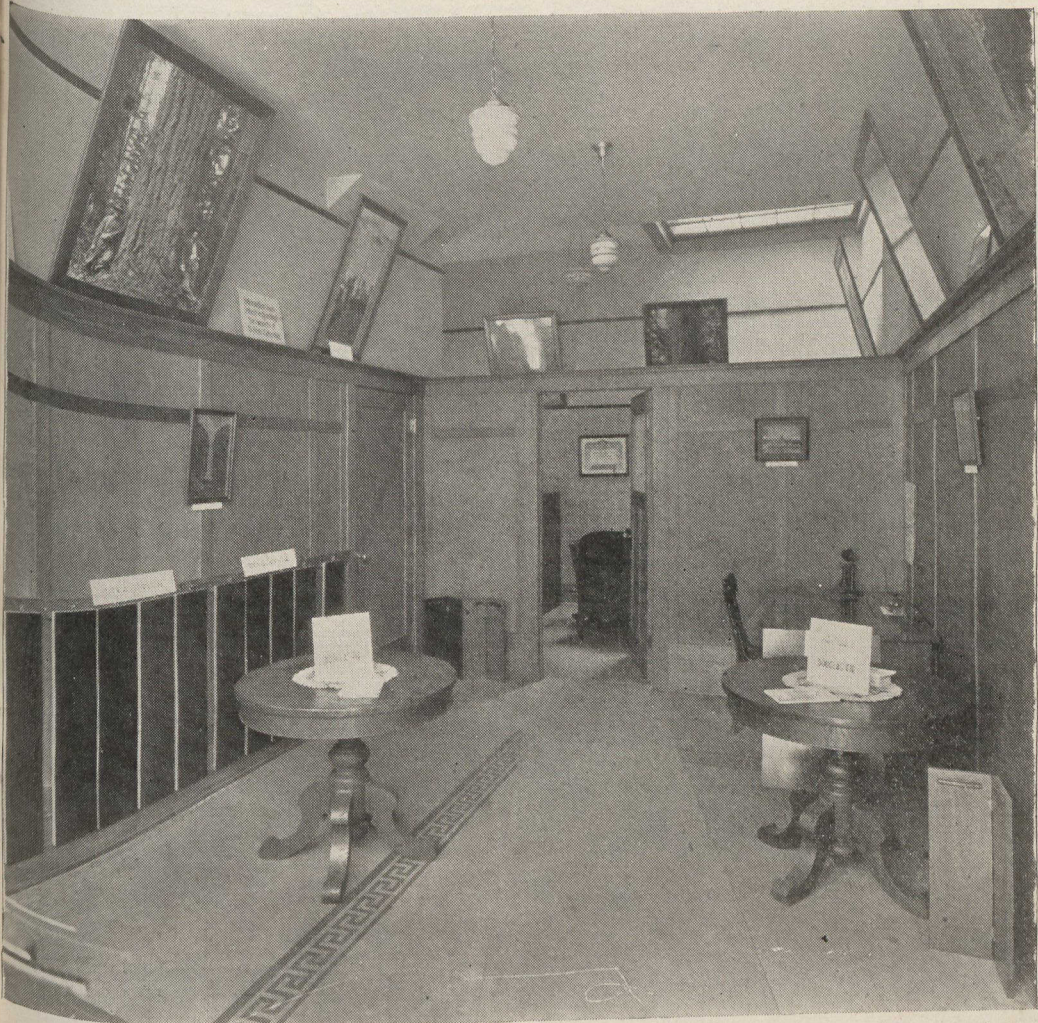
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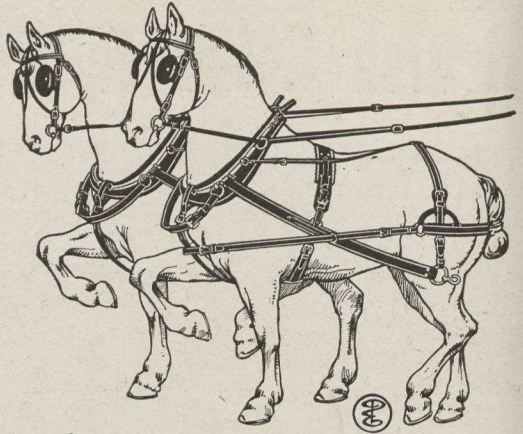
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Canadian Forestry Magazine

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No. 10.



The end of a perfect day. Lieut. Craham, of the Laurentide Company's aviation staff, alighting on Lac Tortue.

Use of Aircraft in Forestry and Logging

Ellwood Wilson

Chief Forester, Laurentide Co., Ltd.



An interesting account of effective work done this year by seaplanes in Central Quebec.



The writer has been in charge of the Laurentide Company's aerial work for two seasons and gives herewith the results of the work. The first season showed absolutely the practicability of the planes for reconnaissance of unmap- ped or mapped areas, for transporta- tion of passengers and of fire-fighting equipment, for looking over the work of

log drives, for spotting forest fires and for aerial photography.

The winter was spent in overhaul- ing planes and engines and in the study of the pictures, taken from the air, on the ground. This spring a photogra- phic laboratory was equipped so that photographs could be handled well and expeditiously.



Note the forest fire just commencing, also the facility afforded by aerial photographs in estimating the general forest conditions and relative areas of timber barrens, etc.

The work commenced on the 17th of May and has been continued regularly to date, the appended table giving the amount of work done.

Miles flown	6,006
Hours flown	101
Photos taken	3,000
Acres photographed..	543,100
Fires spotted	34
Passengers carried ..	23

Staking a Mining Claim

The longest flight from the base was 250 miles out. In the course of the work done above, many things of different sorts were accomplished. A flight of forty-four miles was made to stake out a mining claim. The plane carried four people, two tents, folding canoe, provisions and instruments. The party stayed out two nights and much time was saved, as, in the ordinary course of events, it would have taken two days travel each way by canoe, and with the plane it took less than an hour.

A boundary survey of some limits had to be made and the starting point was difficult to locate, as, if all the work were to be done on the ground, 22 miles of chaining through the woods would be necessary to locate an intersection from which to commence. The plane was sent up and the three sides of the triangle, necessary to locate the intersection, were photographed in one day and the course the new line would have to follow was also photographed, showing all the lakes, streams and hills which the line would cross.

On two sides of the triangle, where lines already existed, they were visible in the photographs at numerous places on the ground and could easily be joined up. Thus all of the field work is practically checked up before beginning the work, which can now be planned with great exactness. It is proposed to put provisions on the lakes which the line will cross ahead of the party so that they will only have to carry enough to last for



A vertical photograph of Shawingan Falls, P.Q., and village, from the Laurentide Company's seaplane.

a short time and save heavy portaging through the woods.

A Quick Job in Mapping

Explorers were taken over territory which was offered for sale, and of which there were no maps. The observer sketched in the burns, timbered areas and other information, and at the same time got a very good idea of the country as a whole. Then taking his sketch map he went in on the ground and estimated the timbered areas, saving much time which would have been wasted in locating the burnt areas. In one trip a reconnaissance of about four hundred square miles was made. The Logging Manager made several trips of this kind and with his sketch maps and his bird's-eye view of the country was able to lay out and direct the work of his explorers. Several flights were made to note the progress of drives and it was very easy

to see just how the work was progressing and whether the streams were being swept clean or not. In one case a large number of rollways of logs were discovered, and photographed which had been left in the woods the previous season. Trips were also made to look over and estimate the number of logs in the sorting booms so that the time and number of men required to saw, so as to finish the winter, could be determined. The Logging Manager and his Superintendents were taken to and from distant points of their work and much valuable time saved.

An Air Inventory

One of the most valuable parts of the work was photographing lands which are to be purchased for planting. A complete dictionary of these lands was made, and as the photo gives every detail it is of great value. Lot lines, buildings,

fences, ditches, roads all show plainly and the areas of different kinds of land also.

Even the character of the soil can be seen. The areas in cleared land, swamp, burn, scrub timber, and good timber can be easily measured with a planimeter and the exact value of the land determined. A scale of prices for the different kinds and qualities of land is determined and all lands are bought by it. The seller and the purchaser can sit down over an aerial photo and make a trade much better than in any other way, for they have all the details before them.

In planning all kinds of engineering work, laying out roads, ditches for drainage, areas to be planted and so forth, the photos are of the greatest assistance, and by taking a series the progress of the work can be checked very much more rapidly than by ground measurements. The areas cut over in a logging operation can be checked on the photos, the roads can be seen, areas left uncut can be determined and the general efficiency of the work can be judged.

What the Work Costs

The general results from the work promise well and the Laurentide Company has decided to make aerial work part of its operations. Permanent hangers are being built, together with houses for the personnel and shops for the care of repair work.

The cost of the work, as carried on experimentally, has not been excessive and as it becomes standardized, can be materially reduced. The main thing is to have the machines in the air as much as is possible so as to cut down the unit costs of the work. The cost per mile works out at about \$3 per mile and the cost of photographs at about 2.6 cents per acre. This is based on the use of the HS2L seaplanes which use about 25 gallons of gas per hour and are slow climbers. Also there are many items of expense which are incident to beginning the work and which will be eliminated later when more experience has been gained.

Easy Transportation.

To sum up the results so far obtained; for carrying men, whose time is valuable,

to distant parts of the work, the planes are most useful. The manager of a company, with large woods interests gets tied down to his office and mill work, and a trip into the woods consumes so much time that he does not like to take it. The same is becoming increasingly true of logging managers and superintendents. They do not like the hardships of long journeys into the woods and the being out of touch with their general work for days at a time. With the planes, the most distant operations can be visited and the work inspected with only one night away from home. Local foremen in the woods will be kept up to their work much better. In case of accident doctors can be rapidly taken into the woods and injured men brought out. Mail can be taken in and reports brought out much oftener.

For rapid reconnaissance the planes are invaluable. Tracts which are for sale can be inspected in days where weeks were required and the information obtained is much more accurate and fuller than can be had from ground work. In a few hours in the air, the general drainage of a country can be determined, burns, swamps and timbered areas sketched in, the species present noted and the general character and quality of the timber ascertained. Windfalls and insect damage can be seen and all areas estimated with more accuracy than from a strip survey. When the ocular survey is supplemented with photos, there is no room for doubt about the character of the country and instead of depending on the opinion of the man who has made the reconnaissance, all the responsible men interested can get together and discuss a purchase or a proposed operation intelligently and with the information before them.

Spotting Fires

Spotting forest fires and taking help to extinguish them is a valuable part of the work.

The carrying of provisions to distant operations will certainly become a part of the work before long, doing away with the building of expensive tote roads and making possible the placing of provisions just before the work begins, in-

stead of taking them in the previous winter, thus doing away with spoilage and the cost of insurance and the labor necessary to watch them. Then, too, it will not be necessary to build large depots from which, oftentimes, quite long hauls to separate camps must be made, but provisions and gear can be put right down at each camp.

In the purchase of lands for other than logging purposes, aerial photos are invaluable, giving as they do, ALL the information required.

Are Aerial Photos Reliable

The aerial camera is going to be more and more indispensable. So far as our

The technic of reading these pictures and of making estimates from them is being carefully and thoroughly studied and a regular dictionary being built up. Much ground work will be carried out this winter, especially in the estimation of quantities from the photos.

The Seaplane is Best Type

The following general conclusions can be drawn from the experience gained thus far. For work in country where there are many lakes, the seaplane is the best type of machine. The float type has not proved satisfactory, as the floats are very fragile and easily become water-logged. The seaplane is structurally



"The actual number of trees can be determined." This photograph gives a good idea of what an air photograph discloses.

studies have gone, the types of timber and land can be accurately determined. The actual number of trees in the crown cover can be determined and a fair idea of the general size of the stand obtained. For forest maps they are infinitely better than ground surveys, giving all the information needed rapidly and accurately and in a form which everyone can easily learn to understand. Instead of the information being stored up in a man's head or in his notes which are often colored by his personal idiosyncrasy, it is always available and leaves no room for varying opinions.

strong and rugged and will stand much harder usage. It presents fairly stable platform for a camera. The type we are using is ideal from every point of view except cost of operation and we have purchased a Curtiss "SeaGull" for patrol work, passenger carrying and photography.

The larger machines will be used for carrying provisions, large parties and fire-fighting apparatus.

Choose Pilot With Care

The personnel of a flying station is a matter of great importance. Experi-

enced pilots are necessary, and the fact that men have wide experience in flying land machines does not always qualify them for seaplane work. Only the highest type of men should be employed, both as pilots, mechanics and riggers, as men of a lower type are likely to have a lower sense of the responsibility and importance of their work. Men who are reckless or who drink should never be employed.

Rigid inspections before flights are absolutely essential and no machine should ever go up if there is the slightest doubt about it being in perfect flying condition. The amounts invested are large and the loss of a machine is a serious matter, ever leaving out of account the risk to the personnel.

Uses of the Dirigible

The development of the "Pony Blimp" or small dirigible, opens up a new line of development which is very promising. With a speed of 45 miles per hour and a wide cruising radius, it uses only three gallons of gas per hour and has a greater carrying capacity than a plane. As it can be stopped in the air at almost any altitude, it offers an ideal means of timber cruising and mapping and for carrying fire fighters and equipment and also supplies for survey parties and logging camps. If the risk of fire is not great and the cost of plant for charging with gas not too expensive it will be an ideal adjunct to forestry and logging work. It will also do away with, what in the northeastern part of the continent is a great drawback to aerial work, the inability to fly in winter. It may be that we shall be able to make flying practical but so far it is out of the question with planes on account of the low temperatures and deep snows which we have in eastern Canada.

I feel that aerial transportation and photography have come to stay and that with careful, well thought-out development will prove invaluable in the management and exploitation of large timber holdings. We are constantly trying to study out new ideas for the planes and the camera and are sure that their field of usefulness will become larger and more important.

GROWING SQUARE TREES!

Cambridge, England. — The Cambridgeshire School of Forestry believes that "there is no reason why trees can not be made to grow square and produce wood of better quality and in greater quantity" if the excessive wood production in certain trees can be controlled. The association believes that this can be done and if so "there will be no more slabs nor wavy planks."

The lumber trade is not likely to invest much in the square tree proposition. Put, if it is a success, there is no reason why some other new things shouldn't be developed. For example, an auger that would bore square holes.—*American Lumberman.*

FOREST INDUSTRY IN POLAND.

The Polish paper industry consists of great enterprises, with a working capital of 100,000,000 marks. In 1913 there were in Poland nineteen paper factories and 20,000 work-people employed. The produce consists of almost all varieties of paper.

Galicia is in a much better situation than the Kingdom of Poland itself, as she has more woods and quick rivers.

THE BUFFALO AND THE TIMBER TREE

"Not only has the buffalo gone from the prairies but the forests have fast disappeared. With the disappearance of the forests the wild thing that dwelt there have also gone and the amount of moisture in the air and the rainfall has changed. Drainage has added to the change that is so gradually going on that it is not noticed.

"People have become so used to finding their newspaper or their magazine in their homes that they give no thought to the possibility of having to do without it. Yet with the going of the forests the basic source of newspapers is disappearing.

"Without pulp wood there can be no papers and reforestation is the only means of meeting the problem yet little has been done toward that end."

Border Cities Star, Windsor, Ont.



On the grounds of Mr. and Mrs. Sovez, Alsask, Sask., where the growing of tree belts has paid big dividends in great crops of luscious small fruits... "Seeing is believing," writes Archibald Mitchell, of the Canadian Forestry Association staff, who took the picture, "but tasting goes it one better." Mr. Arthur Cooch, assistant to Mr. Mitchell, is seen in the foreground, reaching out for an extra tempting patch of strawberries.



Do trees grow well on the prairies? This is the reward gathered by Mr. Anderson, of Alsask, Sask., for a little planning and a few years' cultivation.

Strange Facts of Strange Trees

One of the South American acacia trees manufactures electricity for its protection—or, more properly speaking, it is an electric dynamo. On touching it, one receives a shock so distinct that he is not desirous of coming nearer. Scientists are now working on the theory that certain electrically charged trees exchange electrical or magnetic impulses through the air.

Scientists admit that trees have their laws of marriage and courtship. The Indian fig tree is such an ardent lover that he will actually take on the form of a vine if his mate chances to grow a distance from him, and by this means reach out his arms, that he may embrace her and powder her face with his perfumed pollen.

In western India there is a tree that blossoms only in the dark. For some reason, possibly because as ordinarily seen it is of plain and desolate appearance, it is called the sorrowful tree. Every evening in the year it breaks into bloom, but with the rising sun sheds or folds up its flowers.

The Germans used the seed of the *Sabailla*, botanically known as *Schoenocaulon officinale*, for the manufacture of the lachrymatory and asphyxiating gases stored in their "weeping bombs." The seeds of this strange and interesting plant or tree are in form and color like our oats, and stored, they emit a piquant smell so strong as to make the eyes water copiously; they also make breathing very difficult and painful.

The coconut palm is an example of a single tree which can be made to supply all the needs of a not too luxurious member of society. In certain islands of the southern seas this prolific plant furnishes the natives with the wood from which they build their houses, their boats and their utensils. When the leaves are young they are eaten. When they are old, they are woven and braided into hats, baskets, cloth, fans, bedding, paper

and thatch. The ribs of the mature leaves are converted into arrows, spears, brooms, torches and paddles. Out of the flowers come wine, vinegar and sugar. The fruit makes a delicious food, and its husks yield oil, cord and matting. Even the roots are sometimes used for food.

The sweet gum, sometimes called *gum-amber*, actually plants seeds within itself. The tree first grows hollow within, and then the seeds find their way into the hollow. When the tree is ready to die, the young take up the life thread and, pushing their way through crevices in the bark, burst the maternal trunk asunder.

The oak is the most common tree in northern United States.

The palm tree has for centuries been conceded the emblem of victory.

The wild cherry, with its beautiful red-bronze bark, is a miser. It is so niggardly that it can not bring itself to part with its own dead branches but retains them indefinitely.

Scientists declare that not a few trees have become extinct as a result of inter-marriage with foreign trees, or different species. In some cases a healthy hybrid is produced (as Burbank's plumcot) but more often there is no offspring.

The "Sneeze wood" tree of South Africa has a unique way of protecting itself against enemies. Its wood is light brown in color, runs very close grained, is so hard as to sink in water, is bitter to the taste, and emits a microscopic dust on being sawed or cut. No insect or worm will touch it and men who handle it are continually sneezing.

The sandalwood is termed the "perfume wood" tree, although it is not alone in this quality, as indicated by our own *sassafras* and cedar.

The sapota tree is the "chewing gum tree." Chicle is the proper name of the life blood of this tree from which the gum is made. It grows in South America, Central America and Mexico. It produces a fruit called the sapodilla pear, and has a straight, clear timber trunk.

The cinchona tree, of tropical climes, produces the quinine of commerce.

The natives of the Niger gather immense quantities of butter from the butter-tree. It abounds in such great quantities that it is likely to become an article of commerce.

If a man wishes milk when traveling in the forests of Caracas, South America. Mother Nature supplies him most abundantly from the cow-tree. This product has not only the exact appearance but all the qualities of cow's milk.

The wine-palm of western Africa yields a delicious sap which, mild when first drawn, begins to ferment in a very few moments after it is exposed to the air.

MUSINGS OF AN OLD AXMAN.

By Douglas Malloch, the Lumberman Poet.

Thays a good dele ov bad in moast
 everbuddy but moast of it happened yisterday
 so furgit it an' remember that
 thays juss as mutch good in us too an'
 that its thar' t'day so why wurry about
 yisterday?

When I look around an' see th' world
 with th' sun a shinin' on it I cant figger
 how come the kizer t' ever think o' such
 a thing as war—it dont belong nowhers.

Ever onct in a while I see a feller I'd
 like t' camp with—an' onct in a while I
 see one I'd like t' have camp with me.
 Doant yo' find it so?

LAND SETTLEMENT AND PAPER MILLS.

Speaking at a meeting at Monteith, Ont., Mr. R. A. McInnes, manager of Abitibi Power & Paper Company, Iroquois Falls, said that few people realized what the pulp industry meant to

the North. The Abitibi Co. paid last year three and a half millions in wages alone. Then there were other mills at Smooth Rock, Kapuskasing and so on. In a few years the wages paid annually by these and new mills would run to the enormous total of \$15,000,000.

Another sign of the importance of the forest was the Abitibi Co. had paid in freight to the T. & N. O. in the past year \$950,000 and the other companies in proportion.

The investment in the past three years by pulp companies had been \$60,000,000 in the North country and it was just beginning. That showed the enormous importance of the industry to the North.

Where does the farmer come in? The pulpwood industries must have settlers; they must have produce and labor. First comes the large industry, then must come the settlers; roads are needed. The companies and the settlers must work together. It is useless for the people of the North to act individually. They must first work out a programme for the North and then go to the Government and get what they want.

MR. VERE C. BROWN CHOSEN.

The board of directors of the National City Bank of New York at a meeting recently elected Mr. Vere C. Brown, western superintendent of the Canadian Bank of Commerce, to the position of executive manager of the National City Bank. Mr. Brown will assume his duties in New York in the near future. He entered the service of the Canadian Bank of Commerce in 1857.

Mr. Brown is a Director of the Canadian Forestry Association and has given invaluable aid upon many occasions.

Please send in your membership fee promptly.

The members are responding splendidly to our new plan of a Two-dollar Annual Fee, including subscription to the Forestry Journal.



An interesting photograph from the Great War. King George was visiting a Canadian Forestry Camp and was greatly amused at a young captive boar, shown to him. Immediately at the King's right is Brigadier-General J. B. White, of Montreal. Lord Lovat, Chairman of the British Forestry Commission, is at the left of His Majesty.

Should I Plant Trees in Fall or Spring?

What is the best time to plant a shade tree, in the spring or in the fall?

The question confronts many city and suburban home owners every year. Very often the owner has consulted some one interested in selling him nursery stock and the answer he has received depends upon the time of the year he has made the enquiry. Early in the year he is told "Plant in the spring," later he is advised "Fall planting is the best." Theoretically a broadleaved tree may be successfully transplanted at any time that it is in a dormant state and making no growth, that is, between the falling of the leaves in October and the swelling of the bulbs in April. In the case of fall planting there is a danger on some sites of the tree being upheaved by the ground. This however can often successfully be overcome by a heavy mulching of manure about the base of the tree. Fall planted trees are as a rule slower to open their

leaves and begin new growth than are those that have been left undisturbed until planted in the spring. The chief objection to spring planting is the shortness of the season during which it may safely be done. At that time there is so much other work starting up that everybody is rushed and there is greater chance of careless handling, also delays in delivery from the nursery are more serious in the spring than in the fall. In short it may be said that both spring and fall are good planting seasons but that the spring planting gives on the whole the best results.

When to Prune.

At what time of the year should the pruning of shade trees be done? This question is also frequently asked by the tree owning readers of this magazine. Although the pruning of shade trees is often desirable the season for performing this operation is not nearly so im-

portant as in the case of pruning for the production of fruit. It may be said in general, that pruning should not be done before midsummer. Leave all heavy pruning till fall or winter. Early in the growing season the sap is flowing freely and results in needless loss to the tree. Also this flow will often prevent any dressing that is applied to the wound from adhering properly. Light pruning may be done when the foliage is on the trees if it is for the purpose of shaping the tree. The removal of dead boughs is also best done when the tree is in leaf as the dead branches are then more readily detected.

A third question often asked by tree owners is in regard to fertilizing. Well rotted straw manure is probably the best fertilizer than can be used. It should be spread thickly in the fall over the whole area covered by the crown of the tree and left there throughout the winter. In the spring this should be well worked into the soil. In the case of trees grown on well kept lawns working in cannot be done without injuring the sod; however, the mulching itself will be beneficial if the manure is left until fairly late in the spring to permit the rains to wash some of it into the soil. *B. R. Morton.*

A Forest Tragedy

By *John D. Guthrie*, in "American Forestry."

He left his camp fire burning to see if the Lookout would pick it up.

He did.

He thought this would be a good test to see if the District Ranger was on the job.

He was.

He wondered if a fire would burn very fast in the dry forest.

It did.

He thought he could get away before the Ranger could catch up with him.

He couldn't.

He thought he could bluff the judge at his trial.

He didn't.

He wondered if the Judge would have the nerve to sentence him to jail.

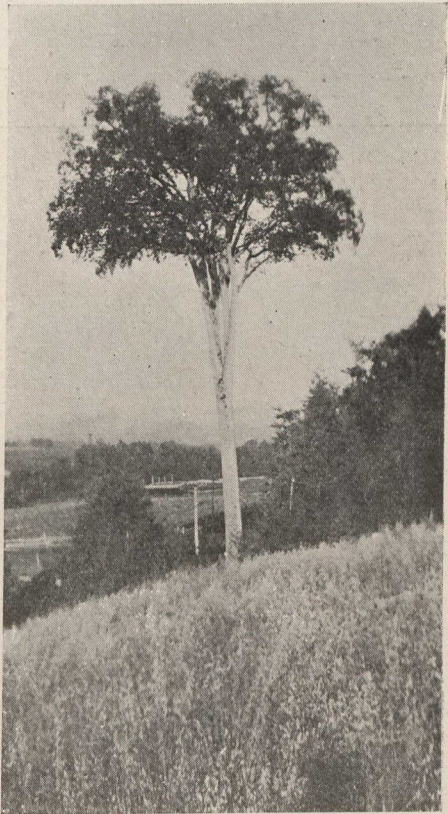
He did.

We wonder if he will put out his camp fire next time he is in the forest.

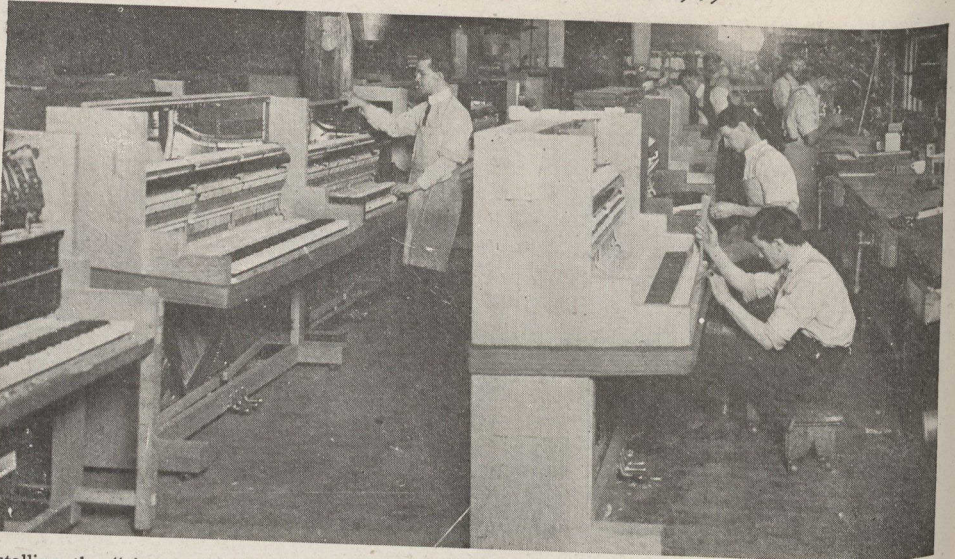
HE WILL!

A Family Friend

Mr. Fred Rogers, of Bristol, N.B., is the proud owner of this stately elm tree. Mr. Rogers' grandfather when he settled at Bristol over a hundred years ago cherished and cared for this tree. In later years his son to whom the farm on which the tree stood was bequeathed,



sold a portion of the farm and the tree as well. However, he soon rued the sale of this time honored and stately tree and bought back the elm and the ground for a radius of 25 feet about its base which he states he will retain permanently in his family.



Installing the "piano action" and tone regulating. The action is put into position after the back is completed but before the case is finished.

Pianos in the Making

By G. Gerald Blyth, Assistant Secretary, Canadian Forestry Association.



The building of a musical instrument--what trees are used and why.



Among the hundreds of wood-using industries spread all over the Dominion there are few more interesting and scarcely any where individuality and the sensitive and sympathetic touch of the human hand plays such an important part, as in the making of pianos. Pianos are finding their way into an ever increasing number of homes throughout the land where they contribute their share in providing entertainment and inspiration of the loftiest kind.

It is the purpose of this article to give our readers an insight into the manufacture of pianos, describing the various stages in the process of their construction and an idea as to the species of wood that go to make up a piano.

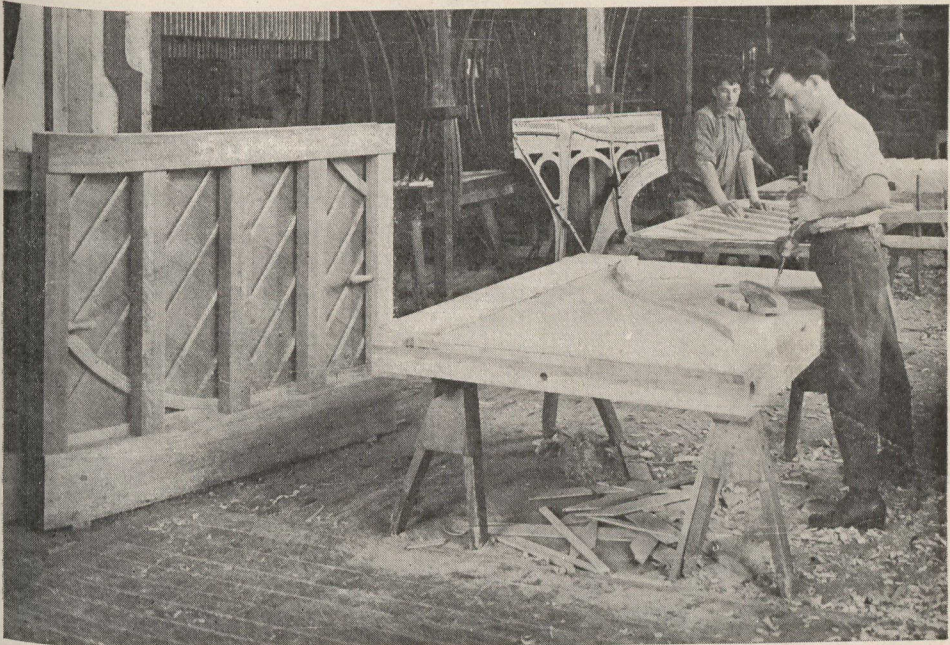
Selecting the Wood.

The various kinds of wood used in the making of pianos have to be carefully

selected and only the highest grades are suitable. Spruce, Maple, Birch, Walnut, Poplar, Gum-wood, Canadian and American Oak, Ebony, Rosewood and Ash, are the principal woods used and mention will be made further on as to species which enter into the manufacturing of the principal parts. After the lumber reaches the factory it is piled in the yard where it is weather-seasoned for at least two years and longer when possible. A further seasoning is necessary before it can be used and consequently the lumber is placed in dry kilns before it is available for use in the shops.

The Sawing Process.

The lumber is next taken to the wood-mill where it is sawed into widths practically all of which are less than six inches. This is necessary to insure that the grain in the contiguous pieces of



On the left is a completed back or "rim." In the foreground the sounding board and bridge are being secured to the back.

wood is so arranged as to prevent warping and also to secure that harmonious arrangement of the grain of the wood which long experience has showed to be most conducive to the best tonal effects. From these small widths are built up the various larger members that enter into the piano such as the "back" or "rim"; the delicate sounding board, the heavy posts of the frame and the various sections of the case. No screws or nails are used but by glue and pressure the larger portions are built up or shaped as required.

Having touched upon the preparation of the wood before it is shaped and built up as well as mentioning the principal woods utilized, let us now pass on to the actual construction of a piano.

The Back or "Rim."

This is the foundation to which the whole system—sounding board, plate, pin-block and strings is attached. It assists the metal frame in taking up the strain of the strings, which often aggregates 25 tones and by its intimate connection with the sounding board assists in securing the desired resonant qualities.

The back or "rim" of a Grand piano is constructed somewhat differently but

it is intended to describe only the ordinary upright type in this article.

Each post which goes to make up the back of a piano is made from several carefully selected pieces of wood, accurately matched and glued together, not a single bolt or screw being used. Cut No. 1 shows a corner of the factory where a number of backs are receiving the final touches. The heavy posts are made of Maple or Birch. At its upper end the back or "rim" carries the pin-block or tuning block which is made of maple. This section of the piano is built up of several layers of maple glued one upon the other with the grain running in alternate transverse directions. The "rim" after it has been glued together in the rough is next planed down to its finished dimensions.

The Sounding Board.

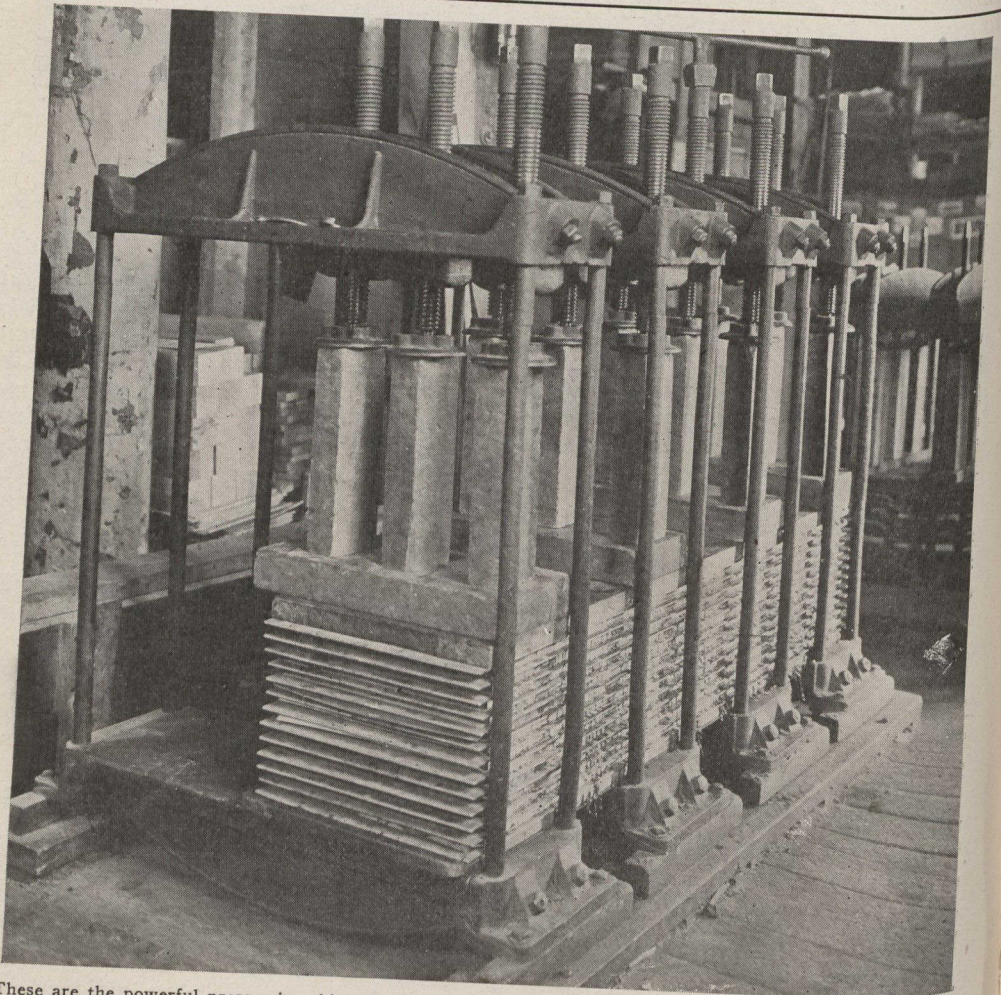
The sounding board is made of Canadian White Spruce and the richness of tone is chiefly dependant upon the selection of the wood and arrangement of the grain in building them up of a number of narrow strips. The function of the sounding board is to increase the area of vibrating surface which is in contact with the air. The piano strings alone have

too little surface area to effect the auditory nerve. The sound board which is connected with the strings through the bridge increases their vibrating surface many thousandfold. In building up the sounding board only the most elastic lumber can be used which will produce vibrations with a minimum expenditure of power. The quartered wood is cut so that the "season rings" run at right angles to the grain, and the many strips which go to make up a sounding board are between 3 and 4 inches in width. Those strips which have a wide grain are placed opposite the bass strings and those with the closer grain are opposite the treble. The board is glued together

in the rough, is about one-half inch thick, and it is planed and sandpapered down to a finished thickness of from about a quarter in the base to three-eighths of an inch in the treble end. This is the work of a specialist and calls for a great degree of skill. A series of parallel pine battens or ribs are firmly glued to the back of the sounding board to strengthen it and also to give to the board the correct curve. A curved maple strip known as the bridge which is about 1 inch by 1 1-8 inches is fitted diagonally across the sounding board.

The Plate.

As mentioned before, the back or "rim" is the foundation of a piano. We



These are the powerful presses in which the pieces of veneered wood are placed, after the gluing process. The piano case itself is made of Ash, on which are glued four thin layers of mahogany or walnut veneer. The engraving shows a number of sections in the press.

have seen how the "rim" itself is built up and finished off. After the sounding board pin-blocks and bridge have been glued on to the rim, the next operation is the attachment of the plate. The plate is secured down by means of bolts and set screws and consists of a strongly ribbed and carefully designed casting made of special iron alloy. The plate has to perform the important function of carrying along its lower end the pins upon which the strings are strung and of bracing at its upper end the pin-block into which the tuning pins are driven. The plate is called upon to stand a tremendously heavy strain amounting in the aggregate to several tons but as before mentioned the back or rim assists to a certain degree in bearing this great strain. As we are chiefly concerned with the wood-using end of the industry it will not be necessary to enter into a detailed description of the design and construction of the iron plate.

The Strings.

These are essentially the sound producing mechanism yet were the greatest of care and skill not used in the selection, seasoning and putting together of the various woods that are used the strings would not produce that singing quality for which these pianos are noted. A highly-specialized grade of wire is used and the operation of "stringing" a completed "rim" calls for a high degree of skill and workmanship.

The Piano Action.

In these days of standardization and specialization the majority of piano manufacturers find it more profitable and satisfactory to import the "piano actions" they use which are made to their requirements and specifications by companies who specialize entirely in constructing same. Wood is used largely in the manufacture of the "piano action," such as in the hammers and the keys themselves and the principal species in general use for this purpose are maple, basswood, ash, cherry and cedar. As lightness is very essential consistent with strength, the wood is so cut that the grain shall, in each member, lie in the direction which is most suitable to the strain which that particular piece must endure.

The Keyboard.

In the early stages of their manufacture keyboards are formed in one piece consisting of a board of white pine which in turn is composed of several widths glued together with the grain so arranged that it shall run approximately in the direction of the finished keys. The board as first glued up, dressed and finished to size is about one inch thick by two feet wide by six feet long. Along one of the long edges is glued a thin strip of ivory. The board is then spaced off into the proper number of keys and after the keys are accurately lined upon the board they are sawn out by a band or fret saw and the ebony keys are glued down on the proper members.

Making the Case.

The body of the piano case is of ash to which the thin strips of mahogany and walnut are glued. Four strips of veneer are used in each finished section of the case to one layer being glued on with the grain running opposite to the next. Cut No. 2 shows the powerful presses that are used in the glueing operation. From the veneered pieces the case is built up and the already completed back action and key-board are fitted. Next comes the polishing operation which is a slow and costly one. The outside portions of the case such as the doors, the sides, the cover, etc., are given seven distinct coats of varnish. A coat of varnish is first put on with a brush. The brush marks are then rubbed off with pumice-stone, the pumice-stone marks are removed by rotten stone and finally the rotten stone marks by hand, there being no polishing agent equal to the human skin. These steps are successively carried out for each of the seven coats after which the case presents the desired grain and lustre.

The piano is then very thoroughly inspected, such details as regulating for touch, tuning and tone having been previously looked after. The Forestry Magazine is indebted to the President of the Martin-Orme Piano Co., of Ottawa, for assistance in gathering information for this article and for courtesies shown during visits to the company's factories.

Growing New Crops of White Pine

On the Harvard Forest, experiments in securing a maximum reproduction of white pine gave this conclusion.

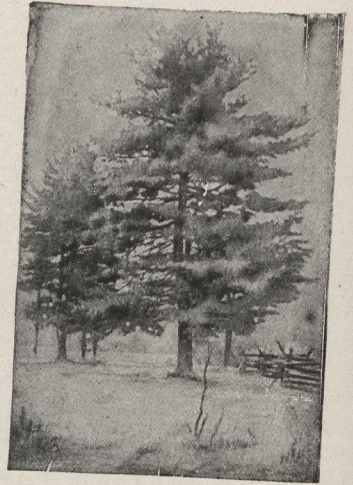
That the best reproduction was secured following a heavy thinning, involving the removal of one quarter of the trees per acre.

Stands so treated have in five years shown as many as 25,000 seedlings per acre. At the end of five years the remaining cover wood was removed.

Clear cutting in strips or in patches gave various results, mostly favorable, but was open to the objection of higher costs, due to the scattered area.

With the annual harvest of Canada's premier wood—white pine—steadily decreasing, as regards what is taken from Crown Lands, our readers will be interested in studies made on 54 separate logging operations in Massachusetts and New Hampshire during four years, by R. T. Fisher and E. I. Terry, and published recently in the *Journal of Forestry*.

Of the 54 separate areas examined only 14 showed satisfactory reproduction of pine. This was taken to mean 500 thrifty seedlings or more per acre. All of these 14 lots were cut in seed years, that is, in the autumn or winter following the fall of seed. Two lots cut in seed years showed no reproduction, the failure being due to the fact that the previous stands were unusually dense and below the seed-bearing age. Of the remaining 40 woodlots cut over in non-seed years, only 10 showed any pine reproduction at all, and of these 10 only one anything like a sufficient seeding. These partially satisfactory results were always explainable on account of accidentally favorable conditions, such as the proximity of seed trees and the smallness of the area cut. The examination showed that general site factors such as slope and aspect had little or no effect, but that the condition of the seed-bed was apparently of first importance. Heavy ground cover and leaf-litter was unfavorable; thin leaf-litter and humus with mineral soil mixed with it or exposed made the best seed-bed. If seedlings failed to start within from 2 to 5 years after the cutting, the development of other vegetation kept them out entirely. Incidentally the study showed that under dense stands no reproduction survives, but that under open or mixed



stands advance growth of white pine may survive for years. There was no evidence of reproduction from seed stored in the leaf-litter more than one year. Outstanding facts were that on all but the lightest of the local soils, the hardwoods are gaining, and that the composition of the present forest types has been controlled in the main by the previous treatment of the land.

Taking the total area of the woodlots examined, about 15 to 20 per cent showed good pine reproduction; on another 20 per cent pine seedlings were scattering. On the other hand from 60 to 70 per cent of lots cut both in seed years and non-seed years, was satisfactorily stocked with valuable hardwoods such as red oak, white ash, hard maple, etc. These figures apply only to the first 10 years after cutting. However successful the reproduction may be at the start, within 10 years from 10 to 80 per cent of the

desirable elements, both pine and hardwood, was overtopped and suppressed by inferior species and clumps of stump sprouts.

Harvard Forest Experiments.

In respect to the various ways of handling the pure pine type which have been tested on the Harvard Forest it can be said that all of those methods which involve the removing of the stand in two or more cuts have proved successful. On account of certain practical and financial factors good reproduction, however, is not the only criterion of a workable method. This will perhaps appear more clearly from a statement of experience with the different systems of cutting.

Clear-cutting the Whole Stand.—This method has been tried on areas of from two to four acres. Cuts were made in the winters following the seed years of 1908 and 1914. All slash was burned in piles. A reproduction followed in which there were from three to four thousand thrifty pine seedlings per acre at the end of four years. This method is obviously the best from the point of view of cheapness in logging, but can be practiced with success only in seed years.

Clear-Cutting in Strips.—Strip cuttings have been made in several different years. The cleared areas varied from 100 to 200 feet in width and in all cases were made on the margin of the stand away from the prevailing wind. The results have been variable. On well-drained sites, where the underbrush and small vegetation was scanty, good reproduction has appeared within five years. On moist or rich land pine has been entirely kept out by dense herbaceous growth.

Clear-Cutting in Patches.—The patches cleared by this method varied from 50 to 100 feet in diameter. The results have been similar to those on the cleared strips, although the reproduction has been, on the whole, more successful. Abundant seedlings have come in on the drier sites where the competition with woody vegetation was not so keen. This method, like the preceding, is open to the serious objection of greater cost due to

the smaller, scattered area. Furthermore, even if the groups of young growth become established, it is difficult later to log the surrounding uncut timber without undue damage or expense.

The Selection Method.—Small areas cut over by the selection method where only single large trees or groups of trees were cut, have resulted in fair reproduction. It is not, however, a practicable means of handling pure pine, being too costly and not calculated to provide the necessary density and growing conditions for the new crop.

The Seed Tree Method.—All experiments with the seed tree method have proved failures. In many cases the trees blew down.

The Shelterwood Method.—Of all methods tested this has resulted in the best reproduction. The first cutting has consisted in a uniform thinning in which mainly the overtopped and defective trees were taken. This meant the removal of about one-quarter of the trees and one-fifth of the volume per acre. Up to the point where windfall becomes a risk the heavier the thinning the better was the reproduction. Stands so treated have in five years shown as many as 25,000 seedlings per acre. Where the overwood was allowed to stand more than five years the reproduction became stunted and too weak to recover promptly when the removal cutting was made.

A New Forest Ensured.

The cutting method now in practice on the Harvard Forest, though based largely on the outcome of the experiments above described, was adopted with considerable reference also to practical and financial considerations. The rotation for white pine is set at 60 years. As the working plan is based upon the principle of a sustained annual yield, final cuttings have to be made each year. In this respect the property is in the same case as that

of a wood-working concern which requires a steady annual supply. Since seed years for white pine occur not oftener than once in three years, this means that any cutting method based on the periodic fall of seed must make provision for securing reproduction after the operations of the off years. The established logging and milling methods almost necessitate the clear-cutting of a considerable area in one place a minimum of not less than 5 to 10 acres.

The method of cutting is a combination of preliminary thinning with clear-cutting. Each year an area large enough to yield the bulk of the annual cut is cleared, and ordinarily thinnings are made on adjacent areas in amounts sufficient to yield the balance of the total cut. The object of the thinnings is primarily to stimulate reproduction of pine so that it will be available when and where cuttings are made in non-seed years. Each year, however, the bulk of the operation is a clear-cutting which keeps the cost of the job within reasonable limits.

Before the final clear-cutting is begun all the advance growth, hardwood and underbrush, both small and large, is cut close to the ground. Usually this can be done with a bush-scythe and at a rate of an acre or an acre-and-a-half per man per day. The purpose of this is to eliminate misshapen and overdeveloped reproduction and to insure the uniform starting of straight, vigorous, seedling sprouts. Cost records show that the work is much more than paid for by a saving in the cutting and hauling of logs due to the much greater ease of handling and loading. When the logging starts the slash is burned in piles much of it in broken time while the job is in progress. The cost of slash burning has varied from fifteen to fifty cents per thousand.

A COMMERCIAL IDEAL

"The ideal forest situation provides annual growth equal to the annual requirements.

"Forest Conservation and forestation will procure this ideal condition in time and the movement is under way."

The above is clipped from a full page advertisement of the International Paper Company of New York, the largest news-print concern in the world. While the International Company has used the argument to point an arrow at Quebec's embargo on export of unmanufactured wood from the company's lands to their American mills, nevertheless the principle of systematic forest management and permanent timber crops is today thoroughly recognized by all progressive pulp and paper companies.

Water Over Sands

By Douglas Malloch, the Lumberman
Poet.

Time slips away like water over sands,
So swiftly—silently, we scarcely know.
We ply our oar with fond and futile
hands,

But with the current we must onward
go.

The changing scent, strange faces on the
shore;

A sudden ripple and a little strife;
And then the scene, the face, the strife,
no more—

And this is life.

How far we come in such a little while!
Like water over sands time slips away;
How short the distance from a baby's
smile

To age's wrinkles and a brow of gray.

If yesterday, today, are not the same,

Beyond this bayou is another bend;

And we shall find, and, finding, fondly
claim

Perhaps a friend.

So hail him!—do not pass him—give a
hail!

Behold each lily, ev'ry perfect thing.

To speed too swiftly down is but to fail,

There are such songs to hear, such
songs to sing.

Yea, there are fruits and flowers, grass
and tree:

Live while you may, while life is in
your hands;

Time slips away like waters to the sea

Run over sands.



Mr. Sovez, of Alsask, Saskatchewan, refused to take the bare prairies as a visitation of providence and therefore beyond human remedy. This is how he establishes rows of evergreens to strengthen the belts of shorter-lived species.

For Every Prairie Farm a Tree Belt!

How the Sutherland, Sask. Nursery is Aiding Western Farmers to Improve Their Lands.

The value of trees as an ornamental feature of home surroundings in both urban and rural municipalities needs no argument or emphasis, but the additional value of tree-planting to the farmer in the prevention of soil-drifting should be known and appreciated by every agriculturist who desires to get the best return from his grain fields. The disastrous results in many prairie sections during the last two years occasioned by the high winds should make this subject one of vast importance to the farmer, and every assistance offered by the government should be taken full advantage of.

To help the agriculturists overcome this seemingly great misfortune which may any year attend their efforts, and to aid them in making their prairie homes assume the most attractive appearance, adding comfort as well as pleasure, the Dominion Government through the De-

partment of the Interior, has established the Forest Nursery Stations, the chief of which is at Indian Head, Saskatchewan, and the most important branch at Sutherland, Sask. Comprising three hundred and twenty acres of average prairie land and operated under the superintendency of James McLean, this nursery station, serves the greatest need of the prairie farmer, who may more or less successfully cope with other difficulties, but who in the face of the soil-drifting problem finds himself helpless except as he takes advantages of the solution afforded through the planting of trees.

Founding of Nursery

The land for this forestry farm was purchased in 1912 and in the summer of 1913 was first plowed. Planting was commenced in the spring of 1914, so that six years is the maximum period of growth of any trees or shrubs to be

found there. A visit to the nursery is necessary in order that one may be convinced of what may be accomplished in six years.

From prairie land, or rather, land which had once been cultivated and later allowed to go back to prairie, has been developed in that time a most beautiful and well-equipped forest tree nursery. Attractive and well built farm buildings have been erected, and a handsome brick residence for the superintendent occupies a choice location in the park-like surroundings.

Primary Object

While the grounds and drives are laid out in artistic manner and garden shrubs and flowers are to be found in vast profusion, and a visit to the farm would furnish a valuable object lesson in landscape gardening, the primary aim of the nursery station is to supply free trees for rural home decoration, and to assist farmers in checking soil-drifting by the use of tree plantations. By tree-planting moisture in the soil is conserved, protection is given to fruits and vegetables which, without such protection, cannot be grown successfully, and the farm generally, through beautification and material benefit of plantations, takes

on an added value. Any garden will give better results when protected from the wind, while the growing of strawberries, white, red and black currants, rhubarb, plums and asparagus is made possible in the most exposed sections of prairie when shelter belt plantations are used.

Forest Trees Only Supplied

Only forest trees are grown at the nursery for shipment, including maple, ash, Russian poplar and caragana, which are distributed free except for transportation charges, and Scotch pine, lodge-pole pine, jack-pine, and white spruce, which are supplied at the nominal cost of two cents per tree, in addition to the transportation cost.

Maples are shipped at the end of one year's growth, ash at two years', caragana at one to two years, and evergreens at from three to five years, an average of two million trees per year being the output since the founding of the station.

Distribution Over Wide Area

Trees have been sent to applicants throughout the three prairie provinces, and to districts ranging from Portage la Prairie on the east to Peace River on the west. All points which can best be served by railways out of Saskatoon receive their shipments while those which



Cabbages, carrots and mangels grown prolifically on the farm of Andrew Anderson, Alsask, Sask. Mr. Anderson owes his vegetable crops to the shelter obtained from belts of trees.



This progressive prairie farmer does not believe in importing his luxuries; he grows them. The view shows a magnificent lot of raspberries on Andrew Anderson's place at Alsas's, Saskatchewan. They were grown with the aid of shelter belts of trees, without which fruit culture on the bare prairies is a hopeless job.

are better served from Indian Head receive shipments from that station.

Naturally the shipments to points in the province far outnumber those to neighboring provinces, the new Canadians showing an ever-increasing eagerness to take advantage of the opportunity offered by the government to improve and beautify their farms.

Caragana Most Popular

The heaviest demand from all points is for caragana, or Siberian peatree, and the reason for this is because it is hardy and ornamental. Russian poplar is next in demand, being equally hardy and very quick growing, the actual growth per year averaging about two feet. Manitoba maple is next in demand, being quick growing, hardy and a good shelter. Willow is recommended for the same reasons. Green ash, while very desirable in many ways, is less called for than other varieties because it is slow growing. When matured it has an additional value in that it makes excellent timber.

Evergreens, while growing more slowly than deciduous trees during the first seven years, will after that time grow

more rapidly than the deciduous varieties and so Scotch pine and Manitoba maple set out at the same time will, at the end of fourteen years, show the former to have attained the greater height. The great secret in planting evergreens lies in never permitting the roots to dry. If this happens the resinous sap solidifies and cannot be liquefied again.

Spruce Desirable

The white spruce is a very choice tree to plant in Northern Saskatchewan as it is absolutely hardy. The native tamarac is recommended because it is hardy, handsome, quick-growing and makes a good ground covering. This variety, however, can not be supplied from the nursery station, as but a limited forest has as yet been grown and these so far have been used for experimental purposes only. Native and Russian birch are also highly recommended for farm planting, but they, too, are only carried at the nursery for experimental purposes as yet. The golden willow, while a choice tree for appearance, shelter, etc., is, however, not as hardy in the northern latitude as the other varieties named above.

Forest Restoration Needed.

In the forest history of any country we find three periods, forest destruction, forest conservation and forest restoration. Canada is now in the second period—that of conservation and a lapping of the periods is seen in the fact that to a certain extent forest restoration is receiving considerable attention. This is a form of reconstruction of the greatest possible benefit to the prairie farmer and for his guidance and assistance the forest nursery station exists.

Trees Check Soil-Drifting.

The one big object in tree-planting is to check soil-drifting and when forest plantations are well-planned and carefully tended the loss of crop from this cause becomes negligible. A row of trees will protect more than a rod in distance for every foot the trees are in wide plantations in rows about fifty rods apart, and working the land in strips, drifting may be overcome entirely.

Tree plantations also afford shelter from wind to crops, buildings and stock. They collect and hold the snow during the winters, preventing it from banking up around buildings. They preserve and retain the moisture in the soil by breaking the force of the hot winds in summer.

Timber From Plantations

Plantations will supply fuel, fencing material and wood for repairs, which is a very important point to many settlers who live far away from any natural supply of timber. Trees are of aesthetic value beautifying the landscape and making life on the prairie much more pleasant and less monotonous, and they add greatly to the money value of a farm.

As farm lands in the west become more thickly settled, a farmer to be successful must make every acre of his property produce the greatest possible revenue without deteriorating the soil. In the case of spots unfit for grain cropping, there is no doubt that the only way to obtain a revenue from them is to plant them up with trees. For a few years after planting, of course, no revenue can be obtained from a plantation, but the initial expense is not so very great and as an

investment would pay good interest in the future.

Shelter Belts at Nursery

Some of the best shelter belt combinations are to be seen in the plantations at the forestry farm. One which commends itself immediately both for beauty and utility is the mixed deciduous plantation. This is a six years' growth of Manitoba maple, poplar, golden willow and caragana. The caragana is a yellow-flowered legume which has more the nature of a shrub than a tree, although it grows often to a height of thirty feet. With its dense growth it is an excellent wind-break, while its flowers make it highly ornamental.

Another plantation which is most strongly recommended for an outside shelter belt is to be found running the entire length of one side of the farm. It is composed of four rows planted four feet apart, showing six years' growth. The outside row is of Manitoba maple, the next of Russian poplar, the next willow, and the inside row of caragana. Some of the maples in this plantation have reached a height of fifteen feet.

Tamarac Being Tried Out

One of the handsomest plantations is that of the native tamarac where the trees, three years old when planted, have been growing for the last six years. This plantation is being tried out experimentally and so far is proving successful, the saw-fly which has attacked it in other districts, not having made an appearance here.

The large plantation of white spruce makes a splendid showing and in their six years of growth in this plantation height of ten to twelve feet. The white spruce is one of the most useful trees from an economic standpoint. It is a most valuable lumber tree and is extensively used in the manufacture of pulp. For forestry purposes it will undoubtedly prove one of the most successful trees for western planting.

The plantation of Scotch pine, that valuable European timber tree, has made rapid growth. Each year prairie farmers in increasing numbers visit the forestry farm in order to learn what may

be accomplished through tree plantations and to gain a first-hand knowledge as to how to care for a plantation. It is the aim of the nursery station to assist these as much as possible and Mr. McLean will take time to take any one over the farm and explain to him the leading features of the various plantations or will give him an interview in his office at any time.

Start Plantations Early

Most farmers, when they begin life on the open prairie, intend some time or other to plant at least a few trees to shelter their buildings and garden. Some begin to prepare for tree-planting as soon as they get on their land, others prefer to leave it until later, but nearly everyone has the intention, some time or other, of doing some planting. The forestry branch provides the farmer with trees and notes particularly the difficulties experienced by him in disposing of his plantations to the best advantage. Briefly summarized, the advice of the nursery station in regard to the question of successfully establishing plantations in the prairie may be stated thus.

Wide belts are better than narrow ones, better shelter, cheaper to maintain, furnish better material in after years and more of it.

Thorough preparation of the land must be made before planting.

Trees must be firmly planted.

Cultivate as soon as they are planted.

Cultivate in summer to conserve moisture. Do not wait for the weeds.

Any blue-joint grass or sweet grass appearing the first summer should at once be dug out.

Close planting saves labor in the long run.

Plantations should never be pruned.

Put the work of the plantation first. It does not take long and only about one-third of the work if done at the right time.

How Trees Are Prepared.

Application forms are supplied to all who desire trees for planting and all applications should be sent to Norman M. Ross, B.S.A., B.F., Chief of Tree-Planting Division, Indian Head. Upon the re-

ceipt of application by Mr. Ross, an inspector is sent out to the applicant's land to see that it has received the proper tillage. The inspector also makes a plan of the build-house. Following his visit the plans are framed and the farmer supplied with a plan showing the varieties and numbers of trees which he should plant.

Principles to be Observed.

The following guiding principles are laid down for formulating plans.

Make convenience the first consideration in arranging the farm buildings and grounds.

Establish the shelter-belt to protect the home and stock against the prevailing winds.

Allow sufficient room between the buildings and the shelter-belt for the extension and addition to buildings, threshing space, and to collect snowdrifts in winter.

Allow space for lawns and ornamental planting.

Allow for the extension of the plantation for wood-lot purposes.

The Forestry Branch cannot promise to furnish sufficient planting material to carry out any plan, but will lend all possible assistance in the way of making suggestions and will supply as many trees as are available for distribution.

WHERE THE PAPER GOES.

Some exciting figures appear in an article on American periodicals in the current Publishers' Circular. One issue alone of a certain popular journal, it is stated, would supply enough paper for all the books brought by all the United States public libraries in a year, two or three times over. Three of the periodicals combined use enough paper in a year to girdle the earth with a page-wide strip 148 times, and the ink used amounts to 3,600,000 pounds. The mere details of 13,000 miles of rope used annually in tying up parcels for delivery is thrown in by way of parenthesis.

Why Close the Timber Industries?

By Roland D. Craig

The effect of progressive forest exploitation, without provision for succeeding crops, is being felt in parts of the United States. At a hearing before the House Committee on Foreign Affairs in Washington, W. E. Haskell, of the International Paper Company, made the statement that "the Underwood Resolution, which provides for a commission to negotiate for the removal of existing export restrictions on pulpwood cut on the Crown lands of Ontario, Quebec, and New Brunswick, is the only measure yet presented to Congress which contains any assurance of a sufficient quantity of pulpwood to perpetuate the present production of our paper mills, to justify the installation of new machines, and to save the great pulp and paper industry of the United States."

This is not an accurate statement of the situation. The facts are: (1) The labour and manufacturing cost of converting pulpwood into pulp is very much less than the cost of converting pulp into paper. (2) The amount of water-power required to manufacture pulp is relatively high and, from an economic point of view, the benefit to the community would be increased if such power were used for other purposes. Further, it is notorious that, in the Northeastern states, this power is required for more important industries and its release would ameliorate the present coal shortage. (3) The paper mills of the Northeastern states can purchase pulp from Eastern Canada, the Pacific states, British Columbia or Alaska and with anything like present prices, can conduct their operations at a profit. Col. Haskell's statement, however, affords further evidence of the serious extent to which the forests of the Eastern states have been depleted.

A recent report of the Louisiana Department of Conservation shows that similar conditions exist in that state in regard to lumber, and points out that Louisiana should and must practise forestry, in order that she may not be obliged to pay \$15 or \$20 per thousand

feet for freight on lumber brought from the Pacific coast twenty years from now, and because her vast unproductive areas of cut-over lands are a heavy drag upon her prosperity.

With these examples of the disastrous effects of such methods in the United States, Canadians should not wait until an actual shortage overtakes us before we learn the lesson so plainly demonstrated.

Re-creating a forest is slow and expensive, but its productivity can be maintained by comparatively inexpensive means. These consist of, first, protection from fire and, second, proper methods of cutting.

No single system of cutting is applicable to all conditions, any more than the growing of all kinds of farm crops, and technical knowledge of the requirements of the different species is necessary. Under some circumstances, more complete utilization of the mature timber will result in satisfactory reproduction. In others, seed trees must be left in order to secure the kind of forest desired.

The increasing quantities of British Columbia lumber being sold in Eastern Canada is evidence of the already growing scarcity of available timber in the East, and, if the immense pulp and paper industry which has grown up in the last decade is to be permanent, steps must be taken at once to make provision for future crops instead of leaving cut-over lands as barren wastes.

FROM A WESTERN PHYSICIAN, OYEN
ALBERTA.

Canadian Forestry Association, Ottawa.

A word of appreciation for the good services of Mr. Arch. Mitchell, now connected with the tree planting car touring the province of Alberta.

I sincerely hope this work will continue; it's filling a long felt want in these prairie districts.

Dr. H. C. Schwartzlander.

Rebuilding the Scottish Woodlands

By Col. John Sutherland, Assistant Forestry Commissioner.

Britain is the largest wood importer in the world, and it is a striking fact that so little effort has been made in the past to help to meet the demand for timber by increased production within the country. Greater Britain or the British Empire is potentially the largest timber producing unity among the nations. The almost unbounded resources which the Empire possesses in all parts of the world need only be scientifically developed and conserved in order to ensure our future supplies and to remove all apprehension of a timber famine. The Mother Country has undoubtedly lagged behind the Dominions and the Colonies in matters of forest production and conservation. Of her 121,380 square miles barely 4 per cent. has been under forest in recent times; still the earliest records show that once upon a time Great Britain was a densely wooded country. Forestry development has not kept pace with other industrial enterprise. Britain owes her supremacy to her insular position and to the development of her Navy and mercantile marine. Her many excellent ports and the ease with which timber could be brought from over the seas made it seem unnecessary to attend to home resources in timber supplies, but a visit to Scotland to-day will disclose the importance of never again being caught without an adequate reserve of all the natural resources which can be developed within our shores.

The upper plains, hillsides, and low-lying valley slopes, which five years ago were covered with trees, are now bare, and too often covered with the debris of the exploiters. This state of matters, while of the nature of a calamity, has not altogether been devoid of good. The War manifests the importance of timber and the necessity of securing within the country a supply of wood sufficient to make Britain more independent of other countries.

At one time the whole of Scotland, and especially that part lying north of a line drawn between Edinburgh and Glasgow, was covered with dense forest. To

what altitude the forest grew is more or less a matter of conjecture, but traces of large trees are found at elevations of 1,600 to 1,700 feet, and in some ascertained cases even 2,000 feet above the level of the sea. The condition of the country, covered as it was by wood, protected the inhabitants from invasion, and while sheltering them, facilitated their raiding hostilities upon the Lowlands. When the Romans invaded in the third century they employed over 50,000 men in destroying and opening up the forests for the purpose of driving out the inhabitants who resisted their advance, and as indicative of the character of the land they called the people Caledonii, a name latinised by them from the Gaelic "Na Caoilldaoine," which means "the men of the woods."

The devastation of the forests was not confined to the invader, for the rival sects and clans, retarded in their conquering aims by the woodland cover of their neighbouring enemies, took means of destroying by fire wide forest tracts throughout the whole country. Also in Cromwell's time vast areas, especially in the Scottish Borders, were laid waste by fire for military purposes. In the early days also serious inroads were made by extensive fellings,—for example, in the time of Edward III., during the first half of the fourteenth century; in order to raise revenue for the prosecution of the French wars, Henry VIII, in the sixteenth century; James I, a hundred years later, and Charles I, all helped to reduce the forest area either for colonisation schemes or for the sake of revenue. Still it is on record that both Henry VIII. and James I. encouraged planting as an important factor in national economy.

The Forestry Commission Programme for Scotland is under review, but it is generally anticipated that during the ensuing ten years 75,000 acres will be planted by the State; that 25,000 acres may be afforested through loans or other schemes in co-operation with local authorities and private owners, and that a similar area may be restored to trees in

the woodlands exploited during the War. This programme envisages the afforestation of 125,000 acres altogether -- no very vast encroachment upon the twelve and a half million acres of moor and waste and deer ground from which the land will be resumed.

At the outbreak of War not less than nine-tenths of the timber consumed in Scotland came from abroad. The Board of Trade Returns for 1913 gave 1,470,000 tons as the quantity of timber imported into Scotland. The total consumption of timber in that year is believed to have been about 1,623,000 tons, leaving as the balance provided by home woods only 153,000 tons or roughly one-ninth. More than one-half of the imports consisted of pitwood. As the result of the War and of the consequent compulsion to find our timber requirements at home the position has been completely reversed, and in this year nine-tenths of our requirements are supplied from home forests and one-tenth from abroad. The development of the home timber industry during the last five years has been enormous, but this development has been at the expense of the small reserve of old woods, and it is feared that large inroads have been and will continue to be made as well into the younger plantations. If the timber in-

dustry is maintained, and there is reason to expect that it will be for several years, a further serious depletion of the timber resources must result, but the industry is important and one well worth retaining in as full activity as the existing resources will allow. About 100,000 people were engaged in it in 1911, and as the fruits of afforestation accrue the expansion of timber work will increase.

The Timber Supply Department created during the War made a calculation of the fellings from 1914 to 1919 inclusive, and these totalled 170,233 acres, but it would not be unreasonable to place the actual inroad upon the woods to date at something like 200,000 acres, which would leave 652,120 acres as the area of woods remaining in situ at the present day. Of this area probably 25 per cent. or 163,000 acres will consist of coppice, the greater part of which is presently of but small marketable use, so that the real reserve of standing timber in Scotland at the birth of the Forestry Commission may be roughly computed at half-a-million acres or 2.6 per cent. of the whole extent of the country. The above estimate of reserves will ultimately be checked by accurate methods when particulars of all woodlands are properly investigated by the Forestry Commission.

MEMBERSHIP APPLICATION

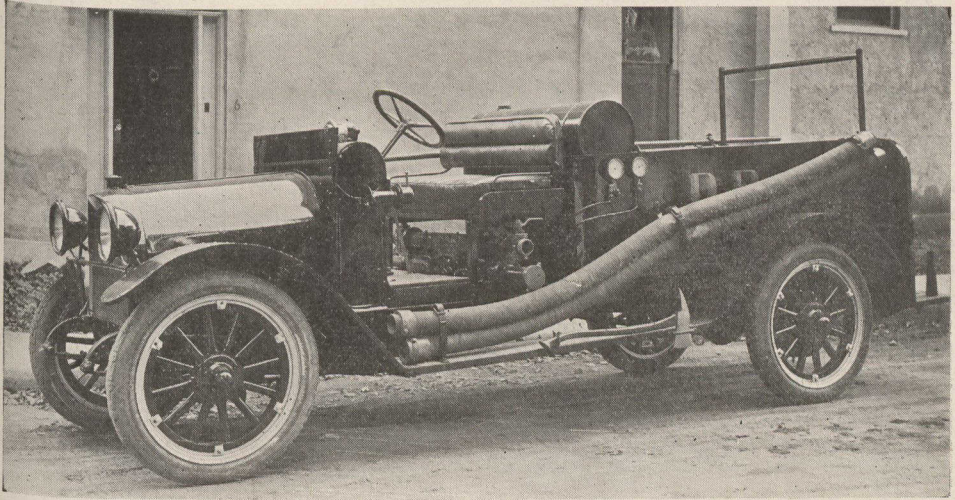
CANADIAN FORESTRY ASSOCIATION,
JACKSON BLDG., OTTAWA.

Please make me a member of the Association and send me 12 numbers of the Illustrated Forestry Magazine, containing Special Articles on Canada's Forests, The Planting and Care of Shade Trees and other allied topics. Membership Fee \$2.00, which includes subscription to the Forestry Magazine.

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Developments in Fire-Fighting Equipment

by G. Gerald Blyth, Assistant Secretary
Canadian Forestry Association.

The Dominion Parks Branch, which was responsible for the introduction of the light weight portable gasoline fire-fighting units now so universally and successfully being used both in Canada and the United States for fighting forest fires has followed up this light weight pumping unit by a heavier type of gasoline operated pump which has just been built by a Canadian firm for use in the valleys, along main roads, in Western National Parks. Much has been written describing the construction and use of the portable units, and the purpose of this article is to convey to these interested in forest fire protection a slight idea as to the type of the experimental unit just completed which will be ready to handle the fire situation along the main auto roads in Rocky Mountains Park next spring.

Strangely enough, the more difficult problem of dealing with forest fires which occur off the main and auxilliary roads was first dealt with and more or less solved; that is to say, the portable gasoline pumping units have preceded the heavier and less mobile type. Those

departmental offices who were responsible for the introduction of the gasoline pumping units were more concerned with providing means of getting water to a fire occurring in the less accessible districts and hence the portable gasoline pumping unit, weighing but 130 lbs. was the product of their lengthy and careful investigations. Having produced an eminently satisfactory unit capable of being easily transported by canoe, pack-horse, railway speeder, etc., the attention of the Parks Branch Officers was next directed towards dealing with the fire situation along the many miles of recently constructed auto roads where a much heavier type of unit could be used which would deliver a greater quantity of water through longer lines of hose.

Automobile Pumping Units

A three-quarter ton auto truck chassis of an approved make was fitted at a well known Canadian fire engine company's factory with a rotary pump which was placed in position on a line with the chassis, behind the chassis transmission and suitably geared thereto. The pump

can be thrown into gear with the engine of the motor truck and water obtained in twenty seconds. It is intended to use standard two and a half inch fire hose of the linen and unlined type which is much lighter in weight and consequently much more suitable for forest fire protection work.

The completed unit is practically identically the same as the ordinary city fire pumping trucks, however, many of the irills and decorations usually found on these have been omitted and only equipment is carried.

Specifications.

Pump—Rotary type, capacity as follows being the result of the final test:—

Tip used.	Vacuum.	Pressure.	Pressure.	Calls at per	Tip. minute.
3/4"	7"	125/130 lbs.	125 lbs.	137	137
1"	10"	60/65 "	55 "	219	219
2x1"	12"	30/35 "	50 "	340	340

The initial or experimental unit now going forward to Banff, Alberta where it will be stationed, will be available for use over an extensive highway system in the Rocky Mountain Park where water is obtainable along almost the entire road system. This unit will be able to cope with fires occurring within a distance of 2,000 feet of the roads and when it is necessary to deliver water for a greater distance it can work in conjunction with the portable units, this making it possible and practicable to deliver water a very considerable distance from the source of supply.

Much credit is due the Dominion

Parks Branch for the pioneer work they are doing in developing mechanical forest fire-fighting equipment.

SLOGANS FOR SMOKERS.

Don't drop FIRE when you smoke in the woods, nor throw it out along the road. Keep the forests GREEN.

DANGER! Matches, pipe coals, cigar stubs and cigarette ends start many forest fires. Help protect woods, streams, scenery.

BE CAREFUL! Don't start a fire in the woods when you begin or end your smoke. Be sure your match, cigarette, or pipe is out.

DON'T START WHAT YOU CAN'T STOP! Be careful with fire in and near the forest.

FIRE IS DANGEROUS! Be careful when you smoke in the woods.

LOOK OUT! When you smoke in the woods, don't start a forest fire.

YOUR CO-OPERATION with the company to keep down forest fires is asked. Break your match in two. Knock out your pipe ashes into your hand. Don't drop a burning cigarette.

FOREST FIRES cost millions a year. Don't start one.

DON'T THROW FIRE AWAY in the woods or along the road.

RED FORESTS OF RED RUSSIA.

Washington, D.C.—A dispatch received by the Department of State from Soviet Russia indicated great harm to the pulp and paper future of that country through extensive forest fires, which are not being checked.



Flying Studies of Forests and Insect Damage

If the Air Board of Canada can give a few more demonstrations of the time-economy of aircraft, such as occurred recently between Ottawa and Haileybury, Ontario, the stimulus to civil aviation will be materially strengthened.

Col. Robert Leckie, D.S.O., M.C., D.F.C., Superintendent of Flying Operations, Air Board, Ottawa, Mr. Clyde Leavitt, Chief Forester, Commission of Conservation, Ottawa, and Dr. J. M. Swaine, Chief of Division of Forest Insects, Entomological branch, Dept. of Agriculture, Ottawa, comprised the aerial party.

The plane left Ottawa at ten o'clock, a.m., following the Ottawa River to Mattawa, thence to North Bay arriving at 1.15 p.m. where a stop was made for dinner and a fresh supply of gasoline. At 2.45 the air travellers left North Bay, returning to Ottawa to follow the Ottawa River again, as far as Kippewa and up Lake Temiskaming, reaching Haileybury at 4.20 p.m. The actual flying time was five hours, at an average rate of 65 miles per hour. The engine is a 350-horsepower, twelve cylinder V type, stationary Liberty motor, and was used by the Naval Board during the war. The airship carries tanks with a capacity of 100 gallons of gasoline sufficient for about five hours constant flying. Her rate of consumption is 28 gallons of gasoline an hour.

The party was met at Haileybury by Capt. Wickens, deputed by the Air Board to operate the machine, while it is in that district, and by Mr. Roland D. Craig, Forest Engineer for the Commission of Conservation and Major G. H. Edgecombe, who are conducting a survey of the forest resources in Ontario, with the view of finding out the present and possible future supplies of timber from which the pulp and lumber industries of the province can be supplied. This work is under the direction of Mr. Craig, who conducted similar surveys in British Columbia. Major Edgecombe and Mr. A.

V. Gilbert are also engaged in collecting the necessary information for this survey.

During the war the value of aircraft for mapping and reconnaissance was demonstrated, and now a number of planes are being used for this in forestry work in Canada.

The Air Board having been given over 100 machines of different types by the Imperial Government, is co-operating with the other Government departments by supplying machines and pilots for such work as mapping, forest fire protection, fisheries patrol and transportation.

Taking advantage of this opportunity, Messrs. Craig and Edgecombe are going to make reconnaissance of the forests in the Temiskaming district from the air, in connection with Dr. Swaine's Spruce Budworm studies.

The advance of the aerial survey is that it enables the observer to map in, with considerable accuracy, the various types, such as swamps, burns, hardwoods and softwoods, in a few hours on an area which could not be covered by a ground survey in as many months. It is not claimed that the amount of standing timber can be judged from the air, but with the area defined, a comparatively small amount of ground work will give a very satisfactory basis for a timber estimate.

Dr. Swaine is studying the injury caused by the outbreak of the spruce budworm which is spreading into Ontario pulpwood forests from Northern Quebec. The injury is to the balsam and spruce timber, and is caused by myriads of caterpillars devouring the foliage. The injured timber turns red and may be distinguished from the air. It is planned to map this area, and the timber owners can then be advised of the rate and direction of the spread, so that they may salvage their timber in advance of the outbreak.

Immense destruction has been caused by the spruce budworm in the Provinces of Quebec and New Brunswick, and this sudden extension of the outbreak into Ontario threatens all the spruce and balsam timber between Lake Temiskaming and the Great Lakes. In conjunction with the air survey, detailed entomological studies are being made by ground survey.

The plane and party remained in the north for about three weeks with Haileybury as the base. Col. Leckie returned to Ottawa in preparation for his flight across the continent from Halifax to Vancouver. On this trip he will come north as far as North Bay travelling from there in the direction of Georgian Bay and the Great Lakes. He was much taken up with the country covered yesterday, and describes the Ottawa valley as a "wonderful sight" from the air.

Apart from their baggage, the flyers brought some personal mail from Ottawa to Capt. Wickens and Mr. Craig, which marks the first time in the history of the north country that mail has been brought by aeroplane.

BRITISH SUBSIDIZE HOME BUILDING

The British Government is making a free offer of £260 to anyone who will undertake to build a house. The builder can occupy it himself or let it to a tenant. He can, if he likes, when it is completed sell it, for the grant carries no irksome conditions, it is not repayable and becomes in fact absolutely the property of the owner. The building must of course conform to official regulations, it must be approved by the local authority, but beyond that approval the grant is free. It is paid in check without delay when the building is completed. It makes house building, even in these difficult times, both possible and profitable, especially when the builder intends the house for his own occupation. The object of the grant is, of course, primarily to encourage private persons to build houses for themselves and thus relieve the enormous pressure placed on the local councils.

NO "BARE PRAIRIE" FOR THIS MAN (Calgary Herald.)

If there was anything that was missing in the drive to two miles south of Coaldale, it was the trees in that varying landscape of green. But the rich vegetation on all sides obliterated all thought of trees until their presence, in making the home and the farm beautiful, was realized when the excursion arrived at the farm of John Hamilton, one of the C.P.R. readymade farms. Whatever wonderment was previously sensed in the rich and varied verdure of crop and grass was for the moment swept aside in the sight that greeted the visitors of a farm which for appearance would be hard to beat in any of the old settled farm districts. It was astonishment of a new kind that was aroused when it was realized that what is now a well cared for farm, that might have been inhabited by a generation of farmers, was only seven years ago a part of the bald prairie. The beautiful ring of trees which encircled the home plot of the farm looked as if it had been there for a period of years, and yet the trees were only planted in 1916, four years ago; and then in slips of nine inches or so long to grow into what now are trees rising in height to some fifteen and twenty feet. And all this, together with the rich fields of wheat and the alfalfa stacks in the farm, obtained by irrigation wisely applied. The astonishment grew when it was ascertained that this carefully and richly cultivated farm of 320 acres was the outcome of the labors of one man with the help of a hired man.

The farm of Mr. Hamilton is a triumph of the virtues of irrigation. The windbreak, with its six rows of trees, Manitoba maple alternating with ash, with willow and Russian poplar, making the two outer circles, was the perfection of the windbreak trees can afford. On the inner side of the circle of trees all through, skirting the home farm, is a well trimmed hedge of caragana. In the enclosure is an ideal kitchen garden, the pride of the lady of the farm, Mrs John Hamilton.

New Forests for Nova Scotia's Barrens

by Freeman Tupper, Acting Woods Manager,
Macleod Pulp and Paper Company.

In looking over the forestry maps of Nova Scotia one cannot help but be impressed, and, if a lover of the forest, saddened, at the large percentage of the colour representing barrens. Still more will one be impressed, and saddened if he should traverse these barrens, and see the vast extent of waste, multitudes of valueless bushes, and huge pine stubs reminding us of the untold wealth which should have enriched our people. "Our Heritage" swept away in a moment!

The passing of this heritage was keenly felt by the older generation who remember the "forest primeval." Its far reaching effects pass on to the present generation, who, having a better perspective, are beginning to realize what the appalling loss really means. It is true we have some timber in sight which is being depleted by loss from windfalls and lumbering operations, and fires are still a common occurrence. Therefore, if the present generation do not endeavour to guard what we already have, the future generation will drink the bitter dregs, and the loss will be nation wide.

Many of our barrens have been visited by prospectors, seeking a hidden wealth, but they only succeeded in a small degree. Farming is out of the question, so it is evident that the only thing left for these lands to serve the public welfare is forests.

Considering the barrens of Queens County, particularly those along the watershed of the Liverpool river and head-waters, to be a fair average of barrens throughout the province, there

are a few facts regarding them which should be brought to the public attention.

Some six or seven years ago, while conducting certain surveys, I had occasion to visit many sections of barrens in Queens County. They were indeed a treeless waste, but are varied in nature owing to repeated fires over portions, so that the original burned areas can now be divided into three distinct classes:

Class 1.—Open Barrens, devoid of trees or stubs, and in some places with sufficient soil to cover the rocks.

Class 2.—Portions of barrens covered with myriads of burned trees and windfalls.

Class 2.—Portions of barrens not burned since original fire, now covered by forest of young hardwood.

During the fall of 1919 and spring of 1920, I renewed the surveys mentioned above. We were amazed and delighted to see the change nature had wrought in a few years. Spruce, red and white pine were growing by the thousands over sections of classes 1 and 2. Even on portions of Class 1, where the soil had been burned exposing rocks and boulders, where modern forestry would perhaps hesitate to replant, were also red and white pine from ten feet down, all growing in a perfectly healthy condition.

What Nature is doing on these barrens of Queen's County at the present time, and on many other portions of barrens in the Province where my interest in the matter led me to visit, is exactly in line with the policy of

Government a vast sum of money in replanting. It means that our heritage is returning; a new forest is born to enrich our country in a future time.

There are still large portions of barrens not seeded as yet, but if these conditions exist on average barrens today, is it not reasonable to believe that other portions will re-seed as years go by?

It would be a crying shame for another fire to destroy this grand contribution, which Nature is again giving to us, and I hasten to make an appeal in behalf of these young trees

for protection—for a Provincial Forester to direct affairs and intelligent Rangers to trail careless sportsmen, who do not realize the possibilities of fire.

Forest conditions effect everybody, and to avoid a forest famine in the future, we must act now. The Government must spend some money on them, and every businessman in the Dominion of Canada should be a member of the Canadian Forestry Association. Once their shoulders get behind the wheel of forest protection, give it a push and keep it going!



These pictures illustrate the good work done by rangers patrolling the Cochrane district of Northern Ontario. They have persuaded settlers to pile their slash for safe burning. In such hazardous country an ounce of prevention is worth a ton weight of cure.



Practical Training for Foresters

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



Three quarters of total time of attendance is spent in field and laboratory.



As has been pointed out in preceding articles, the students in all forestry schools gain practical experience in the bush, forest nursery or mill during the summer holidays and at the same time earn money for the partial payment of their school expenses. The total time thus employed during the three summer vacations of the course amounts to ten or twelve months. Thus quite or more than one quarter of the time during the course is actually given to woods work. While the school is in session the students' time is about equally divided between attendance upon classroom lectures and upon laboratory or field work. It will be seen, therefore, that during the entire four years of the course the students spend three quarters or more of their time in practical work in some form.

In the Practice Camps

The statement in the paragraph above includes the work in addition to the time spent in the practice camp, since the students of all the forestry schools spend from one to three months in the forest under the direct supervision of their instructors. At this time they put into practice as far as possible the things they have learned in their textbooks. In the first place, they usually lay off the boundaries of their practice area and divide it into working sections. The students construct a map showing twenty-five or fifty or one hundred foot contour intervals. This, of course, discloses the topography and drainage and thus indicates where the hauling roads and camps may be conveniently located. The next procedure is to make a forest type map which locates, for example, the pure stands of hardwoods and softwoods

and the mixed stands of these species. It also shows the distribution of the barrens, burns, swales and muskegs if present. The students then estimate the timber on the tract in terms of board feet or cords for each commercial species. This is usually done by establishing a base line and measuring the trees in parallel stripes at definite intervals apart and perpendicular to the base line. The strips on which the trees are measured are run methodically on the tract, so that the final estimate of the stands is a fair average. The students, however, obtain practice in various other methods of estimating as employed in the different parts of the country.

Planning the Future

All this data is placed upon the map of the tract so that one may see clearly the topography and drainage, the location of the logging roads and camps, the nature of the forest types and stands and the amount of material that may be cut in the form of saw logs, pulpwood or cordwood. These are about all the facts with regard to the condition of an area that a lumberman needs for the purpose of logging, but the forester must enter into the condition of the future productiveness of the area, for it is his business to maintain the continuity of the crop. In order to find out the condition of the tract from this standpoint, he must do two things: he must determine the amount of material not yet of merchantable size and having done this he must determine how fast it is growing, or in other words, how much wood in board feet in addition to estimating the amount of material now merchantable on the practice area. The forestry students by means of the data

obtained from regeneration and growth study surveys make estimates of the probable yield at stated intervals in the future. This involves not only a stock-taking of the young growth, but also the determination of the probable death rate as the stands pass from youth to maturity and this in turn involves, among other things, the making of forest disease surveys.

In order to keep an area continuously productive, provision must be made for the reproduction of the merchantable species at frequent intervals. The natural mortality is very large in a forest and, therefore, there must be an abundance of young trees coming on if the continuity of production is to be preserved. The natural regeneration of the forest is precarious and uncertain and the necessary conditions are not well understood. Yet the study of such conditions forms an interesting and very important part in the formation of plans for an unending supply of pine saw logs or spruce pulpwood as the case may be.

Studies of Fire Protection.

There is little need of making plans for the future supply of timber on an area if, as is unfortunately the case in some of our best timbered regions, the area has practically no chance of escaping destructive fires. An essential part of the forestry students' work in the practice camp is to work out the details of an adequate system of fire protection. This includes the locating and building of trails and telephone lines.

The work outlined in the preceding paragraphs covers the main things accomplished by forestry students in a practice camp. In the end they have the knowledge and the data necessary for the making of working plans for the tract, plans that extend a long way into the future and if carried out by the owners of the land would result in a supply of saw logs or pulpwood so long as the sun shines and the rain falls, for wood is only solidified sunshine and water with a few mineral salts from the soil thrown in for seasoning. The forester uses his intelligence to direct these processes of nature. Under a let-alone, do-nothing policy there is no direction and there will

be no future supply—at least sufficient to meet the present demands on the present commercially valuable species.

The Character Equation

In concluding the outline of undergraduate courses in forestry, the writer wishes to say that in his belief no forestry school can make a trained forester. That comes only with experience accompanied with discriminating judgment. The forestry school does, however, attempt to train the mind of the student so he can use it to his advantage and that of his employer in whatever circumstances he may be placed. To develop in the student an active resourceful mind and the capacity for sustained intelligent thought and persistent hard work is the goal toward which the forestry schools constantly strive. A forester can be made only in the forest. It is the function of the teacher to point the way, to lay the foundations. What way he takes, what he builds on those foundations depends very largely upon the man himself.

THE STRENGTH OF TREES

Few people have any idea of the strength of trees. In Boston, Mass., recently, an old elm, more than three feet in diameter, had to be removed from the common. Several of its limbs had been struck off by lightning, and it was supposed to be in a dangerous condition. So one of the tree-levelling devices used in France for tearing down buildings, trees, etc., was brought into play. This is a machine that is worked by a couple of men moving a lever back and forth. A cable was fastened to the tree trunk, and it should have come up by the roots, all theory being correct. Instead, it broke the first cable of steel—one inch thick—and then, when two were wound around that old trunk, the tree shivered a bit and broke them. The contractor gave it up as a bad job, and put several men on with axes to cut the roots.

A Chinese trust controls the dye used on firecrackers, made from cibucaco, a Philippine wood. The same dye is used for sealing wax and Chinese ink.

PRAIRIE PLANTING

(Manitoba Free Press Editorial.)

There is no reason why the prairies should remain bald and treeless in practically any part of western Canada. Trees can be grown and grown quickly if the proper methods are followed. Remarkable results can be attained in ten years in establishing tree belts that will act as windbreaks, stop drifting, and control moisture evaporation. A visit to the federal government plantations at Indian Head, Sask., will be a revelation and an inspiration to western Canadians who have an idea that Providence decreed that this should be a treeless land. Providence meant nothing of the kind. Nature is doing her best to clothe the western plains with trees. The tree belt, in the natural course of events, is steadily travelling westward.

The whole landscape of the western plains could be changed in 25 years by intelligent and systematic forestation. Trees are an asset so easily accrued that the planting of them should no longer be neglected. Now is the time to begin.

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British Columbia Will Maintain Its Forests

By Hon. T. D. Pattullo, Minister of Lands

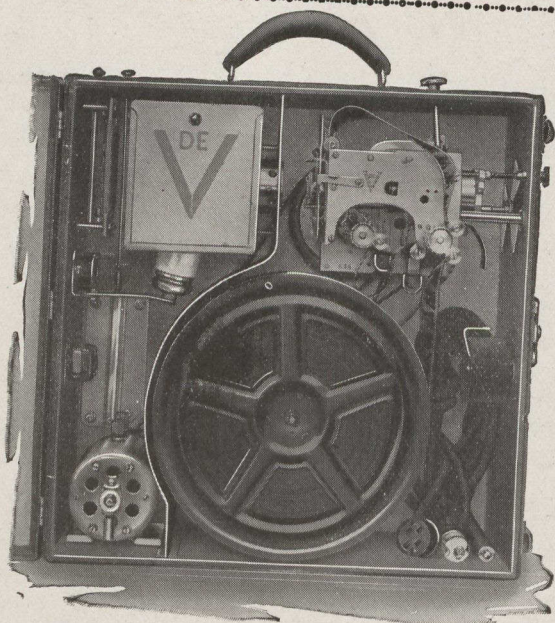
How much merchantable timber have we? This question is being asked today the world over. While I write, an Imperial Forestry Conference in London, England, is trying to find the answer, so far as the British Empire is concerned.

To the south of us, State Foresters and timber experts are seeking to provide Congress with an answer to the same question, as well as answers to further questions arising out of the leading query.

There has been considerable controversy in the various trade journals both as to stands of timber and the best methods of handling them economically.

One expert makes an estimate, and another immediately produces widely different figures. That the experts differ is not the important point—that they are both making a genuine effort to arrive at a fair estimate is the vital fact.

One of the good results of the war is that a general stock-taking of natural resources is going on, and it has been found that this is particularly necessary in regard to timber. After four years of destruction, during which ordinary work was at a standstill, the world is hungry for timber and its products. How long will our visible supply of raw material last? Frankly, we do not know. Fortunately, we are trying to find out.



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WINNIPEG

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It has been a habit for years past to think and speak of our timber resources as being unlimited, with the result that we have been mining instead of cropping it, as is done for instance, in Sweden, where every available stick of timber is utilized. The unlimited supply idea has depleted Wisconsin forests; has left very little timber in Michigan, and is rapidly depleting the stands in the Southern States. It is estimated that the original stand of 650 billion feet in the Southern States has been reduced to 139 billion feet.

There is no occasion for hysteria, but we, in British Columbia, must look facts calmly in the face and lay our plans ac-

cordingly. We must, after careful survey, decide on the best methods of timber conservation.

Much is being said these days of reforestation and extensive experiments along this line are being made by some of the large pulp and paper companies in Eastern Canada. Experts are not agreed that the hope for the future lies entirely in reforestation. They seem inclined to the belief that it will prove rather as an assistance to the forest to reproduce naturally. In other words, that natural reproduction of the species native to each locality is the goal to be aimed at, but that, where necessary, nature should be helped out by artificial means.

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dug this ditch—it is digging ditches for hundreds of farmers, who have found the value of C. X. L. on the farm.

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16



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In natural reproduction and rapid growth, the coast of British Columbia is peculiarly fortunate, thanks to her moist climate and mild winter. It is estimated that we have 97,000 square miles of productive forest land and that on most of that area young timber is growing after previous destruction of the crop by fire and logging. While it is true that much of this young forest is at some distance from present means of operation, by the time it has reached maturity distances will have been shortened, as they are being steadily shortened year by year. The important point is that the timber is there, while it is equally important that it should remain there.

1,000 MILES OF FOREST PER ANNUM.

The newspapers of the United States and Canada consume 2,150,000 tons of newsprint annually. Stated in this way, it probably conveys little information to

you respecting the effect upon our forests. You will better appreciate the situation when I say that it represents the denudation of the mature trees on an area of 1,000 square miles of forest land each and every year. This will give you an idea of the enormous inroads that newsprint manufacture is making upon the forests of North America.—
James White in address to the Vancouver Rotary Club.

SHADE TREE PLANTING

(Parry Sound Star)

Several gentlemen interested in the beautifying of our town, held a bee on Tuesday of this week, and planted about 18 trees. The work was well handled and there is no doubt but that the large majority of these will mature. The trees were kindly donated by Mr. John Argue and taken from his property. This is go-ahead business.

HYDRAULIC PAPERMILL TURBINES MACHINERY

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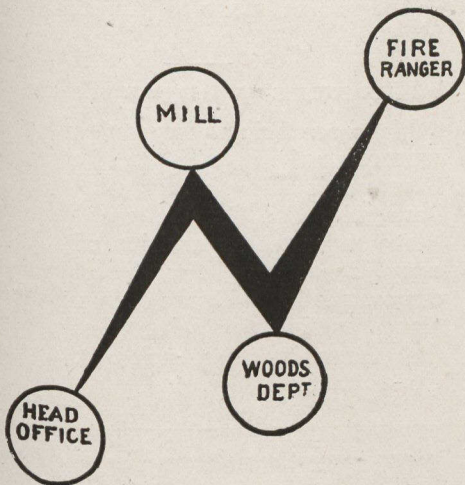
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OUR EMBARGO ON RAW WOOD.

(By Col. H. S. Graves, former Chief Forester of U.S.)

"It should be wholly unnecessary to have any serious difficulty over this question. Canada's position is that the total amount of pulpwood in these Eastern Canadian Provinces—Quebec, Ontario and New Brunswick—is not more than is required for the support of the industries already established or which it is desired to have established in the future. Canada asserts that she is unwilling to sacrifice her own industrial interests merely to extend the life of an American industry which has overdeveloped its manufacturing facilities in relation to its raw materials and progressively destroyed its forests."

Colonel Graves suggested that the two countries ought to work on a joint plan for fostering the forest industries on both sides of the border, and he proposed a conference of representatives of Canada and the United States to work out a plan of mutual assistance. He urged modifications of the laws of New York so as to permit the use of some

pulpwood from State lands where cutting is now prohibited, and a joint effort by the two countries to perpetuate their forests.

LAURETIDE TO INSTALL WIRELESS.

Plans are being discussed at present concerning the installation of a wireless telegraph station in the plant of the Laurentide Co., Grand Mere, P.Q., probably under the supervision of the Forestry Department, for the purpose of communicating with the company hydroplanes, and also to receive messages from the planes in emergencies. Both machines have wireless sets.



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Timber from insect or fire killed trees is just as good for any structural purpose as that from live trees of similar quality, providing the wood has not been subsequently injured by decay or insects. Market dead trees before they suffer injury.

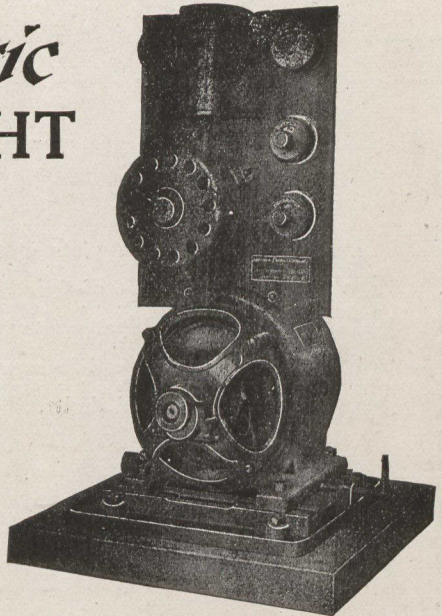
Shade trees may be destroyed by leaky gas mains, which poison the roots, making it impossible for the tree to secure nourishment from the ground. Gas killed trees are often thought to have been killed by insects, and weakened trees are often completely killed by borers or by fungi.

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Paper-Making in Canada

By A. L. Dawe, Secretary Canadian Pulp and Paper Assoc.

Paper has been made in Canada for more than a century. From the records that are available at the present time it would appear that the credit for the first paper mill belongs to what used to be known as Lower Canada. Bouchette's "Topography of Canada" states that Canada's first paper mill was established at St. Andrews, Quebec, in 1803. It was, from all accounts, started by a party of Americans who obtained concessions from the seigneurs. The second mill in Lower Canada appears to have been established at Bedford Basin, near Halifax, in 1818, by R. A. Holland, publisher of the Halifax Record.

In 1825, in a little village known as Crook's Hollow, was erected the first paper mill in what was then Upper Canada. This was a small building, about 30 x 40 feet, in which paper was made by hand. To Mr. Crooks, its founder,

belongs the distinction of having earned a bounty of £100 offered by the Government for the first sheet of paper manufactured in Upper Canada.

Simultaneously, on the banks of the Don River, a few miles from Toronto, John Eastwood and Colin Skinner were working to obtain the same honor. They succeeded in producing paper just a few days after James Crooks, so close, in fact, that the Government rewarded their efforts by remitting the duty on the paper-making appliances which they had imported from the United States.

The subsequent history of the pioneer efforts is not recorded. Little development appears to have taken place until 1840, when the brothers Taylor erected a mill in the same neighborhood. This was expanded by the addition of a second mill two miles above the first, and later by a third. These mills manu-

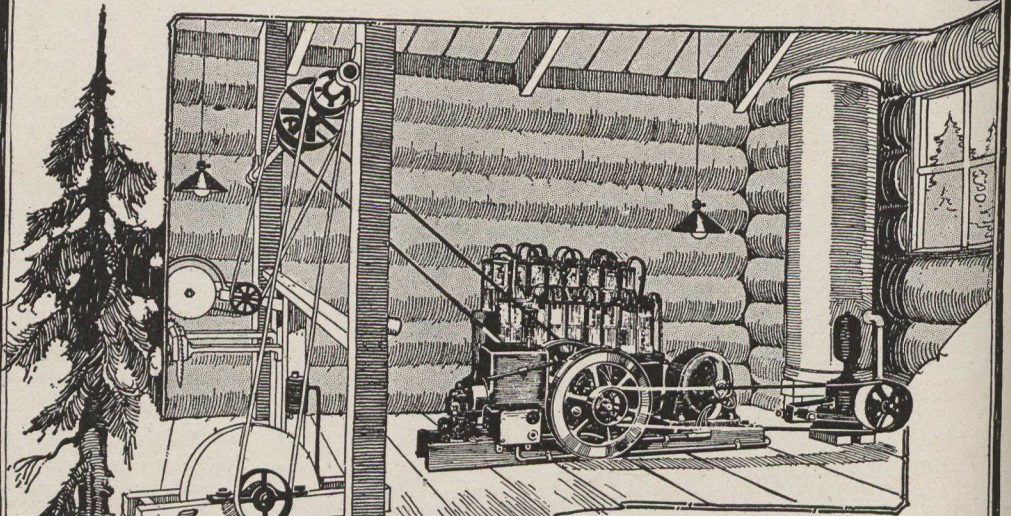
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Electric Light is convenient.
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It can be run by anyone and supplies current for 40 20-watt lamps.

The plant is compact, sturdy, portable and efficient; it can be taken anywhere that a wagon or sled can go.

The engine runs nine hours on a gallon of coal oil and develops 1½ horse power. The generating unit weighs but 500 lbs., the batteries 400 lbs.

A belt pulley is provided so the engine can run a pump, the grindstone, the saw gummer or any other light machine for the blacksmith's or repair shop.

Increase the efficiency of your men by adding to their comfort and providing them sharp tools to do their work.

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factured manilla, news and felt paper, respectively. Only one of them is in existence to-day. It is the flourishing property known as the Don Valley Paper Mills.

The establishment of the third mill in Upper Canada, in 1853, is notable for the fact that it marked the entrance of the Barber family into the paper industry, a connection which has lasted for more than half a century. This mill is standing in the same spot to-day, and is the Georgetown mill owned by the Provincial Paper Mills, Ltd. In 1858 a second paper machine was installed. It was supposed to be a marvel in efficiency. A story is told that when James Barber, who had charge of the paper-making end of the business, was informed that the new machine was running 100 feet a minute, he was so astonished that he would not be convinced until he had timed it with his own watch. It does not need much imagination to picture the growth of the industry when one contrasts this with the speed of to-day's machines, some of which run at a rate of from 600 to 1,000 feet a minute.

The Riordon Beinnings.

Established in 1857, ten years before Confederation, the Riordon Pulp and Paper Company, Ltd., forms an interesting chapter in the history of paper-making in Canada. It was in this year that John Riordon commenced business in Brantford, Ontario, as a trader in paper. In 1863 he took his brother Charles into partnership when they commenced the making of wrapping paper at Lock 5, on the old Welland Canal, at St. Catharines, Ontario. The mill capacity at that time was 1½ tons per day.

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Dead forests drive out population.

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- Brompton Pulp & Paper Co., Common (6%) Stock and General Mortgage 6% Bonds.
- Howard Smith Paper Mills, 8% Pfd. and Participating Stock.
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Forest fires drive out population. There are no jobs in dead forests. Canada has not one acre of timber to throw away.

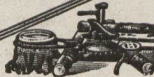
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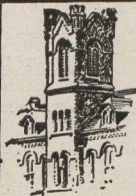
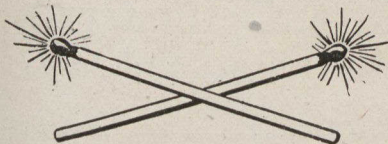
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In 1867 they built what was at the time regarded as one of the finest paper mills in America, at Levels 16, 17, 18, 19 and 20 of the Old Welland Canal, at Merriton. It had a daily capacity of ten tons of news and wrapping paper.

In the early '70's the Riordans were among the first on this continent to undertake the making of groundwood pulp, straw pulp and rags forming the raw material for newsprint paper prior to that time. In 1885, John Riordan died, and his son, J. G. Riordan, succeeded to his interests. It was at this time that Charles Riordan became the active head of the company. In 1887, Charles Riordan, in conjunction with the late Governor Russell of Massachusetts, brought the sulphite pulp process to America under patents of Dr. Kelner, of Vienna. The company built a sulphite mill of 30 tons capacity at Merriton, which is still in operation.

Turning once more to Lower Canada, it is found that the next paper mill was built at Portneuf, followed by one at Valleyfield, owned by Messrs. W. and

T. Miller, who afterwards sold it to the late Alexander Buntin. Mr. Buntin built extensive additions to the original mill, and installed in it the first wood-grinding machine on the North American continent.

In 1859 the firm of Angus Logan & Company was founded in Montreal, and shortly after this the company had in operation a small mill on the Magog River in Sherbrooke. This consisted of two cylinder machines turning out 2½ tons a day. It employed sixty persons. In 1866 they established a mill in the village of Windsor Mills, and shortly afterwards built what is claimed to be the first pulp mill in Canada. This would appear to be correct, the census returns as late as 1871 making no mention of pulp mills.

From this time on the progress of the industry has been steady and constant. The 1881 census showed Canada to have at that time five pulp mills, with a capital investment of \$92,000, employing sixty-eight people, and having an annual output valued at \$63,000.

? WET PAPER ?

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Windsor Mills, P.Q.

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In 1891, 24 mills were in operation with a capital investment of \$2,900,907, employing 1,025 persons, and with an output valued at \$1,057,10.

1901 and To-day.

In 1901 there were 25 mills with a capital investment of \$11,558,560, employing 3,301 people and with an output valued at \$4,246,781.

The most recent census, covering the year 1918, a complete digest of which follows, reports the existence of 37 pulp mills, 31 paper mills and 26 combined pulp and paper mills, a total of 94 mills, in operation. The total capital invested in the industry is given as \$241,344,704, of which \$12,520,765 is invested in paper mills exclusively. \$71,708,223 in pulp mills and \$157,115,716 in pulp and paper mills combined. By provinces Quebec leads in the amount of capital invested, with \$101,456,296; Ontario, \$88,576,807; British Columbia, \$42,705,988; New Brunswick, \$7,852,225; Nova Scotia, \$753,388.

The prairie provinces, Manitoba, Saskatchewan and Alberta, and the Province of Prince Edward Island are not represented in the industry. Tentative proposals have been made from time to time for the erection of one or more pulp and paper mills in Manitoba. An official statement furnished from that province for the purpose of this review says, "There are considerable tracts of pulpwood in different parts of the province, notably in certain sections of northern Manitoba not remote from the new Hudson Bay Railway. Projects for the erection of pulp mills or paper mills have been discussed at one time and another, and it seems more than likely that these will take some definite form in the near future, but as yet they have not gone so far as the incorporation of any company for this specific purpose."

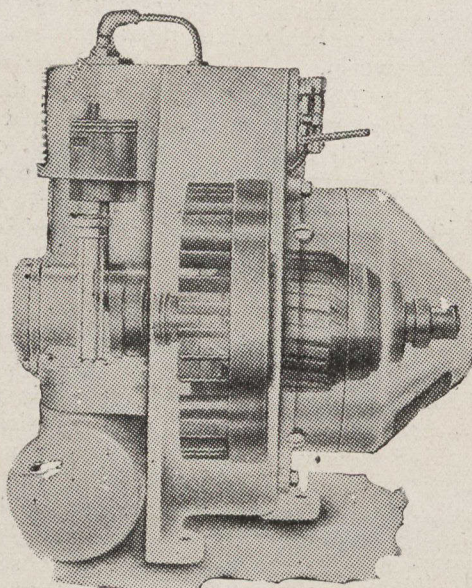
From the foregoing, it will be seen that Canada is to-day one of the greatest paper-producing countries in the world. It is probably destined in time to be the greatest. Canada's supremacy in this field rests upon the possession of extensive forest resources and adequate and abundant water-powers. The importance of the latter element may be

gauged from the fact that it takes practically 100 h.p. to make a ton of paper and that Canada's water-power development is probably the most economic in the world.

The great development of the industry, which has been a matter of comparatively few years, may be traced to several circumstances, not the least important being enactments by the Governments of the several provinces requiring pulp wood cut from Crown lands to be manufactured within the province; the growth in population and the spread of education which have increased the per capita consumption of paper in every civilized country; the great increase in the number of newspapers and periodicals, particularly on the North American Continent; the proximity of the United States with its rapidly growing population, its gradually diminishing supply of paper-making materials and its consequent increasing reliance upon other countries for its paper supplies, and lastly the improvement in paper-making processes, of which Canadian paper manufacturers have been among the first to take full advantage.

Spruce the Ideal Wood.

Rags were formerly chiefly used for the manufacture of paper, followed by straw, esparto grass, cotton waste and other substances. The Chinese, who are credited with originating the art of paper-making centuries ago, used both vegetable fibre and rags. They also used mulberry and other woods successfully in the production of pulp. Wood pulp is said to have been first used by the papermakers of Europe and America about the year 1860, but it was not until several years later that its use had become commercially successful. Out of the necessity of the time came the development of the chemical processes by which a good and cheap paper was evolved, but in the early attempts it was difficult to find the proper wood. Pine and poplar were tried, but without great success. The world was ransacked for wood better adapted for the purpose. Finally the chemist discovered that spruce and balsam were most suitable for the production of the ideal cheap paper and the difficulty was solved.

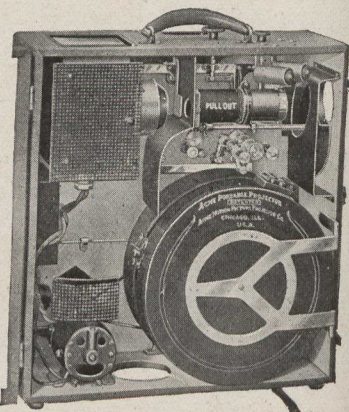


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