The JOURNAL of AGRICULTURE

AND HORTICULTURE

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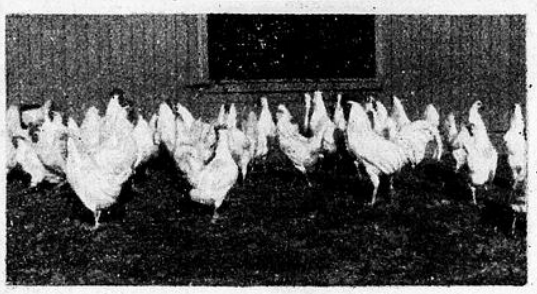
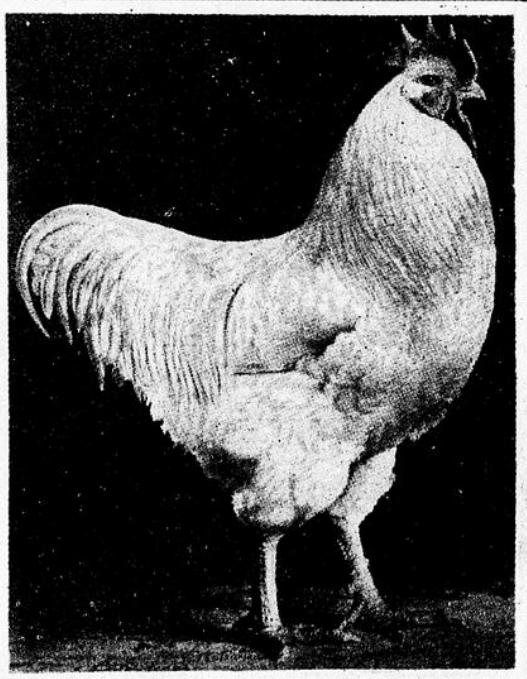


A Breeding Pen of White Leghorns

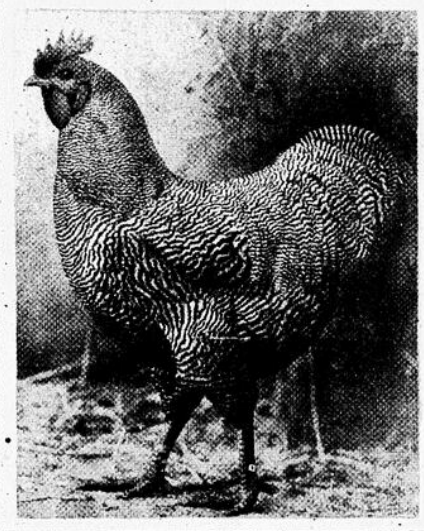
A Black Minorca Cock

A Breeding Pen of S.C. Rhode Island Reds

A Breeding Pen of Pekin Ducks

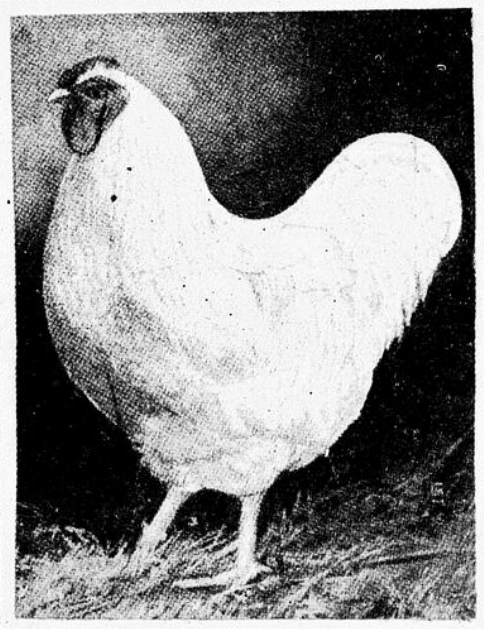


A White Plymouth Rock Cockerel



A Barred Plymouth Rock Cockerel

MONEY MAKERS ON THE FARM.



A White Wyandotte Cockerel

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against Death through Disease or Accident, Fire and Lightning. We issue the most liberal policies free from vexatious conditions and offer indisputable guarantee of solvency and square dealing.

We insure: Stallions, Track Horses, Draft Horses, In-Foal Mares, with or without insurance on the Foal; Cattle, Castration and Transit Risks, etc.

All kinds of Animals Insurance

Write us for further information and address of nearest agent.

THE GENERAL

ANIMALS INSURANCE COMPANY OF CANADA

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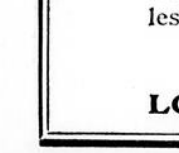
FREE-FARM ACCOUNT BOOK

Bickmore's Farm Account Book will be sent free to any farmer who will tell us who and where he is. This book is arranged to keep all accounts in simple form—more simple and certainly more practical than trying to remember them; shows what to charge against crop production; has a laborers' time record; and section for personal accounts. **64 pages, for ink or pencil.** Not a cheap affair. Its quality is in keeping with **BICKMORE'S GALL CURE,** a soothing, healing salve, the old time reliable horse remedy. Horses are now too valuable and too high priced to take chances of losing their services. Bickmore's Gall Cure heals and cures **Harness and Saddle Galls; Rope Burn, Cuts, Scratches, Grease Heel, etc.** You don't have to lay the horse off. **Bickmore's cures while the horse works.** Great thing for sore teats in cows. The work-horse trademark on every box. None genuine without it. Look for it when you go to buy and do not take a substitute. Farm account book is ready. No obligation. Send today.



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More Barrels from the Orchard
More Bushels from the Acre
More Baskets from the Plants

Spramotor

If you can get these results, it means more profit from your work and more money in your bank account.

There are three ways of tackling crop pests and diseases. You can sprinkle on the mixture in some make-shift way without a proper appliance, you can get one of the cheap, inferior machines or you can buy a **SPRAMOTOR** and get top-notch efficiency and results.

The **SPRAMOTOR** is a tested and proven machine that has won over a hundred First Awards and Gold Medals in competition with the world. It is used by the Canadian Government and by both State and Federal Governments in the United States. It will be found in India (where we ship in 200 lots) in Belgium, in the West Indies, in Finland and throughout the length and breadth of this continent.

Why We Can Guarantee SPRAMOTORS

Our aim is to make every **SPRAMOTOR** owner a booster of our machine. It is not enough for us to be convinced of the superiority of **SPRAMOTORS.** We want every buyer to feel that he has the best spraying outfit made. To ensure this result, we manufacture in our own plant every piece and part that goes into our machines, down to the smallest joint, coupling and nozzle. Every important part gets a thorough testing before being put into place and then we test each machine as it is completed.

Investigate the features of **SPRAMOTOR** that you can't find on any other machine—there are twenty of them, each rigidly protected by patents. You should know all about these facts.

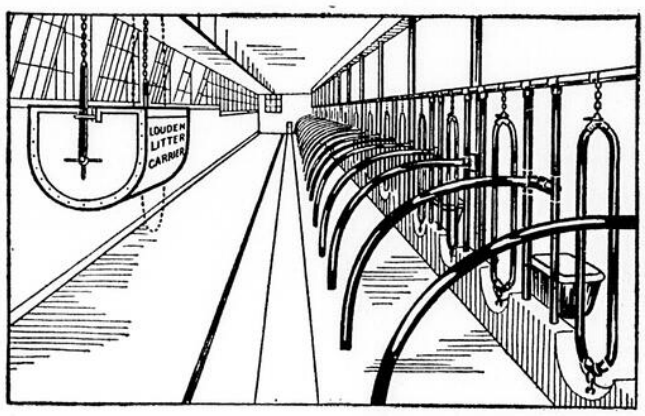
FREE Write us giving some idea of your spraying requirements and we will send you by return mail a copy of our valuable treatise on Crop Diseases (fully illustrated) without charge, also full inforn ation of a Spramotor that will do your work best, at lowest possible cost. Write us to-day !

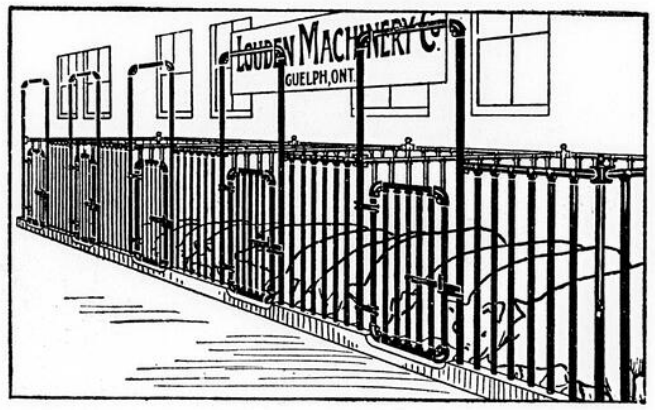
HEARD SPRAMOTOR LTD.,

1802 KING ST., LONDON, CAN.

LOUDEN

Sanitary Steel Stable Equipment





What it Costs and How it Pays

THE LOUDEN Sanitary Steel Stable Equipment costs no more — frequently less — than equipment made from lumber.

PAYS, because it is easily installed, because it is permanent, and because your cows will be cleaner, more comfortable, and easier to care for.

LOUDEN

Steel Stalls, Pens and Mangers

Better your stable conditions, lessen your labour, save your time, and benefit your cows. A stable is incomplete unless equipped the Louden way. Write to-day for catalogue and special plans for building or re-modelling your barn.

Our Architectural department will supply Free Barn Plans.

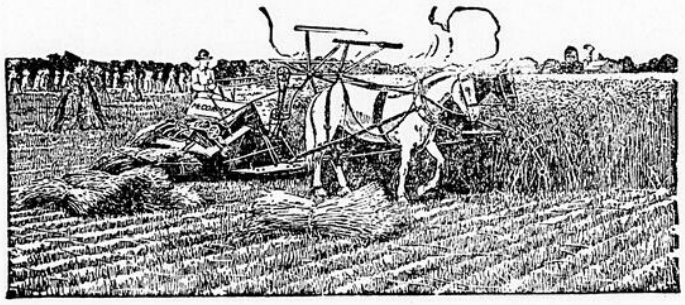
LOUDEN MACHINERY CO., Dept. 24 GUELPH **"Everything for the Barn"** (2)

Always Cures: Cold, Broken Wind, Colics, Ur ne Retention, Intestinal Worms.

Ask for the FREE VETERINARY BOOKLET published by

Dr. ED. MORIN & CO., LIMITED, QUEBEC, Can.

McCormick—The Binder of Satisfactory Service



HERE are some of the things that stand back of McCormick binder service.

On a McCormick binder the reel has a wide range of adjustment and handles successfully, tall, short, down or tangled grain. A third packer assists in handling grain that is full of undergrowth or that is very short. The bottoms of the guards are nearly level with bottom of the platform, allowing the platform to be tilted to cut close to the ground without pushing trash ahead of the knives.

The floating elevator on a McCormick binder handles grain in any quantity and does not clog. The cutter bar is built to use either smooth section or serrated knives. The improved McCormick knotter does good work without the usual close adjustments.

The McCormick local agent will explain these and other important features on the McCormick binders which are built especially to meet Eastern Canadian conditions. You can get catalogues from him, or, by writing the nearest branch house.

International Harvester Company of Canada, Ltd

Hamilton, Ont. London, Ont. Montreal, Que.
Ottawa, Ont. Quebec, P. Q. St. John, N. B.

These machines are built at Hamilton, Ont.

Black Cat Batteries

—cost less
—last longest

WHY? Because they have NINE LIVES!

They outlast all other batteries. Made in Canada by the oldest, largest and most reliable Battery Factory in the Dominion

CANADIAN CARBON CO. 3
Limited
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You Should Read the Studebaker Proof Book

The writer of these words has been reading and preparing business literature for a good many years.

But he has never read and (he is sorry to say) he has never written as convincing a book as this Studebaker Proof Book.

The Studebaker Proof Book is simply a volume of evidence—evidence of the value contained in the Studebaker car.

He feels impelled to urge you to send for it.

And if you do send for it, he is willing to venture a prediction.

He is going to predict that you will buy a Studebaker car.

Turn an X-Ray on the Car

Because he is positive that you will recognize immediately, as he did, that this book is a book of Truth—solid, convincing, substantial Truth in every word, paragraph and page, from cover to cover.

Take the Studebaker FOUR, electrically started and electrically lighted, at $1375.

This Studebaker Proof Book doesn't mention the Studebaker FOUR by name except in the concluding page.

But every fact cited, every detail described, every process pictured, gives you an intimate idea of how that FOUR is built.

It turns an X-Ray on to the car so that you can see its very vitals.

It makes you appreciate perhaps for the first time, how marvelous that price of $1375 actually is.

You Appreciate the Studebaker FOUR

You realize that it couldn't be sold for that price it if were not for the size and scope, and the scientific closeness of Studebaker operations which he describes.

You appreciate, as you travel with him through the plant, what it means to get in this $1375 Studebaker FOUR—no less than 247 drop forgings instead of malleable iron castings.

You discover that not only the vital parts, but even the lamp brackets, body irons, seat braces are of steel, drop forged and heat treated in the Studebaker plant.

It begins to dawn on you why the Studebaker FOUR is lighter and yet stronger that the great majority of cars of equal carrying capacity.

Then you realize that the magnificent long stroke small bore motor in the $1375 FOUR is not only Studebaker design, but very much more.

It is Studebaker-built, down to the casting of the cylinders, pistons and upper part of the crank case, in one of the finest — if not the very finest — foundries in the world.

You learn that Studebaker steel is steel indeed—that every piece that goes into the FOUR has at least from four to six heat treatments.

You Almost See the Actual Operations

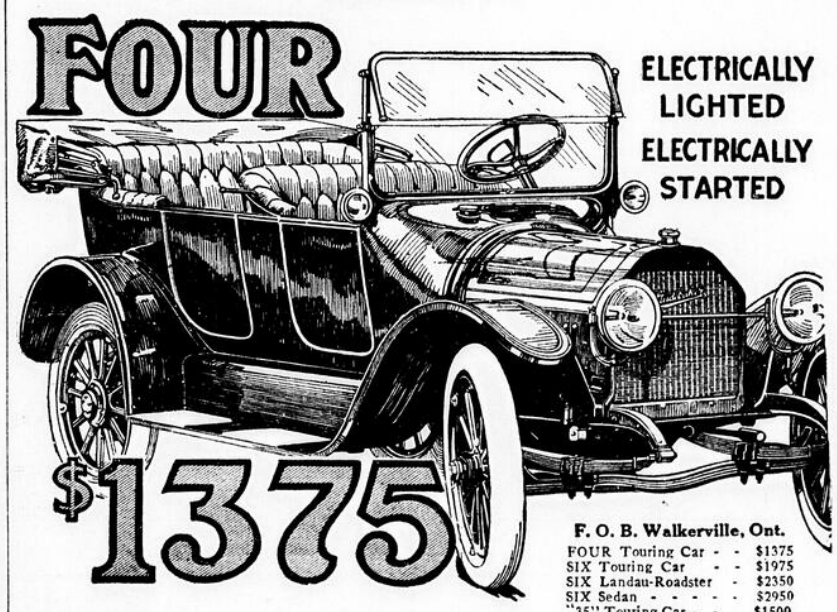
So step by step this graphic Proof Book takes you into shops, foundries, laboratories—shows you how the steel in the $1375 FOUR is tempered and tested for cam shafts, crank shafts, connecting rods, gear wheels, transmission shafts, etc., etc.

By word picture and photograph it describes the drastic test of Studebaker springs—the grinding and cutting of gears—a hundred things you ought to know, told in a way you can understand, and every word of which you will enjoy.

Trust the experience of one who has spent a lifetime studying business literature — this is a book worth having.

Studebaker will send it to you if you'll ask for it on a postal card.

The Studebaker Corporation of Canada, Limited
Walkerville, Ont.



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FOUR Touring Car	$1375
SIX Touring Car	$1975
SIX Landau-Roadster	$2350
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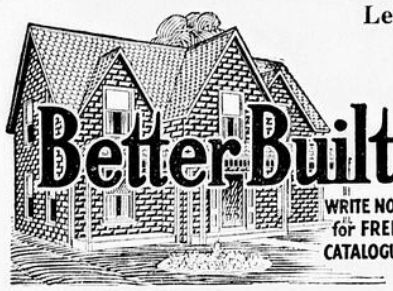
"35" Touring Car	$1500
Six Passenger SIX	$1800

Buy It Because It's a Studebaker



Learn the "Metallic" way-it means Dollars to you.

Better Built with "Metallic" Materials

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The only TOPIC replacing FLAME without pain nor hair falling. Quick an sure relief of: Halting, Swan - skins, Sprains, Strains, vessigons, obstruction of the lefs, Suros, Spavin, etc., etc.

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LAST DISTRIBUTION OF THE AUTOMATIC STITCHER OF "LE CANADA". DONT DELAY FOR THERE IS ONLY FEW DOZEN TO SPARE.

TO FARMERS !

THE St. Canut Dairy Co. is receiving all monday, wednesday and friday cream gathered by hand separators. For further information, apply to J. N. DION, Prop.-manager, St. Canut, Que.

CREAMERY FOR SALE. In the heart of the Eastern Townships. Flourishing business. Good profits. Nice buildings and plant. Fine house and stable. Make 125 boxes a week. Plenty ice and wood. Patrons two-thirds milk. Cheap for cash. Good reason for selling. Apply A.B. C. c.o. THE JOURNAL OF AGRICULTURE, 73 St. James St., Montreal, Que.

Peter, Peter, Pumpkin Eater,
Had a wife and couldn't keep her.
Better food in vain they sought,
Till Crown Brand Syrup Peter bought.
Now they eat it all the time
Think it great and say it's fine!

Crown Brand Corn Syrup

This pure food costs so little and goes so far that its merits should be known in every household. Spread it on bread when the kiddies want a "piece." Serve it with pancakes and fritters. Use it to sweeten puddings, pastry and cakes. ¶ Most delicious taffy and candies can be made with Crown Brand Corn Syrup.

¶ Our Free Recipe Book tells of numerous economies its use will effect in the kitchen. Send for a copy. Address Montreal Office.

PETER'S PUMPKIN PIE

1 Pint Milk.
3 Cups Strained and Dried Pumpkin.
1 Cup Sugar.
1 Cup Crown Brand Syrup.
3 Eggs (beaten separately).
One half saltspoon Salt
1 Tablespoon each Ginger and Cinnamon.

Beat all together until thoroughly mixed, and bake with under crusts only.

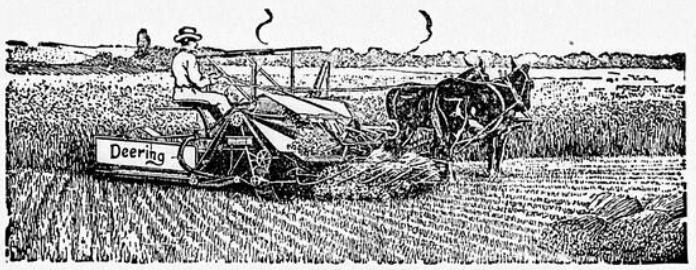
The Canada Starch Co. Limited

Manufacturers of The Edwardsburgh Brands

MONTREAL CARDINAL TORONTO BRANTFORD VANCOUVER

3

Deering New Ideal
A Money Saving Binder



THESE Deering binder features appeal to the farmer. The elevator, open at the rear, delivers the grain properly to the binding attachment. Because the elevator projects ahead of the knife it delivers grain to the binder deck straight. A third packer reaches up close to the top of the elevator and delivers the grain to the other two packers. A third discharge arm keeps the bound sheaves free from unbound grain.

The T-shaped cutter bar is almost level with the bottom of the platform and allows the machine to be tilted close to the ground to pick up down and tangled grain without pushing trash in front of the knife. Either smooth section or serrated knives can be used. The Deering knotter surely needs no recommendation.

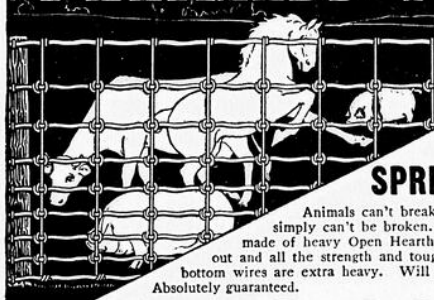
The Deering local agent will show why Deering New Ideal binders are the standard of binder construction. See him, or, write to the nearest branch house for a catalogue.

International Harvester Company of Canada, Ltd

Hamilton, Ont. London, Ont. Montreal, Que.
Ottawa, Ont. Quebec, P. Q. St. John, N. B.

These machines are built at Hamilton, Ont.

PEERLESS-PERFECTION



THE FENCE THAT'S STRONG--YET SPRINGY AS A BED SPRING!

Animals can't break through it no matter how hard their attacks. It simply can't be broken. Just springs back in shape like a bed spring. It's made of heavy Open Hearth steel galvanized wire with all the impurities taken out and all the strength and toughness left in. Will not corrode or rust. Top and bottom wires are extra heavy. Will not sag. Requires less posts than ordinary fence. Absolutely guaranteed.

Here's Proof of Our Statements

Read These Letters

Gentlemen:—I have handled your fence for four years and find it a good, strong, durable fence, and that the galvanizing is first-class. In referring to this I have a fence that I put on four years ago across a gully and the water is as high as the second wire and it is not rusted nor broken yet. I had a team of heavy horses that ran into your fence last summer and did not break or damage it in the least, and I am glad to say that in the four years I have handled your wire I have had no complaints about it. I remain,

Yours truly,
Bowesville, Ont. DAVID CUMMINGS

Gentlemen:—About four years ago a fence was put up of your make on one side of a road and I may say today it is just as good as ever it was. Now on the other side of the road is a fence put up at the same time, but not yours; it looked nice at the first, but today you would not know that fence or think it the same. It is both breaking down and rusted. This is just to show that your fence is the best and will wear and I think credit should be placed where it is due.

Yours truly,
Madford, Man. W. MADDER

These are but a few of the strong testimonial letters we have received from our thousands of satisfied customers. Maybe we have some from your vicinity. Ask us for them. We also make poultry fence, farm gates and ornamental gates. Remember our products are all absolutely guaranteed.

Send for catalog today. Agencies nearly everywhere. Agents wanted in open territory.

BANWELL-HOXIE WIRE FENCE CO., Ltd.,
Winnipeg, Man., Hamilton, Ont.

GRAIN AND SEED GRAIN

Our stock of **grain and seed grain** is completed. Please write for our prices before buying elsewhere.

SPECIALTIES for farmers' Clubs.

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Amatite ROOFING
Sample Free

THERE is a community near here that has found out all about Amatite. It began with a single farmer who wanted to roof a shed on his farm. He had heard that a new roofing had been invented which needed no painting. He found that its name was Amatite and he bought some and laid it. He found that it was just as easy to lay as the old-fashioned painted roofing, and it was sold in rolls with nails and cement supplies free as usual. And he found also that Amatite Roofing instead of costing more as might have been expected, actually cost less than other roofings of much less weight.

After the first winter, he noticed that the Amatite was exactly as good as ever, and after the second winter he was still unable to detect any change in it.

He has other roofings on his farm and he was accustomed to giving them a good heavy coat of paint every two years just as the manufacturers of those roofings urged him to do. He was glad that it was not necessary for him to paint the Amatite roof after the second year. It saved him money and trouble.

He began to tell his neighbors about Amatite, and the local dealer laid in a stock of it. Other farmers began buying it and had the same experience—the roofing gave faultless service year after year with no trouble whatever to the owners.

It is five years since the first Amatite Roofing was laid in that town. Now, Amatite is the principal roofing sold there. It has won its way on its merits.

If you would like to have a sample of Amatite Roofing just to see what the mineral surface is like, we will send it to you free of charge.

Address our nearest office.

THE PATERSON MFG. CO., Limited

Montreal Toronto Winnipeg Vancouver
St. John, N. B. Halifax, N. S. Sydney, N. S.

Are you anxious to save Time and Money on the Work you are doing on your Farm at present and to get Larger Crops from your Farm or Orchard? If so, let us send you Free of Charge our Pamphlets on the use of

STUMPING POWDERS

—USED FOR—

REMOVING STUMPS AND BOULDERS
DIGGING WELLS AND DITCHES
PLANTING and CULTIVATING ORCHARDS
BREAKING HARD PAN, SHALE or CLAY SUBSOILS, Etc., Etc.

Figure yourself what Clearing your Farm is costing now or what you are losing in crops through not clearing

Write Us About Arranging Demonstrations.

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MONTREAL, P. Q. CANADIAN EXPLOSIVES TRADE CXL MARK LIMITED **VICTORIA, B. C.**

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For Farm, Dairy or Creamery

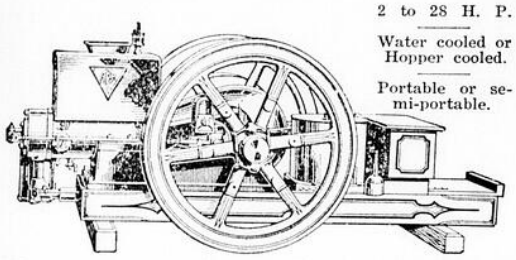
DE LAVAL equipment is first, last and always high grade and dependable and includes only such machines and supplies as are known to be absolutely reliable and "standard."

Ideal Green Feed Silos

IT isn't too early right now to plan for the erection of a silo next summer.

The more you investigate the advantage of having succulent silage to feed your cows all winter, the sooner you will decide to erect a silo; and if you thoroughly investigate the silo question you can scarcely escape the conclusion that the Ideal Green Feed Silo is the best silo for you to buy.

"Alpha" Gas Engines



2 to 28 H. P.

Water cooled or Hopper cooled.

Portable or semi-portable.

Uses all fuels.

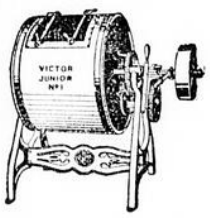
Easy to start. Equipped with magneto.

Develops full power.

The most convenient, reliable and economical power for the farm, dairy, creamery or shop

THE "ALPHA" Gas Engine is the highest grade and most reliable engine that you can buy for any purpose whatever; but on account of its simplicity of construction and reliability of operation it is unusually well adapted for farm use.

Dairy and Creamery Supplies



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THE DE LAVAL line of dairy and creamery supplies for milk dealers, creamerymen, cheesemakers, and dairy farmers is by far the largest and most complete in Canada. We handle nothing but high grade goods, and successful dairymen know that this is the only kind they can afford to buy.

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We issue catalogues of each line
Any of these mailed upon request

DE LAVAL DAIRY SUPPLY Co., Ltd.

LARGEST MANUFACTURERS OF DAIRY SUPPLIES IN CANADA

Exclusive Canadian distributors of the "World Standard" De Laval Cream Separators

MONTREAL PETERBORO WINNIPEG VANCOUVER

EASY Churning—

—churning that is more of a pastime than a labor. That's the kind of churning a MAXWELL'S "FAVORITE" does. The mechanism is so perfect—so smooth. And it gives splendid results.

THE *Maxwell*

"FAVORITE" CHURN WITH BOW LEVER

is used in thousands of dairies—in Canada—Australia, New Zealand, S. Africa and Denmark. It produces butter with a minimum of effort. Used in Agricultural Colleges. Praised by Government Inspectors as the finest butter maker in the world.

Get your dealer to demonstrate the unique features of the MAXWELL "FAVORITE" (with Bow Lever)

MAXWELL LIMITED, - St. Mary's, Ontario.

Adjustable handle—moveable to centre, right or left, as desired.

Strong light steel frame.

All roller bearings. (not ball)

Dark oak finish with gold bronze hoops.

Sold in eight sizes.

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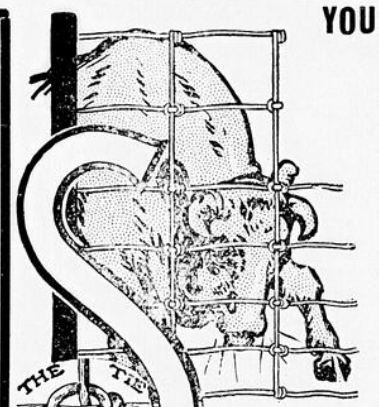

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We are selling fence this year at lower prices than ever before.

The saving you will make on buying even a small order from us, will positively astonish you.

Don't even think of ordering elsewhere until you have received our quotations.

Write now. Tell us the amount you require. We surely can save you money—and we will. What you want is good high grade fence—cne that you can depend upon—for a low price.

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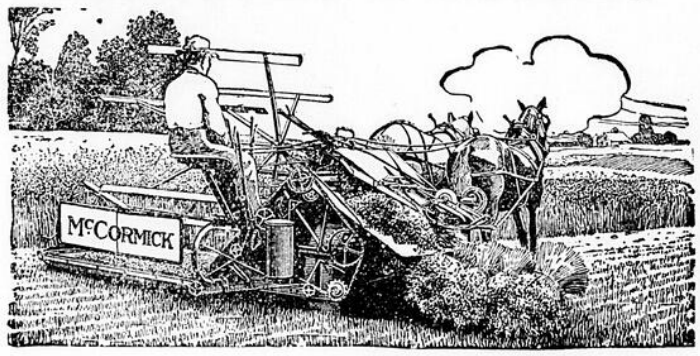
FOR SALE.—Pigs, Yorkshires, all ages, Chester White, farrowed in March, Leicesters Sheep. Apply FELIX PREVOST, Varennes.

McCormick Binders



MANY years of McCormick binder experience have brought out the strong points of the machine and enabled the builders to devise features that make the machine still more efficient and satisfactory. There are a number of such features on McCormick binders, features which insure a complete harvest of the grain, whether it be short, tall, standing, down, tangled or full of green undergrowth.

For Eastern Canadian fields the McCormick binder is built with a floating elevator which handles varying quantities of grain with equal facility. The binder guards are level with the bottom of the platform so that when the machine is tilted to cut close to the ground there is no ledge to catch stones and trash and push them ahead of the binder to clog the machine. These are features you will appreciate.

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AND
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31

S E E D S

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This is the washer that lifts the burden off washday. No rubbing—no bending over hot, steamy tubs. Get a Maxwell High-Speed Champion and have your washing done in *half the time!*

6

Enquire at your Dealers' about our Washers for Water, Electric or Gas Engine Power.

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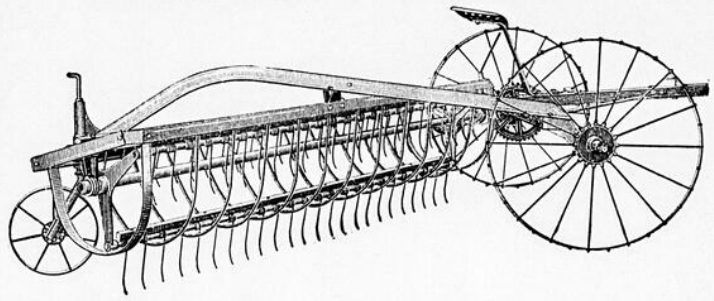
In return for one little drop of oil, he'll work for you a full year. From "Boots on" to "Lights out"—365 times—he'll guarantee to tell you the time o'day with on-the-dot accuracy.

He'll guarantee to get you up either of TWO WAYS—with one long, steady, five-minute ring if you need a good big call, or *on the installment plan*, with short rings one half-minute apart for ten minutes, so you'll wake up *gradually*, and he'll stop short in the middle of a tap during *either* call if you want to shut him off.

Big Ben is a mighty pleasant looking fellow. His big, open honest face and his gentle tick-tick have earned him a place in thousands of *parlors*.

The next time you go to town call at your dealer's and ask to see Big Ben. If your dealer hasn't him, send a money order for $3.00 to his makers —*Westclox*, *La Salle*, *Illinois*—and he'll come to you prepaid.

International Harvester Haying Machines



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NO matter how you handle your hay crop after the mowing is done, whether with rake, tedder and loader, side delivery rake and loader, or sweep rake and stacker, the best machines for your work are those that are sold under the International Harvester trade mark.

I H C local agents sell these machines. It is to their interest to see that your hay is put into the barn or stack in the best condition, regardless of weather or accident. When they sell you an I H C tedder, side delivery rake, self or hand dump rake, stacker, sweep rake, loader, combined sweep rake and stacker, they sell you a machine that you can depend upon, that will give you perfectly satisfactory service.

Write the nearest branch house and we will direct you to the nearest agent handling our machines, and will also send you interesting catalogues describing any one of the above machines you may be interested in.

International Harvester Company of Canada, Ltd.

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STRAIGHT PIPE (Briar and Amber).
CROOKED PIPE (Briar and Amber).
AUTOMATIC STITCHER (always ready).

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ROCK CRYSTAL, beads with golden setting.
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All matters relating to the reading columns must be addressed to Prof. W. Lochhead, Macdonald College P. O., P. Q.

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EDITORIAL

To the Secretaries of Agricultural Societies and Clubs

LISTS OF SUBSCRIBERS TO THE JOURNAL OF AGRICULTURE

IMPORTANT NOTICE

TO prevent any irregularity in the delivery of the "Journal of Agriculture" to the members of Agricultural Societies and Clubs, you are earnestly requested to inform us as soon as possible of the changes occurring this year among the members on your respective lists; that is to say, the names and addresses to be added or left out.

Until you inform us of these changes the Journal will be distributed according to the old list of subscribers.

The list of the names to be added or cut out must be forwarded before the coming month of July, the date of the next subscription year of this Journal, to Mr. OSCAR LESSARD, Sec., Council of Agriculture, Dept. of Agriculture, Quebec.

AGRICULTURAL MERIT COMPETITION FOR 1914

District No. 5

OFFICIAL NOTICE

THE Agricultural Merit Competition will take place this year, 1914, in District No. 5 of this province, including the folowing counties:—

Charlevoix, Chicoutimi, Lac St-John, Montmorency, Portneuf, Quebec and Saguenay.

Farmers wishing to take part in this competition may make application to the Minister of Agriculture at Quebec, from now up to June 15th at the latest, on blank forms supplied by the Minister for that purpose.

No applications received later than June 15th will be considered.

Winners in this district of the Silver Medal and the Diploma of Very Great Merit in 1909 have also the right to compete this year for the Gold Medal and the Diploma of Highest Merit.

FREE ASSISTANCE IN UNDER-DRAINAGE

THE Department of Agriculture of the Province of Quebec is prepared to make drainage surveys of farms and to furnish drainage plans, based upon such surveys.

Those wishing to take advantage of this offer should apply to Mr. J. Antonio Grenier, Secretary of the Department of Agriculture, Quebec, for a form of application. Applicants must undertake to board and lodge the drainage expert during his stay and to provide him with the necessary assistance for his work. There is no charge for the services of the expert.

AGRICULTURE AND THE CHURCHES

ONE of the signs of renewed interest in rural welfare is the greater attention given to agricultural matters by the churches. The recent publication, "Rural Life in Canada" by the Rev. John MacDougall of Spencerville, Ontario, a book reviewed in this Journal some months ago, calls attention to the crying needs of the majority of the English-speaking country communities, and places the rural problem clearly before the public.

It may be of interest and profit to our readers who are mainly English-speaking and non-Catholic to know that the Catholic Church gives greater effective aid to agriculture in Quebec than the Protestant Churches. This is a fact which may readily be proven, and is not in any way controversial. Ever since 1894—twenty years ago—an association called "the Agricultural Missionaries" has been in existence, and is composed of one or more parish priests selected by the Bishop of the diocese to give special attention to the interests of agriculture amongst the farmers. These missionaries preach both agriculture and the Gospel. All phases of agriculture are dealt with, and in the last Report (6th) covering the work of the Association for three years we find that 770 Agricultural Circles were visited by the missionaries or their deputies and 145,250 farmers benefited by their instruction.

Besides the work of this Association most of the rural priests take a great interest in agriculture and help along all movements originated by the provincial department of Agriculture. In fact from the time of the early settlement of the province the priests have indentified themselves closely with agricultural progress.

A feeling is arising among the non-Catholic Churches that the pastors or ministers should be sufficiently acquainted with agriculture to understand the conditions under which the farmers work. It is beginning to be recognized that religion is a seven-day affair and that the ministers who take an active part in the everyday work and community life of their charges exert a more effective influence for good than those who merely meet their people on Sundays. The spirit of the Catholic agricultural missionaries is needed to solve the country church problems.

Allusion has been made in previous issues to the splendid work of some of our rural pastors who realized that their greatest and most enduring work was done through their active interest in agriculture. A fine field of work lies open to men from our theological schools who are equipped to combine the functions of country preacher and rural missionary.

RECENT CANADIAN TARIFF CHANGES

AN announcement of tariff changes of considerable interest to Canadian farmers was made by the Finance Minister in his recent Budget speech. A reduction from 17½ per cent. to 12½ per cent. duty was made on mowing machines, harvesters, self-binders and reapers, and parts for traction ditching machines made free. The request of the Western wheat growers to remove the duty on wheat and flour coming into Canada in order to obtain free entry into the United States market for Canadian wheat was refused.

CO-OPERATIVE BANKS FOR FARMERS

IN working out a system of co-operative agricultural credit and thus solving one of the most important business problems of modern agriculture, the Province of Quebec may justly claim leadership among the provinces of the Dominion. The initiative in this direction was taken by Mr. Alphonse Desjardins, who in 1900 founded the "People's Bank"of Levis, modelled upon similar institutions in Europe but adapted to Canadian conditions. The work received the support of the Provincial Government and in the thirteen years which have intervened no less than 122 similar banks have been established in this province, as well as 19 in the French-speaking communities of Ontario and 23 amoung the French-speaking people of the New England States. The plan has had phenomenal success, absolutely no losses having been yet sustained. Such a plan deserves to be studied and adopted by English-speaking rural communities.

The co-operative bank is an association of neighbours who put their savings into a common fund and who can borrow from that fund upon furnishing security, both moral and material, satisfactory to a committee of their own election. The liability of shareholders is limited to the amount of their subscribed shares. Shareholders may withdraw their holdings upon short notice, ordinarily one month.

The work of the bank is carried on by a general manager and three committees. One of these committees, the Council of Administration, controls the admission of new members, the transfer and withdrawal of shares, the engagement of the general manager, and the general interests of the bank. A second, the Credit Committee, determines the amount of credit to be allowed each member and decides upon all applications for loans. Loans are granted only upon the unanimous vote of this committee. The small area to which membership is restricted — a parish or township — enables the committee to obtain accurate information about every applicant for a loan. The members of the committee themselves are ineligible for loans. The third committee, called the Committee of Supervisions, audits the accounts and

THE GARDEN AND ORCHARD

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FARM AND FARM CROPS.—Cultural Results with Alfalfa at Macdonald College; Underdrainage; Some Experiences in Farm Drainage; Roots; Fodder for July and August; Quicksand in Well; Water Pipes under Road; Treatment against Oat Smut.

LIVE STOCK.—The Sheep Tick; Shearing; Relation between Live Weight and Performance in Cows; Record of Performance Test.

DAIRY.—Wholesale Milk Prices in Canada; City Milk Supply; The Bacteriology of Cheddar Cheese.

POULTRY.—Incubation; The Proper Way to set Hens; Turkey Nests; Poultry Notes; Annual Meeting of Poultry Authorities.

WOMAN'S WORLD.—The Spring Hats; Foods and Food Preparation; How to put away Last Winter's Suit; The Children's Homer.

GENERAL INTEREST.—Standing Crops, 1913; Dairy Value; Trees; Annual Meeting of the Quebec Society for the Protection of Plants;

NOTICE TO SUBSCRIBERS

Subscribers and members of agricultural societies, of farmers' clubs and of the Provincial Dairymen's Association, who do not regularly receive either the English or the French Journal of Agriculture and Horticulture are requested to address their complaints to the Secretaries of their respective Societies, who will transmit them to the Secretary of the Council of Agriculture at Quebec.

SUBSIDY TO SOCIETIES BUYING SPRAYERS

Official Notice

THE entire farming population of this Province, fruit growers especially, are aware of the damage done to trees by caterpillars, insects and fungous diseases.

Spraying is one of the best means of preventing these diseases and arresting their spread.

In order to encourage fruit-growing, the Government offers to all agricultural associations consisting of at least ten members, such as agricultural associations, farmers' clubs and co-operative associations purchasing sprayers, a subsidy equal to one-half the price paid in cash for the purchase of one or more of such machines, provided such half does not exceed $15 for each sprayer with fittings.

The Department of Agriculture has made arrangements with two companies manufacturing sprayers: the "Niagara Brand Spray Company, Limited", Burlington, Ont., and the "Spramotor Company", London, Ont., which will give a discount of from 10% to 25% on the current price of sprayers sold by them to agricultural associations of the Province of Quebec.

To be entitled to this subsidy, application therefor must be made to the Department of Agriculture which will give information respecting the formalities to be observed.

Quebec, April 3rd, 1914.

JOS. ED. CARON

Minister of Agriculture

CLASSIFICATION OF MAPLE SUGAR AND SYRUP ACCORDING TO QUALITY

IN consequence of an arrangement made between the Minister of Agriculture for the Province of Quebec and Messrs. Gunn, Langlois and Company, Ltd., of Montreal, all manufacturers of maple sugar and syrup in the province who can produce an article of good quality may send their products to Messrs. Gunn, Langlois & Co., Ltd., where these products will be classified by an employee of the Department of Agriculture. Those sending products should state upon the bottles that they are for "classification".

Thanks to this advantageous offer, it will be possible to find out and make known the names and addresses of the best syrup and sugar makers in the country.

Quebec, April 17th, 1914.

NEW FRUIT COMMISSIONER

CANADIAN fruit growers will not be surprised to learn that Donald Johnson of Forest, Ontario, has been appointed to the commissionership of the New Fruit Division at Ottawa. Editorially on January 8th, 1914, the Farmer's Advocate expressed itself in favor of a separate Fruit Division, whereas, up till recently, that department of the agricultural work has been supervised by the Dairy and Cold Storage Commissioner.

Donald Johnson, Esq. appointed fruit Commissioner at Ottawa

The new arrangement will give prominence and satisfaction to Canadian fruit growers as will the appointment of such a capable head of the Department as Mr. Johnson. The new Commissioner has every qualification for the office. Born 36 years ago on the Johnson farm at Forest, Mr. Johnson became active in the horticultural work at sixteen years of age and for a number of years served as foreman and head packer. Ten years ago Mr. Johnson became interested in the co-operative movement. He took a leading part in the organization of the Forest Fruit Growers' Association, (one of the first in Canada) and was for six years their president and manager. He has been president of both the Co-operative Fruit Growers' of Ontario and the

has the power of suspending the operations of the institution in an emergency.

Loans are made at a reasonable rate of interest —about six per cent.—and interest at four per cent. is allowed upon deposits.

A reserve fund amounting to not over twice the general assets of the bank is built up by imposing a tax of twelve cents on each $5.00 share purchased and setting aside 20 per cent. of the net yearly profits. In addition there is a Provident Fund, limited to the amount of one-half the general assets, and built up by setting aside 10 per cent. of the net yearly profits. The remaining 70 per cent. of the net profits is distributed in dividends.

A system of this kind provides capital for the progressive farmer who desires to underdrain his land, to put up new buildings or to make other permanent improvements. He can make much more reasonable terms with his neighbours to whom he is well-known than he can with the authorities of the commercial banks, to whom he is a stranger. Banks of this nature serve a most useful purpose in promoting the material interests of rural communities. May their number increase!

PRICES STEADY

THE Department of Labour's Index Number of Wholesale prices rose slightly in March, standing at 136.7 as compared with 136.1 in February and 136.0 in March, 1913. The more important increases occurred in grains and fodder, animals and meats (especially in poultry), canned salmon, apples, beans, potatoes, flour, oatmeal, beef hides, and muskrat skins. Important decreases occurred in eggs, jute, brass and lead, and in some grades of pine. In retail prices, beef, veal, bacon, flour, beans, prunes, and potatoes were upward while there was a general decline in eggs, and butter showed a downward tendency.

Ontario Fruit Growers' Association and has always been identified with any movement for the extension or improvement of the industry. Mr. Johnson has a world-wide knowledge of all phases of the fruit industry. His practical and business experience will stand him in good stead in his new office, where the results of twenty years' experience in the business will be used to the benefit of Canadian growers. The Minister of Agriculture is to be congratulated upon securing the services of such a competent man as Donald Johnson as Fruit Commissioner for Canada.

Farmer's Advocate

TENT-CATERPILLARS

EVERY person remembers the scourge of tent-caterpillars last year. It is probable that outbreaks will occur this year, but in all likelihood they will not be so severe, owing to the operation of certain natural causes, such as diseases and parasites. It is well, however, to be prepared for the worst.

The eggs will hatch this month, and the caterpillars if left alone will feed for about a month and do much damage to the young leaves and buds.

The egg-masses which encircle the twigs are readily recognized at this season of the year and should be destroyed. Every egg-mass destroyed means the destruction of 200 to 300 caterpillars.

As soon as the caterpillars make their appearance they should be sprayed, if possible, with an arsenical such as paris green (⅓ lb. to 40 gallons) or arsenate of lead (2 lbs. to 40 gallons). While young and small the caterpillars are readily killed, but when large they are easily destroyed by spraying. Where spraying is impracticable the tents or nests of caterpillars should be taken down and destroyed.

Last year many trees free from caterpillars were invaded from adjoining infested properties and much damage done. In such cases a band of tar, five or six inches broad, about the trunk a few feet from the ground prevents invading caterpillars from ascending.

W. L.

QUEBEC THE PIONEER

QUEBEC was the first province to have a co-operative forest protective association. The results of two years' operations were so satisfactory in the original association covering the St. Maurice Valley that now a new organization has been formed, which will cover a large section of the province between the St. Maurice and Upper Ottawa. This brings the co-operative plan up to the borders of Ontario, and if it proves again successful it will doubtless cross the Ottawa River into Ontario.

Canadian Forestry Journal

HIGH-PRESSURE BEE-KEEPING FOR THE SPRING

THE object of keeping bees is to produce honey as everybody knows. To produce honey it is necessary to have populous colonies at the commencement of the honey-flow, strong with vigorous worker bees so that it may be pushed to the utmost. Bee-keepers of practical experience make use of various methods of forcing their bees to breed artificially in the spring so that when the crop-producing honey-flows begin their bees will be in the best possible shape to take advantage of them. The most practical and successful of these methods is to stimulate a natural honey-flow by feeding sugar syrup in the spring before the usual spring honey sources begin to produce. White granulated sugar is dissolved in warm water in the proportion of 1 to 1 by bulk and is fed daily to the bees in such quantities as they can take up in the twenty-four hours. The ideal time to begin stimulative feeding would be just previous to the time when pussy willow or soft maple comes into blossom.

The pussy willow and the soft maple are about the first to furnish the bees with the pollen necessary for feeding the young bees. When pollen is not coming into the hive from some source it is not advisable to practice stimulative feeding as honey and pollen are the two prime requisites in brood rearing. By stimulative feeding the queen is induced to lay more eggs, these in turn furnish the hive with an every increasing number of young bees, vigorous and strong to take care of the surplus-producing honey-flows which in most localities begin during the latter part of June.

It is not necessary of course to continue this stimulative feeding after the time when the bees begin to secure honey from natural sources, of which apple blossoms will be the earliest of importance. The object of stimulative feeding is to hasten brood-rearing instead of waiting for the natural sources to begin.

HARRY W. JONES,

Bedford, Que.

CONSUMERS' EXCURSION TO THE MAPLE WOODS

ON April 5th an excursion train on the Canadian Pacific railway carried about three hundred Montreal and Westmount consumers to Foster and Knowlton. At the former station a demonstration of the making of maple syrup and sugar was given on the farm of Messrs. Gunn, Langlois & Co., Ltd. Syrup was made in the ancient way in an iron kettle over an open fire and also in the modern way in a sugar-house upon a Champion evaporator operated by an expert syrup maker, Mr. C. Stafford of the Grimm Manufacturing Company, Montreal. Maple taffy was eaten in the woods in the good old way and on the train a present of a bottle of syrup and a cake of sugar was given to each household represented in the party. At Knowlton a public meeting was held at which brief addresses were made by Judge Lynch of Knowlton, Principal Harrison of Macdonald College who occupied the chair, Mr. A. L. Gareau of the Provincial Department of Agriculture who was present as the representative of the Hon. J. E. Caron, Mr. John I. Brown, Assistant Manager of Messrs. Gunn, Langlois & Co., Ltd., Mr. John H. Grimm of the Grimm Manufacturing Company, and Prof. J. F. Snell of Macdonald College. A motion calling upon the Dominion and Provincial Governments to take more vigorous measures to protect the interests of producers and consumers of maple syrup and sugar, moved by Mr. A. K. Cameron of Montreal, seconded by Mr. H. Sewell Foster of Knowlton and supported by Mr. W. B. Wood of Montreal was unanimously adopted. The hearty thanks of the party were tendered to Mr. John I. Brown, who had organized the excursion.

HOTBEDS AND COLD FRAMES

GARDENERS are accustomed to the use of hotbeds and cold frames which in some cases are used very largely. There are many other persons, however, who might profitably use one or more if they knew how easy they are to handle. Of course they require constant attention and watching to keep the plants from being 'drawn' by too much heat or to keep them from being stunted by too cold weather.

In a hotbed the heat is supplied by manure which should be, preferably, fresh horse manure. The manure requires to be piled in a fairly compact pile to allow of 'heating', and as it heats it is desirable to turn it or re-pile it so that the heating takes place uniformly throughout the pile. It requires from one to two weeks to get fresh stable manure ready for the hotbed. The quantity of manure required depends on the time at which the bed is made and also to a certain extent on the plants to be grown in the bed. About one foot to ten inches of freshly heated manure is quite sufficient from the twentieth of April on.

In putting up a hotbed the work must be done as rapidly as possible to conserve the heat in the manure, and as soon as the frame is placed on the manure about three or four inches of good soil should be put in and the glass immediately placed on the frame. It is well to have the manure extend for a foot all around the frame and banked up somewhat, as this tends to keep a uniform temperature in all parts of the frame.

The size of the frame is immaterial. It is usually made to fit the sash. A standard sash is 6ft. x 3ft.; and a standard frame is made large enough to require four sashes; however, the frame may be just large enough for one or more sashes, or the sash may be any other size than 6ft. x 3 ft. Occasionally storm windows are made use of, but of course a standard sash is the most serviceable, and these cost about $2.25 to $2.75 apiece. The frame should be made of inch boards, and the back should be three or four inches higher than the lower or front side; the frame should be set facing the south. This allows more sunlight to enter, and also the water will then run from the glass. There should be no large cracks or holes in the frame or glass as this will let in cold from the outside; the tighter the sash fits to the frame the greater the protection to the plants or seeds.

In a cold frame we have no heat except that supplied by the sun, and the frame and sash are for protection to the growing plant. In a cold frame the temperature may be from six to twelve degrees higher than that outside. Cold frames should be well banked up with earth on the outside. They are only used late in the spring and principally for 'hardening off' plants before setting them in the field. Plants may remain in these frames for three or more weeks.

During very cold nights the plants in both cold frames and hotbeds may need special protection. This is best given by the use of some mats or blankets, or even old carpets. In case of sudden cold spells strawy manure or even soil may be used over the glass.

During the day, especially on bright warm days, attention must be given to ventilation. If the soil and air become too warm the plants may be 'drawn', that is, long and leggy and soft; if too cold the plants may be stunted in their growth. Ventilation is given by raising a sufficient number of sashes, or even on warm days removing the entire sash, but it must be put on again in the evening. How early, depends on the day and the prospects for the night.

It is best to water the plants or seeds when they need it just before noon, and no more water than is necessary should be given. A good watering is better than several light sprinklings.

Hotbeds and cold frames are valuable for the growing of lettuce, radishes, cucumbers, etc., earlier than they can be grown outside. Also for the starting of tomato plants, egg plants, peppers and melon plants, and they are indispensable where one does not have a greenhouse.

T. G. BUNTING

DESIRABLE VARIETIES OF VEGETABLES FOR THE PROVINCE OF QUEBEC

AT this season of the year large quantities of vegetable seeds are ordered from the seed firms and to the professional gardener who has been engaged in gardening in previous years this ordering of seeds does not offer any serious

difficulties. However, there are always many amateurs who are ordering for the first time, or at least some that are not familiar with the different varieties that are offered by the different seed firms. To such, a seed catalogue is more or less puzzling, largely due to the fact that any seed firm will offer for sale many varieties or strains of the different vegetables, and the question arises: which are the best of this long list of varieties? The descriptions of the new introductions, or "novelties" as they are called, are given a prominent place and much more space than the standard varieties in order that they may be put before prospective buyers in a way to attract attention. The standard varieties are better known and require less space in describing them and often have not a prominent place in the catalogue.

The following list of vegetables is given to aid those who are not very familiar with the varieties. Although nearly complete so far as the good varieties are concerned this list will be found to contain only those varieties which have proven satisfactory in the past. Do not attempt to grow too many varieties. Often one variety of a kind is sufficient, but where it is desired to lengthen the season two or three varieties can be grown to advantage, as in the case of tomatoes, peas, beans, etc. In this list the varieties are given in order of ripening, that is, the earlier varieties are placed first. Practically all the varieties here recommended can be obtained from any of the reliable seed firms, but do not obtain vegetable or flower seeds from a druggist or grocer. Frequently these seeds are old seeds, and although sometimes they may be satisfactory, more often they will not be satisfactory, either from the germination standpoint or from the plants they will produce.

Asparagus:—Argenteuil; Palmetto.

Beans:—Early Red Valentine, Stringless, Green Pod, Early Refugee, Davis Kidney Wax, Keeney's Rustless Wax, and Wardwell's Kidney Wax (golden pod); Lima Beans, Henderson's or Burpee's Bush.

Beets:—Egyptian, Early Eclipse, Half Long Blood, Detroit Dark Red, Crimson Globe.

Brussels Sprouts:—Improved Dwarf.

Carrots:—French Market, Chantenay and Danvers Half Long.

Cauliflower:—Extra Early Erfurt, Early Snowball, Dry Weather.

Cabbage:—Copenhagen Market, Jersey Wakefield (very early), Early Spring, Succession (medium); Autumn King; Danish Roundhead (late); Danish Ballhead (late); Red Dutch.

Celery:—Paris Golden Yellow, Perfection Heartwell and Evans Triumph.

Corn:—Peep O'Day, Malakoff (very early), Early Cory (early), Golden Bantam (an excellent table corn), Crosby's Early, Metropolitan (medium), Country Gentlemen (late). Stowell's Evergreen.

Cucumbers:—White Spine, Arlington White Spine.

Lettuce:—Grand Rapids, Unrivalled, and Boston Market.

Melon, Musk:—Paul Rose, Montreal, Rocky Ford and Hackensack.

Melon, Water:—Cole's Early.

Onions:—Yellow Globe Danvers, Large Red Wethersfield, Mammoth Silver King (White), Prizetaker (for transplanting).

Parsnips:—Selected Hollow Crown.

Peas:—Alaska (very early), Thomas Laxton and Gradus (early), Admiral Dewey, Heroine (medium), Stratagem, Juno, Telephone.

Radish:—French Breakfast, White Icicle, Early Scarlet Turnip.

Spinach:—Victoria.

Squash:—English Vegetable Marrow (summer, fall and winter), Hubbard and Golden Hubbard (winter).

Tomatoes:—Earliana and June Pink, Bonny Best (early), Chalk's Jewel (medium), Trucker's Favorite, Livingstons Globe, Plentiful (late).

Turnips:—Golden Ball, Extra Early Milan.

Swede Turnips: — Westbury.

T. G. BUNTING

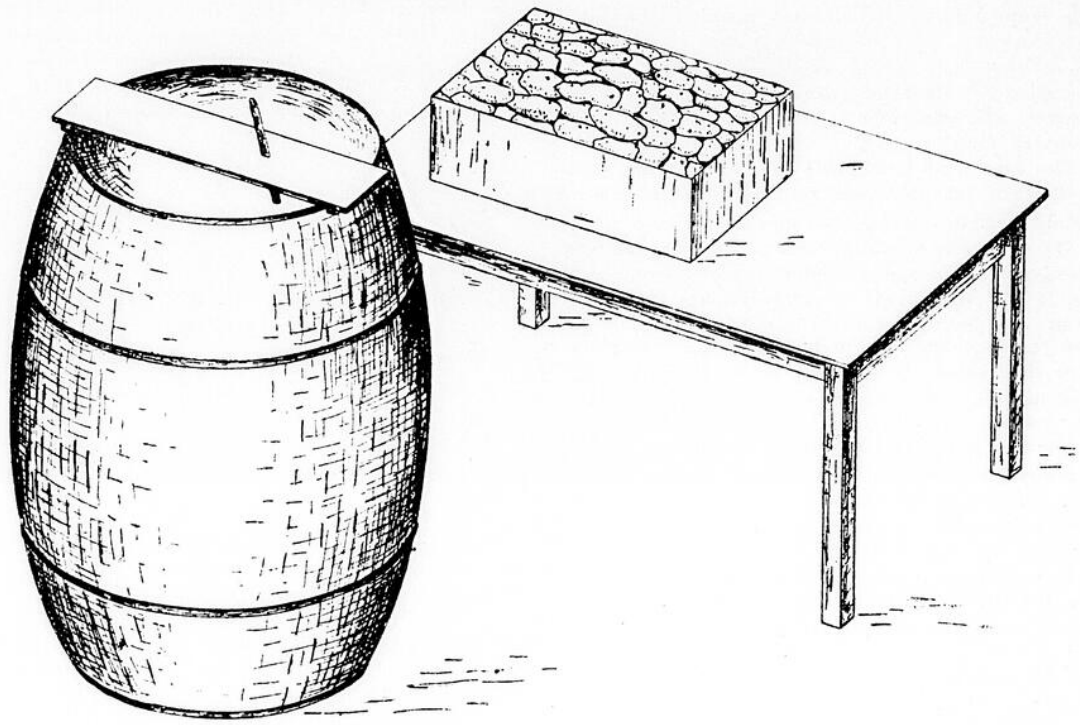
HANDY POTATO CUTTER

Time and Labour may be Saved and Work will be Better Done

TWICE the amount can be cut in a given time and the sets will be more evenly divided, if the easily made potato-cutter depicted in the drawing shown herewith, is used instead of the old method of cutting with the knife held in the hand.

All that is required is to fasten a one-inch board, six inches wide, planed on the upper side, to the top of a barrel or box, holding it on tightly by two deep cleats. A long, sharp, thin tableknife is fixed through the board in a slanting position, as shown in the illustration.

To cut, take the potato in both hands and push it lengthwise over the knife, dropping the sets into the barrel or box. Should the sets be too large, the juice of the potato will cause the two parts to stick together and they can then be cut either lengthwise or cross-wise as desired.—*J. Fixter* in March *Conservation.*



Commission of Conservation

A Handy Potato Cutter

HOW TO CONSTRUCT A POTATO PLANTER

Description of a Convenient, Home-made Instrument that Any Farmer may make for himself

THE accompanying illustration shows a simple home-made instrument that farmers, when planting potatoes, will find very convenient. The following description gives particulars, showing how the planter may be made and operated.

The main frame is 3 ft. 6 in. by 5 ft., and made of hardwood planks 2 in. thick by 10 in. wide, bolted together at the corners. The spouts are made of heavy gas pipe, 14 in. long and 3½ in. in diameter, tapered at the point like a cultivator tooth, so that they will not drag the sod or manure. The upper end of the tooth has a thread on it and is screwed into a piece of hardwood scantling 6 in. by 6 in. and 28 in. long, bolted firmly to the frame. The balance of the spout attached to the hopper is made of heavy zinc and is wider at the top for convenience in dropping in the potatoes. The spouts are placed 3 ft. apart and the wheels are centered 18 in. from them, so that the one wheel comes back into its own mark, thus making all the rows the same distance apart. Should it be desired to have the rows closer together, the machine can be made on the same principle to suit any distance.

The wheels are the kind used on the old fashioned walking cultivators, with levers for raising and lowering. The ratchets on the levers should be small and close together, so that they can be moved up or down any desired distance. Gang-plough wheels with ratchets on the sides may also be used by elevating the frame to suit.

The wheels should be so placed that the machine will balance when two boys are sitting on the back. The boxes, holding one bushel of cut potatoes, are shaped like a mason's hod and held firmly in place in front of the top end of the spouts. The distance apart for dropping the cut potatoes is regulated by blocks, bolted on the spokes, which come in contact with a piece of light steel spring, which makes a noise so that the boys know when to drop the sets into the spout. A seat may be arranged directly behind the spouts for the comfort of those dropping the potatoes.

As soon as the potatoes are planted it is advisable to harrow the land so that any that are not deep enough may be covered. It is also advisable to harrow several times before the potatoes come up, the last harrowing to be just when the sprouts are appearing. The harrowing will kill weeds, and keep the crust broken to form a mulch to conserve moisture and warm the soil. In this way growth is encouraged and much time is saved in weeding the potatoes after they are up.—*John Fixter* in March *Conservation.*

THE FARM AND FARM CROPS

CULTURAL RESULTS WITH ALFALFA AT MACDONALD COLLEGE

By L. S. Klinck, Professor of Cereal Husbandry

(From "The Agricultural Gazette", Dep. Agric., Otawa).

SEVEN years' work with alfalfa has given, on an average, nearly three cuttings of nutritious hay each year and a substantial fourth crop has been allowed to freeze down for winter protection. These results indicate that any land in good physical condition, free from acid, moderately rich and well drained, whether naturally or artificially, is suitable for growing alfalfa. Every year finds this crop demonstrating its ability to give satisfactory returns in the Province in districts and on soils heretofore regarded as unsuitable.

Variegated alfalfa, such as Grimm and strains of Grimm, have, with us, not only proven more hardy than other sorts of alfalfa, but have also shown themselves to be decidedly more cold-resistant than common red clover or alsike. The row on the left of Fig. I. labelled "Lyman" is the Grimm variety and shows clearly the ability of this alfalfa to withstand adverse winter conditions much better than the other commercial sorts shown on the right. If, however, the stand of the hardiest alfalfa is lost as a result of freezing or of smothering by ice, as sometimes occurs, it is generally advisable to break up the sod and reseed the field as soon as the land can be gotten into good condition.

Grass and weeds are alfalfa's worst enemies, therefore alfalfa should be seeded down after a hoed crop. A study of alfalfa-growing in the Province of Quebec points strongly to the conclusion that lack of proper preparation of the soil is responsible for more depleted stands than lack of fertility.

This is evidenced by the fact that the majority of alfalfa fields are almost choked out by blue grass and couch grass at the end of the second year.

Alfalfa is a delicate plant in the early stages of its growth, therefore the seed bed must be especially well prepared—fine on top and firm below is the condition sought. When these conditions are complied with alfalfa will make a remarkably quick germination and early growth, providing moisture and temperature conditions are favorable.

In preparing soil for alfalfa, plow the land to a good depth in the fall. In early spring give the field an occasional stroke with the harrow to compact the lower layers of soil, prevent the formation of a crust, kill germinating weeds and conserve moisture.

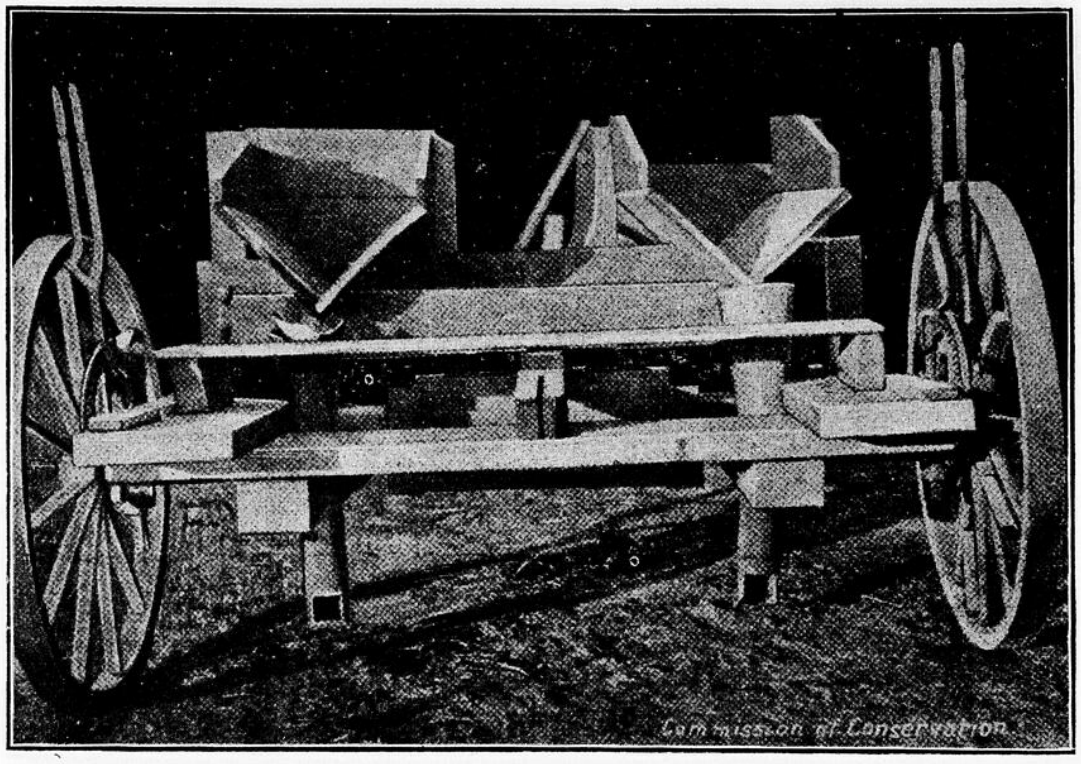
If barnyard manure is applied during the winter, it should be turned under with a light furrow in the spring or thoroughly incorporated with the soil by means of the disc cultivator. Composted manure is much to be perferred to green manure, as it keeps the soil less open and is also less liable to give trouble from weeds.

If sown broadcast, twenty to twenty-five pounds of seed to the acre will be required; if sown in drills thirty inches apart, four to five pounds of seed will be ample.

In general practice it is not advisable to sow early. While good stands are not infrequently secured in the fall wheat districts of Ontario by seeding alfalfa on winter wheat land in early spring just before the frost comes out, experiments at Ste. Anne go to show that, in a normal season, the best results will be obtained in Quebec by seeding about the middle of May. In a backward season, earlier seedings are apt to be injured by excessive moisture or by late spring frosts; later seedings, in a very dry year, are likely to germinate unevenly on account of insufficient soil moisture. When alfalfa is sown in rows it may safely be seeded as late as the middle of June, as the growth in the cultivated drills is much more rapid than in the uncultivated broadcast fields.

At Macdonald College, on well prepared land, late summer seeding has been practised with excellent results; but on land in poor heart, this practice has given the lowest returns of any of the many methods tried. The rates of seeding are the same as on the spring-sown land. Early August has proven the most satisfactory time for late summer sowing. One decided advantage in favor of seeding at this time, on reasonably clean land, is that one is never troubled with annual weeds. Nor does one have to wait a year for returns, as the usual number of cuttings of hay can be taken the next year. Again, if the land intended for alfalfa is not in a hoed crop, it may be cleaned by summer fallowing before seeding in August; or, if well composted manure cannot be had in sufficient quantity properly to enrich the land, field peas may be sown early in the season and turned under in the early podding stage. Alfalfa, seeded in August, is always sown alone, never with a nurse crop.

If sown in the spring, alfalfa should rarely, if ever, be seeded alone. Success beardless barley, sown at the rate of three pecks to the acre, makes the best nurse crop. This barley will hold weeds in check, protect the young alfalfa plants from the direct rays of the sun, and will yield a fair return in grain without injuring the alfalfa, providing it



A Convenient, Simple Potato Planter

THE SPRAYING OF ORCHARDS

A Necessary Precaution to Prevent Codling Worm, Plum Curculio and Scab

FRUIT-GROWERS who intend to spray their orchards thoroughly this year will already have made their *first application* before the buds began to enlarge and while the trees were still dormant, with the strong lime-sulphur mixture, specific gravity of 1.035. The *second application* for apples and pears should be made just before the blossoms begin to open, with lime-sulphur of specific gravity 1.009, to which 2 to 3 lbs. of lead arsenate to every 40 gallons of the mixture are added as a poison. When commercial lime-sulphur is used the dilution should be 1 to 30.

In the case of plums and cherries the second application should be made about a week after the blossoms have fallen.

The *third application* for apples should be given when the blossoms have just fallen, with lime-sulphur of specific gravity 1.008, to which 2-3 lbs. of paste lead arsenate are added to every 40 gallons of the mixture. This is the spray which controls the codling moth and apple scab, so that thoroughness and promptness are essential. When commercial lime-sulphur is used one gallon should be diluted to 35 or 40 gallons.

For plums and cherries the third application should be given about two weeks after the second.

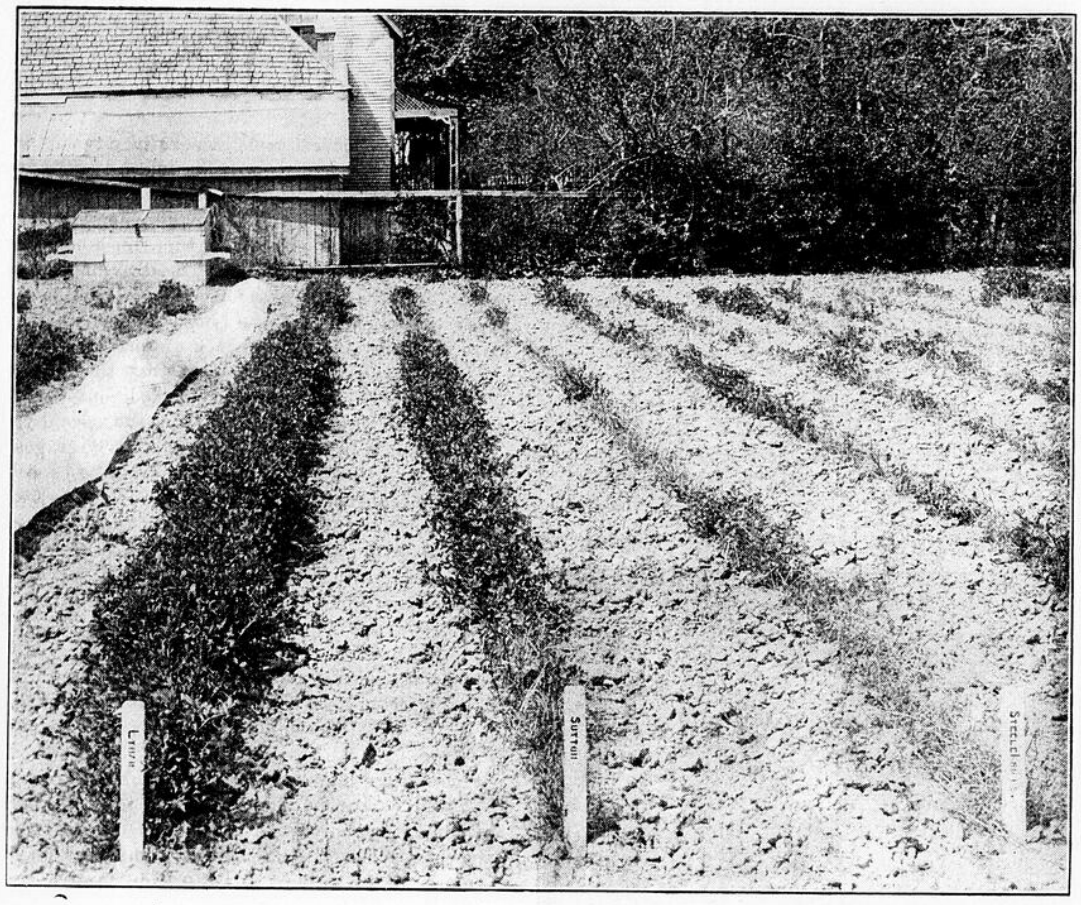
A *fourth application* of the same strength as the third should be given apples ten days or two weeks later to control the scab on Fameuse and McIntosh.

Father Leopold of La Trappe stated at the recent meeting of the Quebec Society for the Protection of Plants at Macdonald College that:—"The time and expense required to spray the orchard is trifling, compared to the value of the fruit produced. Thirty-four cents a tree is the approximate cost of the whole work for a season, that is for the four applications; and if unwilling to make the four, there are three that should always be made. Why is it that there are so few home orchards sprayed? The excuse cannot be given that spraying does not pay. Lack of time can hardly be given as a legitimate reason. Ignorance of how to do it is a very feeble way of getting out of spraying. Isn't it just real laziness?"

Father Leopold's statement is true, and pity 'tis 'tis true. There is little sense in growing apple trees for years, and, when they are large enough to bear fruit, permitting worms, caterpillars and scab to render them worthless.

If every farmer owning an orchard would spray his trees thoroughly three or four times every year according to directions the total value of the fruit would be tremendously increased. An outfit is necessary, but this is not expensive, and if care is taken it will last for several years.

W. L



GRIMM ALFALFA

Fig. 1. The row on the left labelled "Lyman" is the Grimm variety and shows clearly the ability of this Alfalfa to withstand severe winter conditions much better than the other commercial sorts shown an the right

is cut as soon as ripe and the shocks are not allowed to stand any considerable length of time on the land. The Success variety of barley is preferable to any other kind of cereal as a nurse crop for alfalfa because it rarely lodges, does not shade the young plants too much, makes its demands upon soil moisture early in the season, confines its root system to the upper layers of the soil, and so does not enter into as keen competition with the alfalfa for moisture as wheat or oats. Moreover, being one of our earliest ripening grains, it is harvested early and so gives the alfalfa plants every facility for the development of a good root and top growth before winter.

On the Cereal Department plots inoculation has not, in all cases, increased the yield or vigor of the resulting crop. This can easily be accounted for by the fact that the necessary bacteria are already present in considerable numbers. On land where alfalfa or sweet clover (Melilotus alba) has not previously been grown, always inoculate the seed. Several methods have been tested, but for ease and effectiveness of treatment, coupled with low cost, the nitro-culture put up by the Bacteriology Department of our Agricultural Colleges at Guelph and Ste Anne is to be recommended. In farm practice inoculation should always be employed and seed so treated should be harrowed in as soon as sown.

The first crop should be cut for hay as soon as one-twentieth of the plants are in bloom, or if the season is cold or wet and blossoming is delayed, cut as soon as the new shoots appear at the crown. This point calls for special emphasis, as many inexperienced alfalfa growers wait so long for the bloom to appear that they lose a cutting of hay as a result. Nor is this the most serious loss. If the cutting of the first crop is delayed, the young shoots, which later would have produced the second crop, are destroyed at the time of first cutting, with the result that the vitality of the plants is seriously weakened. Impaired vitality, due to ill-timed cutting, accounts, in part, for the fact that in many alfalfa fields the second crop turns a reddish color, loses the greater part of its leaves and becomes tough and woody instead of developing normally. Losses from the attacks of leaf spot will also be materially lessened by prompt cutting. If, however, leaf spot does seriously check the development of the plants, it is best to cut the crop at once even if the quantity of hay cut is too small to harvest. Whenever this action is taken promptly, a new set of shoots will appear almost immediately.

When blue grass or couch grass gets a foothold, the disc cultivator has been found a most valuable implement in holding the grass in check and in thickening the stand of alfalfa. On all except very loose soils the discs should be set to cut. This apparently drastic treatment has been productive of excellent results, especially on old alfalfa sod, where blue grass began to come where the stand of alfalfa had been reduced by winterkilling. Whenever practised, discing should be done immediately after the hay has been removed.

Experiments in growing alfalfa seed have been conducted on a small scale for several years. Seed is obtained from the second cutting. Results thus far indicate the superiority of drilling over broadcasting for seed production.

Always allow the last crop of the season, no matter how heavy, to freeze down. While valuable as hay, it is much more valuable as a protection to the crowns and roots. There is no danger of this aftermath smothering the crop out, as sometimes occurs in heavy stands of clover, as the alfalfa will not freeze down and form a dense mat. A large number of experiments have been conducted with a view to learning whether some substitute could not be found which would enable us to harvest the last crop of the season without incurring the risk of having the plants winter-kill. Thus far, no system for management has been discovered which will compare at all favorably with the practice of allowing the last crop to freeze down and form a mulch for winter protection.

CULTURAL WORK WITH ALFALFA IN THE PROVINCE OF QUEBEC

In addition to the work at the College, considerable illustration field work with alfalfa has been carried on in four widely-separated counties in the Province of Quebec in co-operation with the Committee of Lands in the Commission of Conservation. The results of this work, which has now been carried on for three years on two blocks on each of eleven farms, while not so gratifying as those obtained at the College, nevertheless give large warrant for ultimate success.

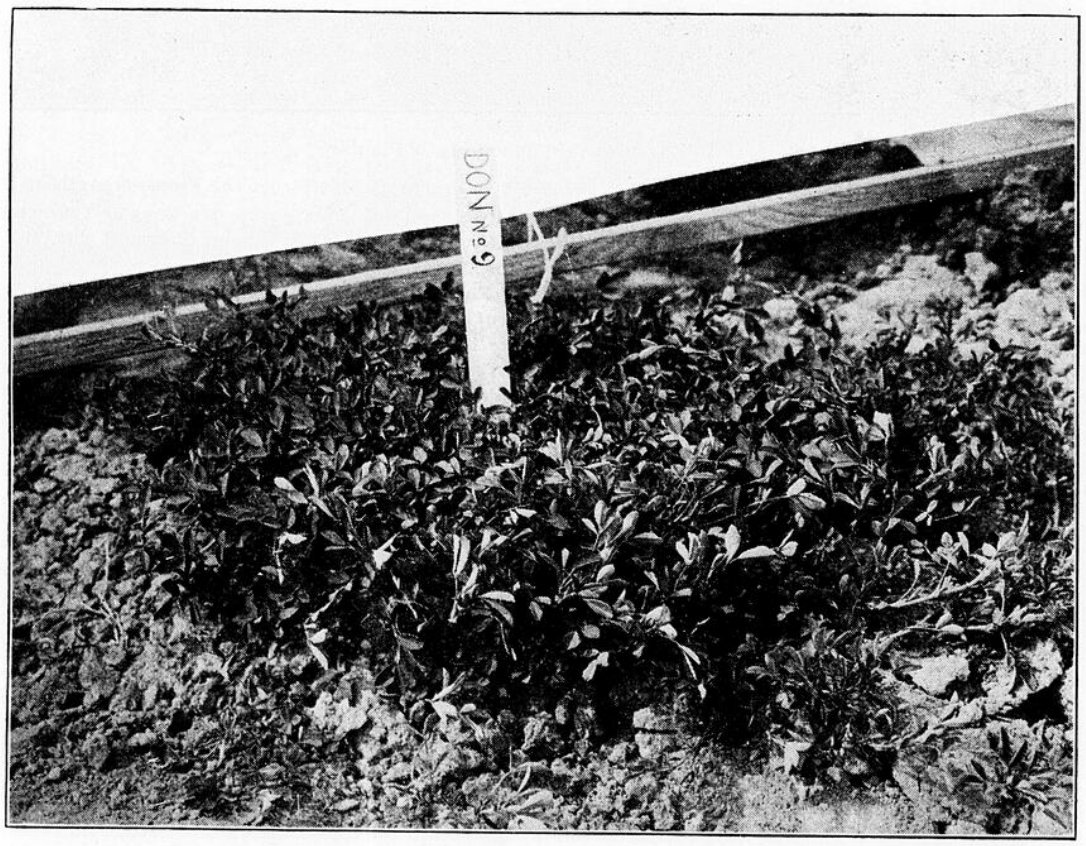


Fig. 2. AN INDIVIDUAL PLANT OF THE DON VARIETY. As the symmity of the parent plant from which Quebec No. 1. Alfalfa was originated was marred by the removal of 125 root cuttings, this illustration of plant No. 9 is inserted to show the general habit of growth of the parent plant.

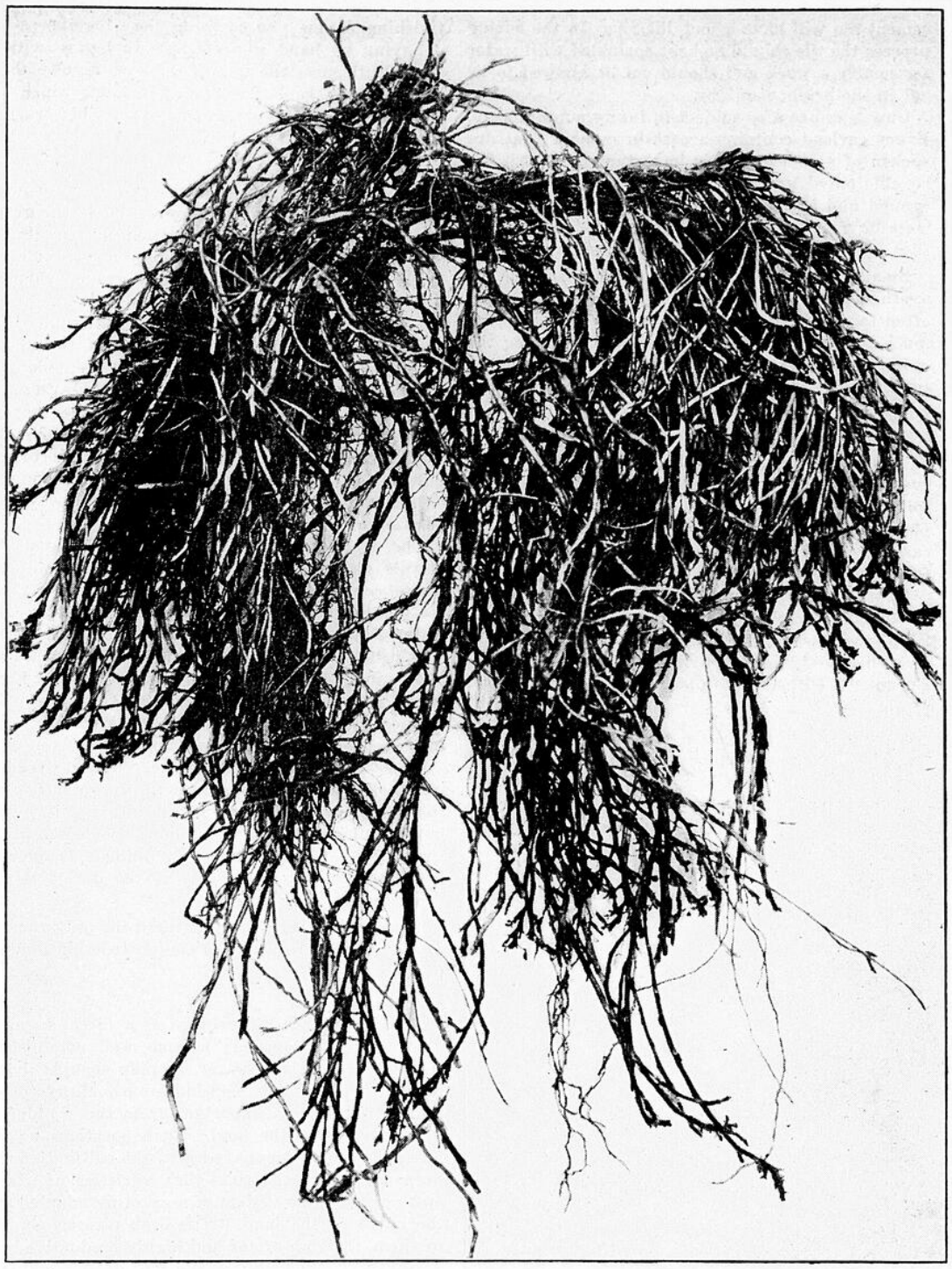


Fig. 3. ROOTS AND ROOTSTOCKS REMOVED FROM DON ALFALFA NO. 1. This illustrates well the dense mass of roots and underground rootstocks which constituted less than half the number produced by the remarkable plant from which Quebec No. 1. Alfalfa was original

SELECTION AND BREEDING WORK WITH ALFALFA AT MACDONALD COLLEGE

In the spring of 1911 a comprehensive study of varieties and strains of alfalfa was begun by the Cereal Husbandry Department. Eighty-eight of the most promising hardy strains obtainable were brought together from all parts of the world where soil and climatic conditions closely approximate our own. Each variety was sown on two distinct types of soil. All came through the first winter without any appreciable loss through freezing. The winter of 1912-13, however, was an unusually severe one. All clovers on the Department plots—common, mammoth and alsike—were completely killed. The loss among the eighty-eight alfalfas, while heavy, was not nearly so serious, and in no case was it complete. While many of the alfalfas under test suffered comparatively little, the medias and falcatas proved the most hardy. Of the medias in commerce, Grimm and certain strains of Grimm proved most resistant to our winter conditions. Minnesota Stocks No. 5 and No. 8 proved especially so, and as these strains combine all the other excellencies of the original Grimm stock, over two thousand individual plants of these selections were propagated in the greenhouse and later were transplanted at stated distances in the field for breeding work

While selection and breeding work has been vigorously pushed with alfalfas adapted primarily for hay, considerable attention has also been given to the problem of producing a hardy pasture alfalfa. From Prof. N. E. Hansen we obtained in the spring of 1911 five hundred and fifty year-old plants, representing six varieties, collected by him on his third trip of agricultural exploration in Northern Europe and Asia. One of these new importations, a variety named Don, (Medicago falcata), contained one plant, now known as Quebec No. 1 alfalfa, which, when three years old, had developed such a dense mass of underground rootstalks that 125 healthy root cuttings were obtained from less than half of the plant. These have been multiplied in the greenhouse and in the field and a sufficient number of plants is now available for test at the different Agricultural Colleges and Experimental Farms in Canada.

As a photograph of the above-ground part of plant No. 1 was not secured before the root cuttings were taken, Fig. 2, showing plant No. 9, which resembles No. 1 quite closely in stem and leaf, has been inserted to give an idea of the general appearance and habit of growth of plant No. 1 before the cuttings were taken.

Fig. No. 3 illustrates well the dense mass of roots and underground rootstalks which constituted less than half the number produced by the remarkable plant from which Quebec No. 1 alfalfa was originated; while Fig. 4 gives some idea of the enormous development of rootstalks on a single lateral root borne by the parent plant.

As the original variety, from which this individual plant selection was made, has come through two winters without the loss of a single plant, and as its habit of growth is such as to give great promise of its ability to compete successfully with grass in an ordinary pasture, Quebec No. 1 alfalfa is now being sent out to other Agricultural Colleges and to the Experimental Farms in the hope that it will make a valuable contribution to our list of pasture crops, especially on land which does not lend itself readily to rotation.

UNDERDRAINAGE

(Continued from April issue.)

Action of Underdrains

IN the previous instalment of this article mention was made of the ground water-level or water-table. This has been very aptly likened to an underground lake, for up to that height all the spaces between the particles are filled with water.

The fundamental principle underlying drainage is to lower the level of this underground lake, so as to increase the area through which plant roots may range for food and moisture. Water has no difficulty in entering the tile. Instead of *running* in it is actually *forced* in until the ground level is down to that of the tile itself. One frequently hears the statement that tiles should not be placed too closely together to admit the free entrance of water. This contention has little foundation in fact. Owing to the condition of the tiles which are always more or less rough and uneven on the ends they cannot be placed too closely together, in practice.

Planning System

As was stated at the outset a good map is the first essential in laying out a drainage system. With this at hand it should be an easy matter to locate any and every point throughout the entire system. The outlet, where the work should start, calls for special construction. It may be either faced with stone or built directly into a concrete wall. The location is very important. If at all possible, avoid placing it so low that at any time of the year it may be flooded. With the outlet well established we should note successively the position of the mains and their grade and the position of the laterals and their grade.

It is a comparatively easy matter to run a drain true to grade. Elevations are determined at every one hundred feet along the drain. Two stakes are then set, one on either side, at these points. A crossbar is then fixed to the stakes so that the top of it will be exactly six feet above the bottom of the drain. By stretching a cord tightly over these cross pieces immediately above the line of the drain, we are able, with the aid of a six-foot measuring stick, to get the exact grade at every point.

In laying out the system care should be exercised that no sharp corners are introduced. Any curves that are necessary should be made sweeping. Unless, however, we are supplied with specially made junction-tiles it is advisable to make the points between laterals and mains at right angles so as to give a higher joint.

The grade should be carefully established. If the tiles be set too steeply there is danger of inducing a heavy rush of water which may wash away so much soil that the tiles become loose and out of line. In draining hillsides always run the

lines obliquely down the side to avoid any difficulties that may arise due to excessive washing.

Distance Apart :—

Any figures given in connection with general drainage work must, of necessity, be very arbitrary. Generally speaking, however, in the lighter soils such as loams they should be from forty-five to sixty feet apart, while in clays the distance should be from twenty-five to thirty-five feet. The more open and porous the soil the farther apart should the drains be placed. In this connection the subsoil has an important bearing. A hard pan close to the surface prevents the downward movement of water and necessitates more frequent lines of tiles.

Depth of Drain

Drains should be placed so deep in the soil that they will not be affected by the frost. Under average conditions this will mean from three to three and one-half feet. Drains should never be less than 30" deep, under any circumstances. Tiles which are working properly are not in great danger of heaving, as it must be remembered that they are continually working even though the surface is frozen. On this account there is not, at any time of the year, so much moisture in the soil to freeze and expand.

Kind and Size of Tile and their Cost:—

Two kinds of tile are in general use at the present time, cement and clay. Their relative value is largely determined by the care with which they are made. Cement tiles are usually hand-made. Numerous types of machines are on the market for their construction. A good one may be obtained for from seventy-five to one hundred dollars. One barrel of cement, which weighs about four hundred pounds, will make two hundred and forty-five four-inch tile. Two men with a machine can make about two hundred in a day. The most difficult part in tile construction is the matter of curing. A well cured cement tile will have a metallic ring. In the curing process the tile should be kept sprinkled with water for nearly a week and should not be allowed to lie out in the bright sunlight.

Clay tiles are also subject to faulty manufacture. Every carload contains a certain number that are spoken of as "dead". It is important that such tile be eliminated as they quickly go to pieces in the ground and are liable to clog the whole system. A metallic ring is also characteristic of good clay tiles.

Small tile should no longer find a place on the average farm. Nothing less than three-inch and often four-inch tiles should be used. They are very much less likely to fill with sediment and clog the system, and the permanency thus insured amply justifies the slightly increased initial expense.

Digging

Other things being equal, move just as little soil as possible in digging the drain. Frequently, however, it is possible to loosen the upper two feet of soil with the aid of a horse and a good subsoil plow. When conditions are such that this system can be worked it pays better to move more material for the sake of having it loosened by horse power.

Near the bottom of the drain the earth should be kept as compact as possible so as to give the tiles good bearing on a solid bed. This is essential to insure a straight line when all the earth has finally settled back into place.

Laying Tiles —

Laying should always be commenced at the outlet. The bottom should be very carefully finished just before laying the tile. Special shovels are available for this work, which are built to cut a slice the same shape as the tile. The final finishing should not precede laying by any great distance. A bad rain storm would be liable to wash such a piece so deep that is would be impossible to get a proper grade on a solid bed. As a general rule keep the finishing, laying and covering close together.

Laying by hand is preferable to laying with a hook. With most tile it is possible to revolve them so as to get the highest possible joint, which is most essential for a permanent drain. This practice is not possible with a hook.

Tiles Becoming Blocked

Blocked drainage systems are most usually caused by faulty laying. A depression in the grade of the drain is likely to cause a deposit of sediment at that point. Eventually this may be sufficient to block the drain. Even a very low grade, which is sometimes necessary, may have this effect.

Loose joints, both between the individual tiles and more especially at the junction of the mains and laterals, will probably collect a great deal of sediment and frequently block the entire system.

When tiles are blocked for any of the reasons mentioned above this may often be overcome by plugging the outlet and allowing the tile to get quite full of water and then suddenly letting it out. The rush of water usually clears away any obstructions.

The practice of providing settling basins at intervals along the drain is sometimes followed. These consist of square concrete chambers three feet square on top by five or six feet deep. The water flows in on one side and out at the other. The stillness of the water in the basin provides an opportunity for the sediment to settle out. Each basin is provided with a cover so that it can be cleaned out from time to time. This system is good in very open soils to prevent clogging.

Other causes of stoppage are not so readily removed. Roots of trees and plants frequently find their way into a tile, completely blocking it. This is particularly true of the willow, which is a great water lover. Ground-burrowing animals frequently get into the tiles, especially if the outlet is not protected by screening.

With such obstructions as these the only remedy is that of digging down to the obstruction and replacing the tiles.

Conclusion

The importance of drainage as a factor in agricultural production has become well established. Important as it is, however, no man should undertake it without due consideration. Many other factors are just as important from the standpoint of returns from the land. Such questions as the general system of management—the cultivation and preparation of the soil—the varieties of farm crops grown—the system of marketing adopted and the value of the land itself, bear directly on the problem. On high-priced and highly productive land drainage is indispensable and will quickly pay for itself. Cheap land, removed from centres of population and transportation facilities, presents a doubtful proposition for drainage.

Drainage represents a poor investment for the slovenly and shiftless farmer, but to the systematic farmer who considers carefully the returns from every acre it is an indispensable acquisition in the Eastern Provinces.

L. C. RAYMOND

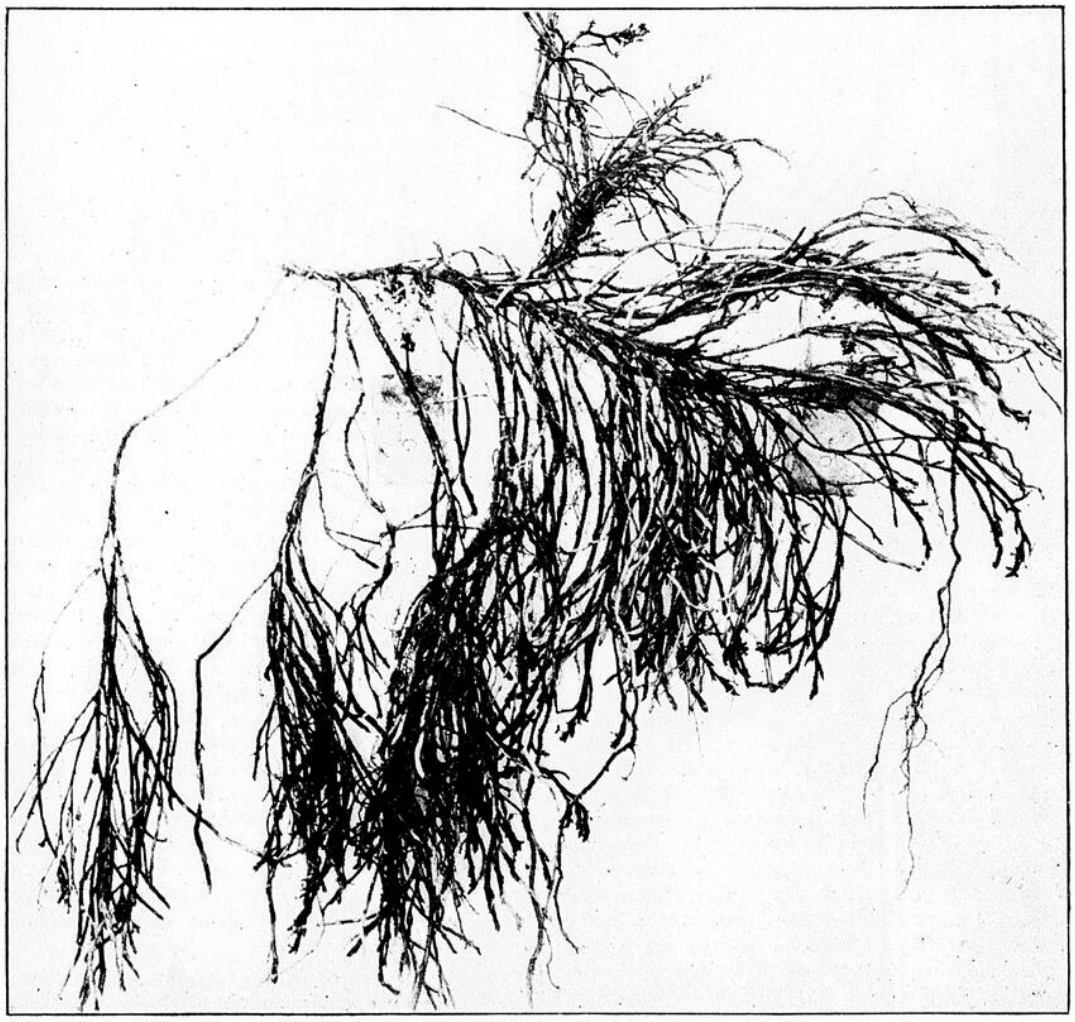


Fig. 4. A SINGLE LATERAL ROOT SHOWING NUMEROUS ROOTSTOCKS. This illustration gives some idea of the enormous development of rootstocks on a single lateral root barm by the parent plant from which Quebec No. 1. Alfalfa was originated.

SOME EXPERIENCES IN FARM DRAINAGE

WHEN, as a young man, I first undertook the responsibility of running a farm, I soon realized the fact that the farmer who has wet fields, or wet places in his fields, is literally at the mercy of the elements. No man is so absolutely dependent upon the weather as the farmer. Before I struck in for myself I was familiar with the workings of a well-drained farm, and understood in a general way the advantages of tiling. Not, however, until my plans were blocked season after season did I realize that systematic farming, with a regular rotation of crops, is absolutely impossible until the wet places are made dry.

About a third of the farm is composed of gravelly ridges, naturally well-drained, and on these I found it possible to grow any kind of crop suitable to the climate; but along the lower sides of all of these ridges the land was too wet to cultivate until very late in the spring, and too wet to plow soon after the fall rains began. In a wet season no crops worth mentioning would grow in the more springy places, and on the flatter portions of the farm, between the ridges, only average crops of hay and grain could be grown.

Ridging the undrained fields. During those "good times" for which our city friends sigh (some twenty years ago when cheese sold at about 8 cts. per pound, eggs at 8 or 10 cts. per dozen and everything else in proportion), it was out of the question for a farmer without capital to buy high-priced tile and go to the expense of putting them in the ground. The common practice in this province of ridging up land in narrow beds we found worse than useless. Where the open furrows are so near together, not enough water is gathered in a single "dead-furrow" to run away freely; then the worry and annoyance of bumping over so many miniature ditches makes life scarcely worth living. By making the beds much wider than common, say ten or fifteen paces and striking out down the centers of the lands for two or three successive plowings, the land can be brought up into great swells, with wide easy open furrows between, in which a sufficient quantity of water will gather to run off freely, provided the land is plowed in the direction of the grade of the field. Fields which we intend to tile we have plowed in this way, making the beds thirty feet wide. By digging our ditches in every second furrow we bring our lengths of tile 60 ft. apart, and save a foot or more of digging. A two-foot ditch in the bottom of such a furrow will place the tile three feet below the surface when the land is plowed down level; and everybody knows, who has ever handled a pick and shovel, that the last 12 in. in the bottom of a three-foot ditch seems to require more hard work than the 24 inches above. In some fields the beds may be made twenty paces wide, eventually putting tile in each furrow. The following diagram will illustrate the effect of plowing land in wide or narrow beds. It is obvious that more water will collect at *a* and *b*, and that it will run off more freely than the smaller quantities collected at *c*, *d*, *e*, and *f*. In back-furrowing down the center of these wide beds care should be taken not to overlap the first two furrows; when this is done, unless these furrows are cut exceedingly thin, the ridges will become "humped" up in the centers. In finishing in the "dead-furrows", after one or two previous plowings the same way, the last four furrows should be cut very thin. Of course, the wider the beds are struck out the more times can they be plowed without changing the position of the "dead-furrows".

Experiences with stone drains and home-made tiles. In those good old times previously mentioned, while tiles with us were out of the question, we tapped some of the wettest spots by digging short ditches to the nearest open ditch and filling with small stones. Where we were able to put them down to a good depth and secure a free outlet they have been fairly satisfactory; in other cases they have not proved very successful. Unless there are plenty of small stones conveniently at hand, with a good proportion of flat ones to cover the open throat which should be laid in the bottom, the work of making these stone drains is very slow and laborious. In these days it will pay better to make roads of the stones and buy tiles for drainage.

Our first tiles were laid in the spring of 1908. These were three-inch tiles which we made ourselves from concrete, using a hand machine. After some experience we found that good tiles could not be made on this machine without a large outlay for cement and labour. Large pipes for culverts, from 8 in. to 24 in. in diameter we made successfully and at comparatively small cost, using them where open ditches had to be crossed. In March, 1909, we bought a carload of 3 in. clay tiles. When the car arrived the snow had nearly disappeared, so we drew part of them to a field which we intended to drain that spring, distributing them along the ground where the ditches were to be. The upper part of this field had been in corn the previous year, the lower part was in grass. Many tiles which lay in small depressions in the corn field were badly chipped by freezing and thawing which took place during the latter part of March and the first part of April; but not a tile was injured where they lay on the grass.

Grading the drain. — In draining a field the first thing to look for is an outlet for the water. Our tiles were to empty into open ditches, so the first consideration was to deepen these to an average of three feet. Eventually two of these have been tiled and used as mains and we hope in time to get rid of practically all of our open ditches in this way. In digging for the laterals we throw out two furrows with an ordinary walking plow; then, by using a long evener with a horse on each side of the ditch and a chain to let the plow down, we are able to loosen the soil for several inches below the first two furrows. Sometimes, where the shovelling is easy, the plow is only used to break and turn the sod. By plowing two furrows, each 12 inches wide, the top of the ditch is made wider than necessary; but this extra width is an advantage in places where deep digging is required to get down to grade—it gives more room for a man's arms and shoulders. In many places the grade is so slight that some kind of mechanical contrivance is necessary in order to secure sufficient fall. We graded our first ditch by means of a ten foot straight edge and a spirit level, drawing this affair along the ditch as we finished the bottom. This proved to be a clumsy and tiresome method and unless great care is used there is a tendency all the time to work up toward the surface. We next tried the target method, setting posts along the edge of the ditch at intervals of twenty or thirty feet, on which we nailed strips of board projecting over the ditch and at an equal distance (say 4½ or 5 ft.) above the bottom of the ditch. By sighting along these it is possible to grade satisfactorily, provided careful men with correct eyes do the work. And right here let me say, don't rely too much on the old "experienced" ditcher who depends altogether upon his eyes, and who ignores and ridicules all kinds of mechanical aids. He may be all right where there is plenty of fall, but where the grade is only three or four inches in 100 feet he is pretty apt to get too low in places, which will cause trouble by the tiles filling with silt where they dip below the surface.

The overhead line method. Of all methods of grading, save of course where a traction ditcher is used, we believe that the overhead line is the easiest to operate and the most satisfactory, especially when unskilled men are employed to do the grading. In using the overhead line it is first necessary to find the rise or fall in each 100 feet of ditch. The sum of these rises and falls will give the grade, which is the difference in elevation between the source and the outlet. The ground level at the upper end of the ditch should be high enough above the outlet to give a fall of at least three inches in every 100 feet. The first essential in determining the grade of a ditch is a levelling instrument of some kind. We use a home-made drainage level which consists of an upright piece of wood 5 ft. high, 3 in. wide and 2 in. thick, sharpened at the bottom. A cross-piece 2 ft. long is bolted to the upright about 6 in. from the top, the nut being drawn just tight enough so that the horizontal piece can be tilted in either direction. A carpenter's level is screwed to the top of the cross-piece. A pair of peep-sights, each with a peep-hole and a cross-wire, are clamped one at each end of the level so that the peep-hole of one is opposite the cross-wire of the other. This instrument can be tested by sighting some object from one end of the level, then reversing the level and sighting the same object, always, of course, keeping the bubble in the center. If both ends do not sight the same, the peep-sight at the low end may be raised by means of thin strips of cardboard until it is brought up to a level with the other. In determining the grade with this device we proceed as follows, the course of the ditch having been previously marked out. A stake is set at the outlet and at every 100 feet along the whole length of the ditch. The stake at the outlet is marked O, the next 100, the next 200, and so on to the end. Two men are required to do the work, one to operate the level and the other to hold the measuring rod. The one who sights the level we will call A and his assistant B. A places the home-made level midway between stakes O and 100, sinking the upright firmly into the ground and as nearly perpendicular as possible. He next makes the level horizontal by tilting. B stands the measuring rod on the ground at O, selecting a spot as nearly as possible on a level with the surrounding ground, that is, avoiding holes and hummocks. He then places a target (a narrow strip of white cardboard answers the purpose) across the rod as directed by A. "A then sights backward and directs B to raise or lower the target until it is in line with the cross-wire of the peep-sight, and when correct B notes the number of feet and inches the target is from the ground. When this is done B moves forward to stake 100 and stands the rod on the ground there, and A, without moving the level, turns around and sights forward to the rod, directing B as before. When the target is just level with the instrument B again notes the reading". Since the readings at stake O and at stake 100 are on the same level, that is, in both cases the target was level with the instrument, the difference between the two readings must be due to the rise in the ground. For example;-suppose the reading at stake O is 4 feet and at stake 100 it is 3ft. 6 in., then the rise for the first 100 feet of ditch will be 6 inches. A then places the level midway between stakes 100 and 200 and proceeds as before, continuing the process until the upper end of the ditch is reached. In several instances we have found depressions or basins in the high ground near the upper end of some of our ditches. In these cases, instead of a rise between (say) stakes 700 and 800, we find a fall; in other words, the ground for some distance may slant the wrong way. Farther on we shall state how this difficulty is overcome.

Now in regard to the use of the overhead line in grading the ditch bottom. A pair of good strong stakes about 6 ft. long are set at station O, one on each side of the ditch, and driven firmly into the ground. A second pair are set in the same way at station 100. Where a tile empties into an open ditch there should be a drop of at least two or three inches, also where a lateral joins a main drain. For this reason we dig our ditch at stations down to within two or three inches of the level of the open ditch bottom. A light pole 6½ ft. long (which is a convenient length for most men) is used for measuring. We now stand this pole on the bottom of the ditch at stake O, making a mark on one of the long stakes exactly 6½ ft. above the ditch bottom. One end of a crosshead (consisting of a stiff narrow board) is nailed to the stake at this mark; the crosshead is then levelled and the other end nailed to the opposite stake. The level is then set up midway between stakes O and 100, and exactly in line with the two long stakes on that side of the ditch. A sights back to station O, and B makes a mark on the long stake, level with the instrument, as directed by A. A then sights forward to the long stake at station 100, and B again marks as directed. These two marks, of course, are exactly level with each other. We now measure the distance from the mark to the top of the crosshead at station O, which we will suppose is 6 inches. The crosshead at station 100 is then

nailed to the stakes at a point 12 in. above the mark. Six inches above the mark would, of course, bring the crosshead level with the one at stake O. But since our fall from stake 100 to stake O is 6 in., we must bring our crosshead up 6 in. more (making 12 in. in all) in order to get the proper grade. A strong light line (a fish-line is good) is strung tightly between the two crossheads, as nearly as possible over the center of the ditch. We generally support the line in the middle by a third crosshead, which may be placed by sighting through, in order to prevent sagging. In grading the bottom of the ditch the measuring pole 6½ ft. long is used to measure the line overhead. It is obvious that if the ditch bottom is at all points 6½ ft. below the line, then the grade of the bottom must be the same as that of the line.

This method of grading sounds very complicated on paper, but it is really very simple when you once get the "hang" of it. It takes a good deal longer to tell how it is done than to do it. The following diagram, copied from Bulletin 175, Ontario Department of Agriculture, will perhaps help to make clear this method of grading. This bulletin, by Professor W. H. Day, I have found of great assistance.

C. S. MOORE,

(to be continued)

ROOTS
Some Pointers

ROOT-GROWING requires considerable work and attention. Under Canadian labour conditions the economic limit for the acreage to be planted with roots will therefore be reached sooner than in countries with lower wages where roots occupy from ten up to thirty per cent. of the land. Otherwise nothing could have prevented roots from becoming the most important crop in the majority of dairy districts in Canada.

The feeding value of roots depends on their content of dry matter. Under average conditions 10 lbs. of mangels or carrots or Swedes, or 12.5 lbs. of turnips contain 1 lb. of dry matter and have the same feeding value as 1 lb. of Indian corn. Each amount constitutes one feed unit.

A big root crop, not a small one which is always expensive, will present the feed unit at a lower cost than most other crops, with the exception of alfalfa, where this valuable plant thrives.

A good loam will give high yields of all kinds of roots. Speaking more in particular, Swedes do better on heavy land than other roots; carrots give fair returns on sandy soils, provided moisture conditions are not too poor; soft turnips do well even on poor land, if only it has been heavily manured and worked the same year; but mangels require decidedly rich, deep soils in good heart.

On shallow, weedy, or poorly drained land seeding on drills is preferable. On deep clean and rich soils flat land culture is better and cheaper, because the weeder or tilting harrow can be advantageously employed on flat land.

Under conditions similar to those at Macdonald College, carrots should be planted the first days of May, while the 8 th to the 15th of May has proved to be the best seeding time for mangels. Swedes, when grown for cattle feed, should be planted before the 25th of May. Where Swedes are grown partly for the market it is advisable to delay the seeding a week or two. Soft turnips may be sown comparatively late in June, although these also respond very readily to early seeding.

Early seeding, combined with comparatively heavy seeding, results in a good stand, and a good stand is half the crop. With drills 25"—30" apart use about 4 lbs. of carrot seed, 15 lbs. of mangel seed, 4 lbs. of Swede seed, and 3 lbs. of turnip seed per acre.

PAUL A. BOVING,

Macdonald College,
Cereal Husbandry Department

FODDER FOR JULY AND AUGUST
Dairy Farmers should Provide Now for Abundant Feed in Late Summer

FOR profitable management of a dairy farm, it is essential that as high a rate of milk production be maintained during July and August—when the pastures are dry and feed is scarce—as during the preceding months. If the yield of milk is allowed to decrease for a few weeks, it is impossible to bring it back that season to its proper level.

Consequently, although there is generally plenty of good pasturage during the months of September, October and November, a time when the price of cheese and butter is very high, it is of the greatest importance to feed well during the months of July and August so that all possible profit may be secured from the high prices and the abundance of fodder that can be grown.

The most economical, easiest and safest way to secure abundant feed during the months of July and August, is to cultivate fodder plants to be cut down green; or part may be fed on the field.

From experience gained, the most useful plants for this purpose seem to be: vetches, peas, oats, clover, alfalfa and corn.

To each ten cows we recommend dairy farmers to prepare about as follows:—

1. *Red Clover*, 1½ acres:—Must have been sown the year previous with the mixture of peas and oats given below.

Cut 20th June to 15th July.

2. *Peas, vetches, oats* and *clover*, ¾ acre:—About the first week of May sow ½ bu. peas, ½ bu. vetches, 3 bu. oats and 10 lbs. red clover seed per acre.

Cut 15th to 31st July.

3. *Peas, vetches, oats* and *clover*, ¾ acre:—About the third week of May sow the same mixture.

Cut 1st to 15th August.

4. *Corn*, 1½ acres:—The third week of May, or as soon as possible, sow on a well drained clover-sod field, manured at the rate of 10 tons per acre, and plant in hills 3 feet apart in each direction.

Begin to cut the 15th of August. Sow ¾ acre of Longfellow and ¾ acre of Leaming or Wisconsin No. 7. This should provide fodder up to the time that other corn is ready to cut for ensilage. Any surplus from this field can go into the silo.

J. FIXTER,

in April Conservation

QUICKSAND IN WELL

Editor, Journal of Agriculture:—

I have occasion to dig a well 8ft. x 8ft. and about 40ft. deep on a large farm here, and as it is through quicksand it presents quite a difficulty. Would you be kind enough to advise me how to proceed ?

I intend to put down a good mine cribbing, made up of 6in. x 8in. timbers, with two thickness of 2in. plank on the outside, interlined with heavy tar paper to prevent quicksand from seeping in.

I have the use of a 6in. centrifugal pump with motive power.

My difficulty will be to prevent quicksand from getting in under cribbing from the outside.

I may state that there is water 4ft. from surface. Will it be necessary to go through sand and also hard pan to get down to water again to ensure a continous supply?

If you could give me directions how to proceed, or advise me where I could get a good book on the subject, I should esteem it a great favour.

W. C. S.

Ans. Your best plan, if you can afford it, is to have a drilled well put down below the quicksand. As you know, these wells have an iron casing 4½ or more inches in diameter, and this casing shuts out the quicksand entirely.

Quicksand is the most difficult problem to solve in well drilling and the above method is by all means the best plan of overcoming it. If however you cannot do this I will mention some of the ways in which the trouble is partially avoided:—

1. In some cases farmers allow the quicksand to rise until it comes to a stable level and they put the bottom of their suction pipe above this level.

2. In other cases a wooden box, sand-tight, is put down, the box having holes bored around the side, covered with fine wire mesh. If the sand is very fine this should be from 80 to 100 mesh to the inch.

3. When the supply needed is not very great a sand point is put on the end of the suction pipe, or a number of sand points are connected by elbows and trees and all joined to the end of the suction pipe.

C. J. L.

WATER PIPES UNDER ROAD

Editor, Journal of Agriculture:—

THE macadamized road will pass our place next summer, and our water pipes cross the road.

If we should want to renew them could there be any way devised to do so without breaking the road; I mean could they be taken up now and put in to some kind of a case so as to be able to draw them out from under the road.

What would you advise? will there be any more danger from frost than under the old road? The pipes are inch, laid ten years.

J. F. B., Hillhurst, Que.

Ans. You could lay the pipes in a stout wooden box, or better still in drain tile. The tile would be less apt to rot.

There will be no greater danger from frost, if the ends of the box or tile are closed so that there is no possibility of a draft. Just place the pipe in the box or tile and cover up as you would an ordinary drain.

C. J. L.

TREATMENT AGAINST OAT SMUT

THE principal cereal crop of the Province of Quebec is Oats. In 1913 the area devoted to oats in this province was 1,303,000 acres, which yielded 39,000,000 bushels, valued at $18,732,000. The average percentage of Smut in oats given by Professor Güssow, Dominion Botanist, Central Experimental Farm, Ottawa, in his recent Bulletin, "Smut Diseases of Cultivated Plants", is over 7 per cent. Taking this loss, 7%, as a basis for Quebec, the total money loss due to Smut in Oats in 1913 was $1,311,240!

A loss of one million three hundred and eleven thousand dollars is a heavy penalty our farmers have to pay every year for neglect of treating their seed oats with formalin solution. The treatment is so simple that there is no good reason why every farmer should not practise it.

First of all, the farmer should purchase a supply of formalin from a good reliable druggist a week or two before seeding-time. It is a liquid and comes in pound bottles. One bottle when diluted as described below will treat, by the sprinkling process, about forty bushels of grain.

A day or two before the oats are required for seeding they should be piled in a heap on a clean barn floor, and the pound of formalin poured into a barrel containing 40 gallons of water. With a sprinkling can the solution from the barrel should be sprinkled on the grain; at the same time the grain is shovelled over and over until every grain is wet. The pile of wet grain should then be left for two or three hours, then covered with clean sacks for five or six hours or over night. After this

LIVE STOCK

THE SHEEP TICK

THE sheep tick is the most persistent of all the external parasites that infect the sheep. This pest is a species of the Hippoboscidae a family of the order Diptera or Flies. There are several species of this family, one of which infests the horse, the other being found on owls and other birds. Both these species are winged but the sheep tick is wingless. Two varieties of sheep ticks are to be found—the red tick, which is commonly found on sheep in Quebec, and the white, which restricts itself to warmer climates.

LIFE HISTORY

The life history of the sheep tick is very peculiar, more especially its mode of reproduction. From five to eight ticks are produced by a single female in a year. The egg hatches within the body of the parent, and the larva is nourished in this condition until full-grown. After being born it is ready to turn into a pupa, a stage passed through immediately before reaching maturity.

REPRODUCTION

Reproduction is supposed to take place much more rapidly when sheep are out on pasture during the summer, one authority claiming that ticks are rarely troublesome when sheep are housed during the entire year. Our experience at Macdonald College would lead us to believe that, while reproduction is likely to take place more rapidly during the summer, yet there is an increase during the winter as well.

CHARACTERISTICS

Ticks are not capable of migrating from one flock to another, but migration takes places between individuals within a flock.

This migration appears to be somewhat limited unless favored by certain conditions. It is generally believed that ticks have a preference for the younger members of the flock due to the fact that lambs and yearlings are usually the most attacked. This may be due to the greater length and density of the fleece of the younger members of the flock. While ticks may be found at certain times apparently airing themselves on the surface of the fleece, they show a decided preference for seclusion beneath a heavy fleece, and this is not provided in the same degree, at least in most cases, with the older ewes. It is also probable that the lambs and younger sheep have more tender skins, and, being usually in better condition, provide superior conditions for the maintenance and reproduction of the ticks. Ticks display a special preference for the young lambs in the spring after the ewes are sheared, due in part to the above reasons, because the lamb has then a longer fleece than its mother. It is a notable fact that ticks having once found a suitable place of abode seldom leave. Hence a lamb that becomes infected with ticks from the ewes after shearing, owing to the superior conditions provided for them to thrive and reproduce, is likely to be harboring large numbers of ticks by the time it is a yearling.

Ticks live by sucking the blood of their host. Besides inflicting pain they sap the vitality and strength of the sheep. If present in sufficient numbers they may even cause death. Affected sheep rub themselves repeatedly, and in this way considerable damage is done to the fleece, spoiling the appearance and causing looseness due to pulling out.

MEANS OF DESTROYING

The life history and habits of the sheep tick make it plain that means of destruction are likely to be most effective in the spring and fall of the year and this has led to the prevailing methods. Some farmers practise dipping in the spring after shearing, others in the fall, and a few dip twice a year. The various pine-tar solutions prove effective. Where dipping is done thoroughly no ticks are to be seen. Yet to keep the flock fairly free of these vermin repeated dipping is necessary. Something must be wrong with our method of treatment, because it has been proved that a flock once rid of ticks remains so until reinfected by some new source, hence if once thoroughly destroyed there should be no recurrence. The probable source of the ineffectiveness of our treatment lies in the fact that usually only one dipping is given. The fact that the egg hatches within the mother tick and the larvae are mature when born would lead us to believe that a number of these hatch out and are born from the parent mother after death. There is also a possibility that a few may escape death from the first treatment. Consequently a second treatment is to be advocated. If thoroughly carried out this should entirely rid a flock of the pest. If a flock is once known to be free of ticks any new animals bought should be isolated until all ticks have been killed. Rams are a common source of infection. Being bought often just previous to the breeding season they in mating disperse a few among the flock. Breeding rams should be dipped before using, and then closely watched and redipped until free of the ticks.

Dipping is believed to have a beneficial effect upon the wool and is to be recommended whether ticks are present or not. Where only a small flock is kept, a small tank specially made for the purpose, with one sloping side upon which are cleats for the sheep to walk out on, will be amply sufficient. This should be placed in front of a doorway, through which it is convenient to drive the sheep, with a platform at the other end down which they may walk without injury. Where several large flocks are kept in close proximity a larger vat could be constructed and operated cooperatively. This plan is followed in certain parts of the States, and other classes of stock besides sheep are dipped as well. This plan is less expensive, quicker, and gives excellent satisfaction where in operation.

A. A. MAC MILLAN

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the grain should be spread out to dry.

In order to avoid re-contamination of the treated seed before sowing, it is advisable to dip the bags or sacks in the barrel of formalin solution while the grain is being treated, and allowed to dry.

Grain thus treated but not required for seed is perfectly safe to use for feed.

The cost of treating seed grain in this way is a little over one cent per bushel.

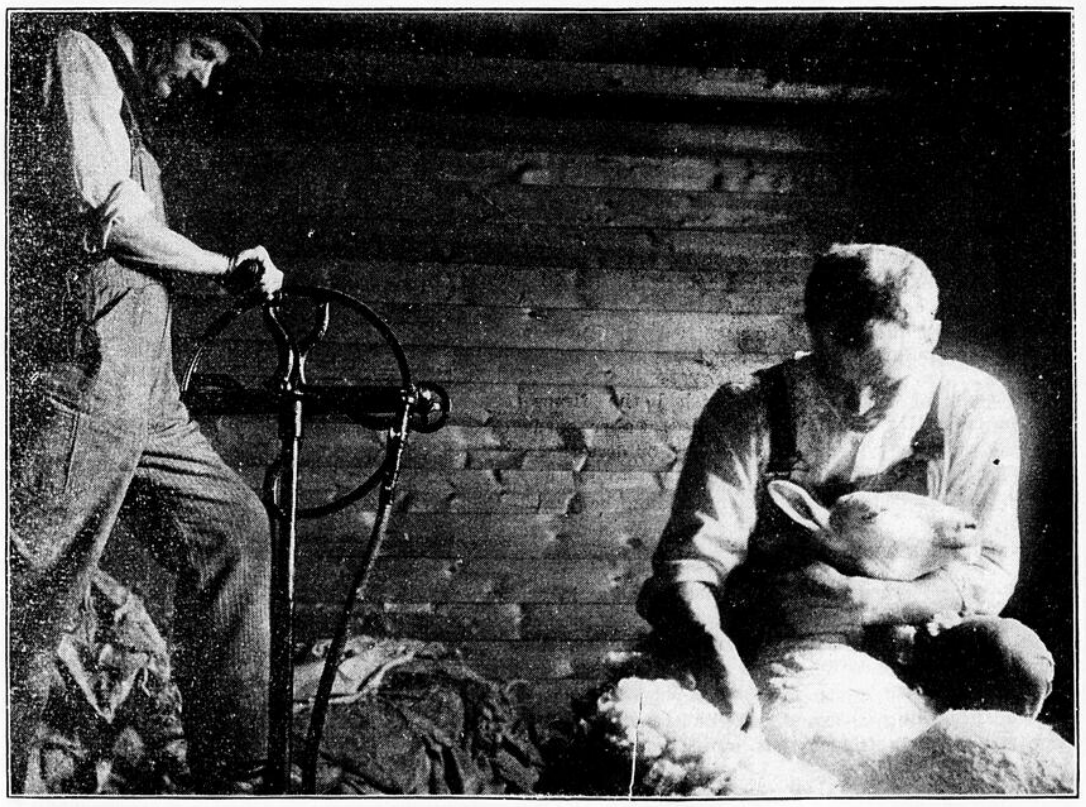
W. L.

SHEARING

UNLIKE most farm animals the sheep produces a double source of revenue, its annual fleece practically paying for its keep during the winter. The ewe flock, while providing nourishment for the growing foetus, have been steadily adding length and weight to their wool covering as well, and in the spring the removal and sale of this, which has provided warmth and protection throughout the winter, brings a handsome return.

In all the large sheep-ranching countries where flocks of several thousand are kept the shearing season is one of the busiest. All the work must be accomplished in a short time for each particular district, hence in many cases the work is handed over to experts. These men do the work by contract or charge a flat sum for each animal. They begin in the earlier districts and travel to the colder sections as the season opens up. Large shearing sheds are often erected for the purpose of shearing and storing the wool. Every precaution is taken to insure quickness, cleanliness and thoroughness in the work. The intelligent methods practised at shearing time in such countries as Australia, New Zealand and Great Britain add greatly to the quality and price of their wool when placed for sale in the large wool markets of the world.

Conditions in the Dominion of Canada and the Province of Quebec particularly are very different.



Shearing sheep by machinery. By means of this simple contrivance the work of shearing is reduced to a minimum

Small flocks of from ten to one hundred in number are scattered here and there throughout the country, some sections having more, others less. Very little thought has been put into any particular division of the sheep industry and practically no thought whatever into shearing. The work has been performed in a haphazard manner, a few men being proficient in the work but the large majority unskilled. Many farmers with a small flock of ten to fifteen ewes do their shearing on the ground, others in a stall of the cow stable, hence our wool is contaminated at this time with materials that might easily be avoided. While it is true that our conditions will not allow us to undertake such elaborate buildings as are used for shearing in those countries where sheep alone are kept, there are nevertheless principles which apply in a small as well as in a large way.

WHEN TO SHEAR

Where the custom of having the ewes lamb on grass prevails, shearing usually takes place before the really hot weather sets in. Some men prefer to delay shearing until rather late, hoping to gain greater weight of wool owing to an increase in the oil or yolk. There is little to be gained by delay, because considerable wool is likely to pull out and be lost, and, moreover, sheep lose flesh very rapidly if not shorn before hot weather arrives. There is also danger of the lambs eating some of the wool, which is likely to result in the formation of wool balls in the stomach and consequently in loss by death. Good dry weather should be selected for shearing. If the flock has been washed, time should be given for the wool to become thoroughly dry. It is always advisable to tag the ewes before shearing. Cleaner wool is assured as well as cleanliness to the operator. Shears used for this tagging should be cleaned before being used for other work. No attempt should be made to remove the dirty wool or tags with a shearing machine. The plates are likely to be broken or notched and the sheep cut as well. It is seldom advisable to shear ewes before lambing as there is always danger of hurting them at this time.

The old-time method of shearing with the hand shears is rapidly giving place to the shearing machine. Less skill is needed to operate this machine with the same efficiency as the hand shears. There is little danger of cutting unless the machine is carelessly handled. The ends of the teats may be cut off or serious cuts inflicted but this should not be tolerated under any consideration. The position in which the sheep is held while the various parts of the body are being shorn can be best learned by watching a skilled workman at work. The legs of a sheep should never be tied during shearing. Experience enables the operator to place the sheep in a proper position for shearing every part of the body and one in which the operator, if efficient, has perfect control of the animal. There is no animal that submits itself so readily to gentle yet skilful manipulation as the sheep.

As soon as each sheep is finished the fleece should be neatly and properly rolled. Paper cord may be used for tying. Any droppings or dirt that may have accumulated while shearing should be swept and cleaned up before commencing the next sheep. A clean dry room may be used for storing the wool until shipment.

There is no excuse for any farmer shearing in a dirty place because there is always a place in every barn that can be made perfectly clean with very little preparation. Now that more of our wool is likely to go to the States where it will be sold according to grade and condition, it will pay handsomely to see that more care is taken with it.

A. A. MAC MILLAN

THE RELATION BETWEEN LIVE WEIGHT AND PERFORMANCE IN COWS

By T. Peters in "German Agricultural Animal Breeding", May, 1913

The writer made some investigations, based on the data of the Dutch Herdbook Association, as to whether heavy or light cows turn their feed to better account. The data for 1911 are given in the two following tables, in which the animals are grouped according to their weight. The figures in Table 1-A refer to herdbook cows, while those in Table 1-B refer to cows which are not registered. All the cows were five years old.

TABLE I—A.

Weight Group.	No. of Cows.	Average Weight.	Milk Yield.	Milk-fat Yield.		Increase in live weight.	*Units of performance.
		lbs.	lbs.	p.c.	lbs.	lbs.	
Under 1,1000 lbs	67	1,056.0	7,101.6	3.26	231.6	59.4	113.6
1,100-1,208 lbs.	263	1,161.6	7,403.0	3.22	238.0	77.0	119.9
1,210-1,318 lbs	464	1,265.0	7,799.0	3.24	252.3	59.4	123.4
1,320-1,428 lbs	304	1,368.4	8,109.2	3.22	261.1	55.0	126.3
Over 1, 428 lbs	128	1,482.8	7,856.2	3.21	252.1	37.4	120.1
Average of all groups	1,226	1,280.4	7,727.2	2.23	250.4	59.4	122.5

TABLE I—B.

Under 1,100 lbs.	84	1,031.8	6,331.6	3.21	203.1	59.4	101.2
1,100-1208 lbs	216	1,157.2	6,892.6	3.19	220.0	83.6	112.5
1,210-1,318 lbs	237	1,258.4	7,453.6	3.17	236.7	77.0	118.0
1,320-1,428 lbs	143	1,366.2	7,821.0	3.20	250.1	68.2	123.8
Over 1, 428 lbs	32	1,478.4	7,312.8	3.20	234.3	70.4	117.2
Average of all groups	712	1,234.2	7,218.2	3.19	230.1	74.8	115.8

(1) By unit of performance the writer understands 2,204 lbs. of milk fat, or 6,612 lbs. of body weight substance.

From this summary, it is clear that light cows, on the average, are inferior performers. The larger milk yield of the herdbook cows as compared with the unregistered animals is attributed by Mr. Peters to the better constitution and resistance powers of the former.

RECORD OF PERFORMANCE TEST

Ayrshire Cows and Heifers that have qualified since February 20th, to March 20th, 1914

Mature Class

Name of Cow — Owner	Milk Lbs.	Fat Lbs.	Fat %	Days No.
Blossom—16363, J. L. Stansell, Straffordville, Ont.	10498.	484.	4.61	365
Barcheskie Juniper—27804, J. L. Stansell, Stratffordville, Ont.	9328.	444.	4.76	361
3 year old Class				
Bessie of Fernbrook 2nd—36359, Collier Bros., Beachville, Ont.	9024.	334.	3.70	365
Fern of Springbank—32836, Wellesley Leeming, N. Seneca, Ont.	8352.	335.	4.01	365
Brownie of Fernbrook—38577, Collier Bros., Beachville, Ont.	7928.	340.	4.29	365
Little Kilmory Gwendoline 3rd—31438, W. F. Kay, Philipsburg, Que.	6965.	309.	4.42	327
2 years old Class				
Jubilee of Hickory Hill 3rd—38202, N. Dyment, R. No. 2, Hamilton, Ont.	11891.	458.	3.85	365
Rose—31884, Roy W. Bulloit, Cardigan, P.E.I.	10795.	435.	4.03	365
Queen of Fernbrook—35465 Collier Bros., Beachville, Ont.	8602.	390.	4.53	365
Selwood Milkmaid—33429, Alex. Hume & Co., Menie, Ont.	8154.	351.	4.30	343
Scottie's Snowflake—35128, T. C. Treverton, Latta, Ont.	8137.	307.	3.77	365
Maple Forest Lucky Girl—35904, McMillan & Leggat, Trout River, Que.	8007.	258.	3.22	326
Janet of Fernbrook—35469, Collier Bros., Beachville, Ont.	7650.	287.	3.74	365
Lulu of Orchard Grove—34152, Frank A. Wight, Thedford, Ont.	7315.	273.	3.72	365
Empress of Ravensdale—31343, W. F. Kay, Philipsburg, Que.	6913.	276.	4.00	310
Meg 2nd—34256, Frank A. Wight, Thedford, Ont.	6694.	275.	4.10	327
Flora—31810, Frank A. Wight, Thedford, Ont.	6611.	270.	4.08	360
May Osborne—34151 Frank A. Wight, Thedford, Ont.	6476.	274.	4.22	365

W. F. STEPHEN,
Secretary,
Canadian Ayrshire Breeders' Association
Huntingdon, Que.
March 27th, 1914.

DAIRYING IN GEORGIA

AN ATLANTA man tells of an amusing experience he had in a mountainous region in a southwestern state, where the inhabitants are notoriously shiftless. Arriving at a dilapidaded shanty at the noon hour, he inquired as to the prospect for getting dinner.

The head of the family, who had been "resting" on a fallen tree in front of his dwelling, made reply to the effect that he "guessed ma'd hev suthin onto the table putty soon."

With this encouragement the traveler dismounted. To his chagrin, however, he soon discovered that the food set before him was such that he could not possibly "make a meal". He made such excuses as he could for his lack of appetite, and finally bethought himself of a kind of nourishment which he might venture to take and which was sure to be found in any locality. He asked for some milk.

"Don't have milk no more," said the head of the place. "The dawg's dead."

"The dog!" cried the stranger. "What on earth has the dog to do with it?"

"Well," explained the host meditatively, "them cows don't seem to know 'nough to come up an' be milked theirselves. The dog he used to go for 'em and fetch 'em up."

THE DAIRY

WHOLESALE MILK PRICES IN CANADA

A comparison with those paid in other countries

MR. W. F. Stephen, Huntingdon, Quebec, secretary of the Montreal Milk Shippers' Association, sends us the following comparison of farm wages and wholesale prices of milk in Canada and other countries, which he points out are particularly interesting in view of the fact that the greater part of the cost of milk production is *labor*. We have worked over the figures he has garnered from official sources and have tabulated them in such a way as to make the comparison obvious at a glance. In doing so we have expressed all wages in terms of the month or year. We have also omitted numerous details given by Mr. Stephen regarding the system of paying for milk in the various countries, and have tabulated only the wholesale price per hundredweight as calculated by him from the prices given in the official sources for the quart, liter, gallon, etc. *S* after wages signifies that subsistence (board and lodging) is included; *H* that house and garden are included.

FARM WAGES AND WHOLESALE PRICE OF MILK.

Country	City.	Wholesale price of milk per cwt.	Farm wages per month.	Farm wages per year.
Canada,	Montreal,	1.30 — 1.90	$30—35,*S.*	$350—400,*S.*
	Ottawa,	1.50 — 2.20		
	Toronto,	1.25 — 1.85		
England,	Nottingham,	1.20 — 1.60	$19—21,*H.*	$ 97—122,*S.*
	Liverpool,	1.35		
	Birmingham,	1.30 — 1.90		97—122,*S.*
	London,	1.50 — 1.90		
Ireland,	Queenstown,	1.05 — 1.63		$ 97—107,*S.*
	Dublin,	.80 — 1.60		
Netherlands,	Amsterdam,	.93 — 1.34	$ 8 *S.*	$ 80—120,*S.*
	Rotterdam,	.88—1.32		
Germany,	Munich,	1.36	$ 3— 5,*S*, winter, 6—10,*S*, summer.	x
	Hamburg,	1.49		
	Dresden,	1.67	$18—21.	$ 48—71,*S.* (girls)
Switzerland,	Berne,	1.67 — 1.75	$ 8—12,*S.*	
	Geneva,	1.68	8—15,*S.*	
	Zurich,	1.63		
Norway,	Christiania,	1.41	$11—13,*S*, men, 5— 7,*S*, women.	
Denmark,	Copenhagen,	1.20	$11—13,*S.*	
Sweden,	Gothenburg,	.97 — 1.21		$171, *S*, men, 99, *S*, women.
Australia,	Sydney,	1.20	$22—26,*S.*	
	Victoria,	1.02	26, *S.*	
New Zealand,	Auckland,	.98	$22, *S.*	

x The Bavarian farm laborer also receives one suit of clothes and two pairs of boots a year.

It will be seen that while wages are extremely high in Canada the wholesale price of milk does not differ materially from that in the other countries taken as a whole. With the exception of the Australasian British Dominions, the only countries with prices materially lower than those prevailing in Canada are countries where farm labor is extremely cheap.

CITY MILK SUPPLY

Efficient Pasteurization and Thorough Inspection Needed

IT would seem, from an address delivered recently in Montreal by Dr. F. C. Harrison, Principal of Macdonald College, that there is a reason for the resolution passed at the semi-annual meeting of the Milk Shippers' Association, "that the city authorities take more adequate measures to ensure the purity of milk being shipped to and sold in Montreal".

Last summer Dr. Harrison, with the assistance of Mr. Wilfrid Sadler and Mr. A. Savage, backed by the Quebec Provincial Board of Health and Food Inspection Department carried out an exhaustive investigation of the Montreal milk supply. All kinds of dairies from the best to the worst were visited, and some 1,500 samples collected and examined.

The results of this investigation are the more interesting in view of the very recent agitation on the part of some milk shippers to increase the price to such an extent that the consumer would have to pay more than the eight and ten cents a quart ratio which have held for some years. The Association in some cases might, and no doubt are shipping a quality that is worth the best price, but figures given by Dr. Harrison prove that the supply is by no means uniform. The prices agreed upon by the shippers—May and June, 16 cents per gallon; July, August and September, 17 cents per gallon; October, November, March and April, 22 cents per gallon; and December, January and February, 24 cents a gallon—while being an increase of from one to two cents to the wholesaler mean no increase to the consumer.

HIGH PRICE FOR DIRTY MILK

What is the consumer paying for? In most cases Dr. Harrison says, the middlemen doubled the price they originally paid; the milk when it reached the consumer was from 36 to 48 hours old; and the daily supply sold in Montreal—owing to carelessness in handling—contained about 150 pounds of dirt and filth.

The districts drawn on for the supply extended as far as Ontario and the Eastern Townships, and when this is considered it will be understood that there is often considerable delay in transit from the producer to the city.

In the course of the investigation all came in for the same rigid examination,—cows inspected as to condition of health; stables as to construction, light, room and cleanliness; milk houses as to construction and equipment; milkers as to health and cleanliness and the milk as to temperature and condition.

BEWARE THE FLY

The principal defects observed were the result of the proximity of stables to dairies, and of there being too many flies. Many of the dairies practised pasteurizing their milk, but in many cases on account of the milk not being kept at a proper temperature and in constant agitation all the time, the so-called pasteurization was useless. The fly is one of the principal causes of impure milk, and one fly alone had been examined and found to have on its exterior no less than 750,000 bacteria.

The fact that under favorable conditions the descendants of one organism in 24 hours number sixteen and half millions is something that producer, dealer, and consumer should never lose sight of. The rural samples examined during the investigation contained from one to two million bacteria in every sixteen drops, the city samples from 25 to 27 millions in sixteen drops. That was the gross number of all organisms. Rural samples contained 100,000, and city samples 900,000 putrefactive bacteria; and there were in rural samples 7,000 colon bacilli, and in city samples 317,000. These averages were based on 386 rural and 684 city samples. Some samples of pasteurized milk contained from 800,000 to 2,000,000 bacteria.

Samples taken in the six best dairies in Montreal showed from two to eight million bacteria per cubic centimetre (16 drops); 519 hotel and restaurant samples averaged 25 million per cubic centimetre and in one place alone there were 22 million colon bacteria to the cubic centimetre.

In discussing the results of his investigation Dr. Harrison gave it as his opinion that pasteurization with efficient apparatus, the milk being cooled as rapidly as possible and bottled in a sanitary manner, was necessary before any city could have a thorough system of inspection from the farm to the consumer; and that the producer receive as a reward for purity an enhanced price, this not to mean a higher price to the consumer, but a cutting down of the middlemen's profits.

WEEKLY STAR,

April 1st, 1914

THE BACTERIOLOGY OF CHEDDAR CHEESE

(continued from April issue).

IN our first article we discussed the process of cheese-making up to the time that the rennet was added. As is well known the rennet will coagulate the milk, and this action is supported by the acid produced by the lactic acid bacteria. More acid will give a firmer curd. When commencing to cut, the whole cheese vat is one solid mass and thus all the bacteria are contained in the curd. A good cheesemaker will keep most of the bacteria in the curd after cutting, and very few will have passed into the whey. It is customary, for spring cheese, to commence cutting early, using first the horizontal knife and cutting slowly lengthwise; then with the perpendicular knife the mass is first cut crosswise and then lengthwise. It is advisable to cut small cubes (¼ inch length) as the cubes will be smaller and more uniform and are not so easily broken. Broken cubes cause a considerable loss of butter fat in the whey, and also large numbers of lactic acid bacteria escape from the broken cubes.

Stirring commences at once and is kept up for ten or fifteen minutes. Immediately after cutting the cubes begin to contract and whey is pressed

POULTRY

INCUBATION

DURING the last few weeks I have been visiting various parts of the province in the interests of the poultry industry. It is very encouraging to find a much greater interest being taken in poultry culture than ever before, and this increased interest is not local but is spreading over all parts of the province. The counties of Ottawa, Pontiac, Chateauguay, Huntingdon, Missisquoi, Brome, Stanstead, Sherbrooke and Compton have become especially interested in more and better poultry.

3000 baby chicks, 36 hours old

out. This contraction is due entirely to the action of the acid inside the cubes, which acid is produced by the numerous lactic acid bacteria. Here we see the advantage of keeping all the lactic acid bacteria inside the cubes, for we want the acid inside the cubes, as it is most valuable there.

After the curd has been stirred for fifteen minutes the cubes become much firmer and the curd can be loosened from the sides of the vat without much loss. As soon as the curd is loose from the sides heat can be applied. Heat to a temperature of 98 F., which temperature should be reached about ninety minutes after the curd has set. As acid develops very quickly in spring cheese, it is advisable to remove part of the whey so that at the moment the right acidity has developed the rest of the whey can be very quickly removed. Harsh treatment of the curd must be condemned, for it only means breaking the cubes, and the larger amount of whey produced in the latter way is at the expense of the quality and quantity of the cheese. The curd should form by natural agencies, especially the action of the acid under the stimulus of heat. In order to prevent the curd matting together gentle stirring should be kept up. After cooling, when the whey shows an acidity of about 0.18 per cent. the whey must be run off altogether or the curd dipped. Now the curd occupies only a fraction of the space taken by the original milk but still contains most of the lactic acid bacteria, and has absorbed most of the acid which is bound to the casein. The whey contains only the bacteria which escaped, during cutting, from the broken cubes. After dipping, the curd is left in a loose open condition about eight inches deep, to allow the last of the free moisture to escape. Another change takes place here, for the tremendous amount of acid absorbed by the curd has made a plastic mass of the casein, and by its own weight the whole mass fuses or mats together, and if left long enough will become one single unit without any mechanical holes. In the absence of sufficient acid such matting or fusion does not occur.

When the curd is well matted it is cut into strips and turned upside down; this turning is repeated in about fifteen minutes and two layers placed on top of each other. The turning is continued every quarter of an hour until the curd has reached an acidity of 0.8 per cent. and is well matted and flaky, when it is ready for milling. During this period, from dipping to milling, the temperature is kept at about 95 °F. After milling the curd is stirred to prevent matting until the acidity has reached 1.2% and the curd is cooled down to 85 °F. when 2 lbs. of salt per 1000 lbs. of milk is added and the curd is put to press at a temperature of 83 °F. From the moment the cheese leaves the press the ripening process begins and hereafter it is a purely bacteriological problem.

In this ripening process the same acid plays an important role. The rennet used to curdle the milk contained large quantities of pepsin, the digestive agent found in the human stomach. This pepsin, can act only in the presence of acid, and, as we have seen, the young cheese contains more than 1 per cent. acid and billions of lactic acid bacteria which will attack the milk sugar still left in the cheese and change it into acid in a few days. All this acid actuates the pepsin, a very useful and important function in the ripening of the cheese. Cheese made without an acid starter and under such conditions that the few acid bacteria originally present cannot increase in numbers or cannot produce acid has always failed to ripen. After three months these cheeses still show a spongy texture and have scarcely any cheese flavor. Finally, we must consider the protective action of the acid against the putrefactive bacteria. Putrefactive bacteria are always present in milk, especially when insufficient care has been given to the milk. These putrefactive germs are also concentrated in the curd and would decompose the mass in a short time if they were not held in check by the high acidity. When we wash the acid and the sugar out of the curd, so that no acid can be formed, the cheese develops most undesirable odors and tastes, liquefying bacteria are found in large numbers and the mass softens and gradually melts away.

The beneficial action of the lactic acid bacteria may be summarized in the following five points:—

(1) they favour the curdling process;
(2) they favour the expulsion of whey;
(3) they cause the matting of the curd cubes;
(4) they actuate the pepsin of the rennet extract;
(5) they check the putrefactive bacteria.

When the lactic acid organisms of this group have exhausted all the sugar they disappear gradually, but even their decomposing bodies liberate compounds which continue the ripening of the cheese for months. Later in the ripening process other kinds of lactic acid bacteria appear which are able to attack the casein itself, and to produce among other products lactic acid also and thus play an important part. However, from a practical standpoint, the lactic acid bacteria mentioned before deserve the most consideration, as they decide more or less the final product.

J. VANDERLECK

Much good work has been accomplished by the Demonstrators, and it seems that the distribution of eggs to school children has done much to encourage further development.

Many farmers who previously had no interest in poultry are beginning to realize the value of a few fowls on the farm. More farmers are using incubators, which is a sure sign of larger flocks.

For the average farmer the operation of an incubator is a somewhat difficult task. With a good machine and proper attention, providing the hatching eggs are of good quality, good success usually results.

THE INCUBATOR

The incubator should be given a good location. A cellar or a semi-basement about four feet in the ground and about three feet above ground makes the best room for the incubator. The room should be well ventilated, though it should be free from draughts. The floor of the room should be clean. The temperature should be fairly constant so that the temperature of the incubator chamber will not be affected too much.

The degree of success in incubation depends upon the method of operation, particularly during the first week. It is well, for amateurs especially, to follow the directions of the manufacturers fairly closely. When experience is gained the directions may be varied to suit local conditions. The incubator should be started a few days before the eggs are to be placed in it, in order that an even temperature may be maintained.

TEMPERATURE—A temperature of approximately 103° Fahrenheit should be maintained throughout the hatch. The temperature which the thermometer should register, however, depends upon its positon in the incubator chamber. A temperature of 103° should be the registered temperature on a level with the tops of the eggs as they lay upon the trays.

The heat regulator should be adjusted properly to make accurate records of any variations in temperature.

All thermometers should be tested before being used.

CARE OF THE LAMP—An important factor which has to do with the maintaining of a uniform temperature is the flame. The lamp requires filling with oil every morning. The wick should be trimmed at the same time. It should be trimmed in such a manner as to give a broad, even flame, the corners of which are slightly rounded. When a new wick is to be used the rough edges should be burned off by holding the end of the wick in the flame of a lighted match. The proper method of trimming the wick is to rub off the charred portion with the fingers and then light. If an even flame does not show as the wick is turned up, remedy the defect and be very sure to round off the corners of the wick so that no smoking will result.

The lamp should be attended to after the eggs are turned and aired in the morning.

During incubation the eggs require to be turned. The turning should not be started before the third day, and it should be stopped on about the eighteenth day. The purpose of turning is to prevent the embryo in the egg from becoming stuck to the shell and to give the eggs a uniform temperature. For all practical purposes, turning twice each day is sufficient. The best method is simply to "shuffle" the eggs; that is, remove a few eggs from the front of the tray as it rests on top of the incubator, then roll the balance of the eggs on the tray forward and place those taken off at the back of the tray.

The eggs should be aired a few minutes each day, except the first one or two and the last two days. In the natural method the eggs are aired whenever the hen leaves the nest for feed. In artificial incubation airing is done at the time of turning. It is customary to air about ten minutes during the forepart of the hatch, and gradually lengthen the airing period as incubation proceeds. During the turning and airing the incubator door should be kept closed.

During the development of the embryo, oxygen is taken in and carbon dioxide is thrown off. It seems that an excess of carbon dioxide is detrimental to the best development of the embryos. For good results the eggs must be given fresh air, and the circulation of the air through the incubator chamber should be rapid enough to supply sufficient oxygen for the living embryo. Some incubators are supplied with automatic ventilation. With those incubators which are equipped with ventilating devices, the ventilators should be kept closed during the forepart of the hatch and gradually opened as the hatch proceeds.

If the ventilation is too rapid the eggs will lose much moisture. Where the evaporation of the watery content of the egg is excessive, moisture must be supplied. It seems best to supply moisture from the beginning. Some incubators are equipped with moisture trays, while in others a shallow pan or dish may be filled with water and set in the bottom of the incubator chamber.

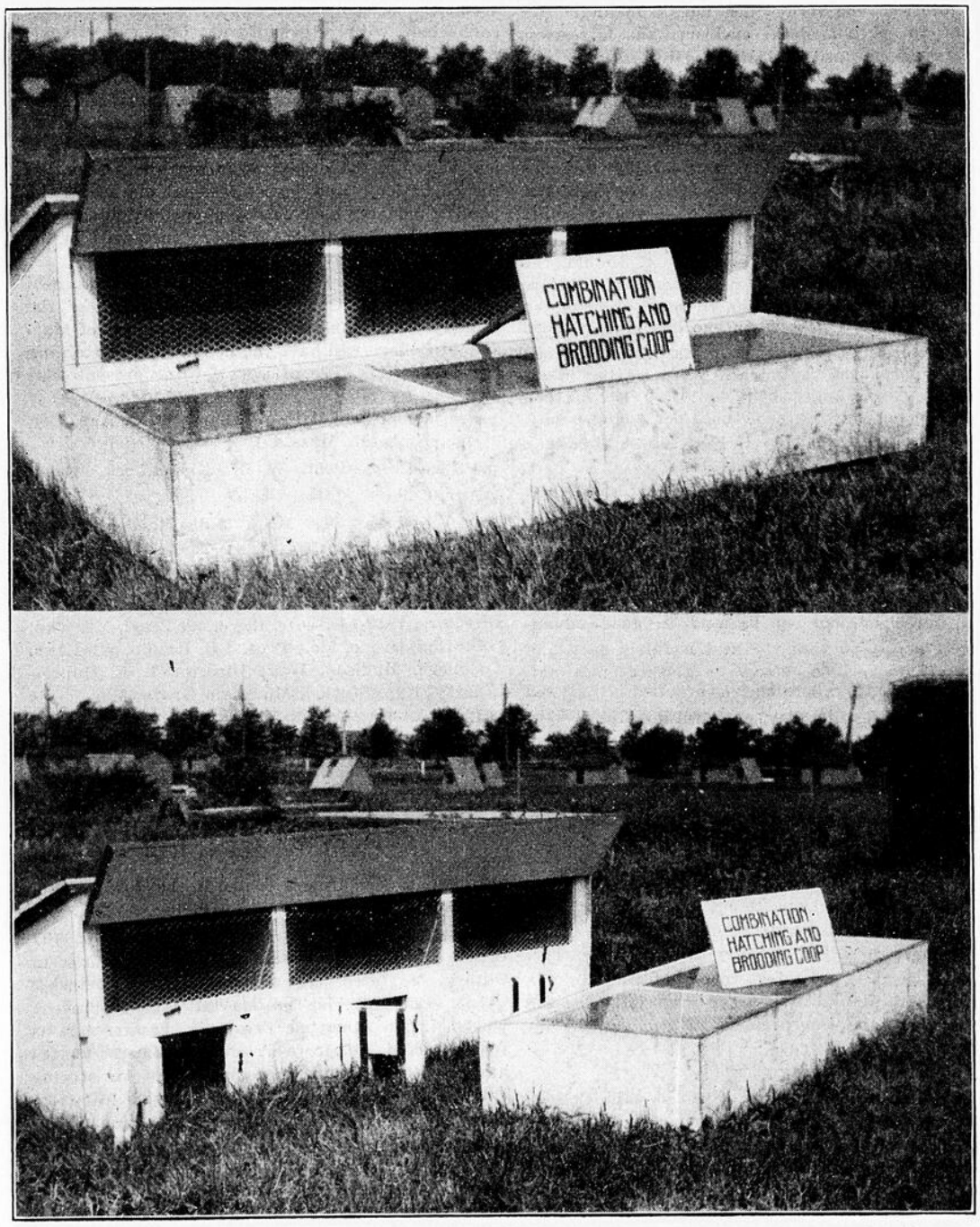
The germ in a fertile egg will show signs of development when incubated for a few hours. On the fifth or seventh day the germ has developed sufficiently to distinguish a fertile egg from an infertile one. An infertile egg shows no signs of development during incubation.

To determine whether an egg is fertile or infertile, it is tested with the egg tester or candler. The condition of the egg may be seen when the egg is placed between the light of the tester and the eye.

Testing is done usually on the seventh and again on the fifteenth day. The first test is for the purpose of testing out all infertile eggs and "blood rings." "Blood rings" are eggs in which the germ has died during the early part of incubation. The purpose of the second test is to eliminate from the incubator all dead germs, those embryos which have died after the first test.

While the chicks are hatching it is wise to keep the incubator chamber dark; this will tend to keep the chicks quiet and they will not be inclined to crowd to the front of the incubator. The chicks should not be removed from the incubator until several hours after the last chick has hatched.

The flame of the lamp should be gradually lowered while the chicks are hatching, for they give off considerable body heat. If the chicks start to pant, open the door of the incubator very little to give ventilation. While the chicks are being held in the incubator, the temperature should be lowered



A handy little coop for hatching and brooding chicks. One hen may be set in each compartment and when the chicks are hatched they are brooded in the same coop. The front run is to confine the chicks for the first few days. The top is hinged. It is 6 ft. long by 3 ft. wide and 2½ ft. high in front and 1½ ft. behind.

gradually, as in this way the chicks are prepared for the brooder.

Every incubator should be disinfected with a ten per cent. solution of a good commercial disinfectant before and after every hatch.

M. A. JULL

THE PROPER WAY TO SET HENS

SETTING hens is an important matter where the poultry-man depends on the hens for incubating. The location of the nest is the first thing to be considered; it should be in a fairly secluded spot away from the rest of the flock, and where no one except the attendant needs to go. The hen wants to feel that she is alone, and if she is allowed to steal her nest she generally selects a spot where there is little or no danger of being molested. The nest should be so situated that it can be kept sweet and clean, and where the hen can exercise and dust while off her eggs. It should be about 18 inches square, the sides, bottom, top and back solid, with a four to six-inch board along the bottom of the front part; a slatted door should be put on to shut the hen in during the time that the attendant is not around, in order to prevent her from leaving the nest.

If set on a board floor, an upturned sod or a shovelful or two of fresh earth should be placed in the box and formed round into the shape of a nest. Then cover with short cut hay, straw or shavings, shaping it with the hands into proper form. Place a nest egg or two in this and see that everything is ready for the hen. At night place the broody hen gently on the nest and close the door, leaving her alone until morning. In the morning open up her box and place some feed before her. If she refuses to leave the nest within a reasonable time, shut her up and leave her alone until the following morning. If she refuses to leave her nest the second morning lift her off gently and destroy her nest egg. Give her a setting of eggs while she is feeding and see to it that she is put back on her nest if she does not go on of her own accord. Provide her with plenty of good fresh drinking water and a dust bath, and have plenty of good feed before her. Corn is one of the best grains because it keeps the hen from getting too thin, and this can be prevented by giving her fat-forming food. It is also a good food to keep up the heat of her body.

While the hen is off the nest the eggs should be examined. Remove all broken eggs, if any, and wash all the soiled and dirty eggs in warm water. If the nesting material is soiled it should be replaced with fresh material. This is very important, for if the nest is left in a filthy condition it will soon be swarming with lice; the pores of the egg shells, also, may become stopped up with the filth, and this will interfere considerably with the vitality of the chick or embryo. Before placing the hen on the nest it would be well to dust her with some good lice-destroyer, and once a week afterwards, dusting her the last time just a day before the eggs pip.

If more than one hen is set at the same time the eggs should be tested on the seventh day and the fertile eggs placed under as few hens as possible. The other hens may be given a fresh supply of eggs or sent back to the laying runs if you have plenty of broody hens.

When the eggs begin to pip, which should be about the twentieth day, it is better to leave the hen alone and not excite her in any way; otherwise she would probably kill a few chicks. It would be well to keep her shut up on the nest, because it sometimes happens that one of the chicks gets out, and while the hen goes off to look after it the rest of the hatch will spoil. When the hatch is all off, lift the hen gently off the nest, remove all egg-shells, etc., replace with some clean nesting material and put the hen and chicks back on the nest. Leave them on the nest for from 24-36 hours before removing them. At the end of 36 hours the hen and her brood should be taken from the nest and placed in a coop about 3 ft. long, 2 ft. 6 in. deep and 2 ft. high, with a well-sloped roof to shed the water. The front should be of wire netting and the coop should have a solid bottom so that it can be easily moved to a fresh spot at night while the chicks are in it, and be as well rat and skunk proof. The following morning give them their first meal, which should consist of bread crumbs and hard-boiled eggs, moistened a little but not sloppy and containing some fine chick grit, and plenty of fresh water to drink. It is well to place their first feed on a board. This treatment will give the chicks a good start in life.

S. A. BERGEY

TURKEY NESTS

IF strong vigorous poults are to be expected, free range is absolutely necessary for the turkey hen, thus allowing her to choose her own nest. Altogether too often the busy housewife declares that she cannot follow the turkey hen all over the farm in search of nests, but must confine her flock in small enclosures. Where such practices are followed the turkey hen walks up and down trying to get out of the enclosure and is restless and rebellious until at last, in a lifeless way, she deposits her eggs in a nest which she was forced to select. This method of forcing the turkey hen to lay where she does not wish and the restlessness and rebellious spirit of the hen will not only have a tendency to considerably decrease the number of eggs laid before she sets, but also has a tendency to make the young poults when hatched weaker and less vigorous than if the hen is allowed to choose her nest. Should the hen at any time get out of the enclosure before she sets she has been known to run a mile or so from home for a nest when she has been worried and watched and no suitable nests provided. When this happens the turkey hen when setting is exposed to great danger. Only too often she is then robbed of her eggs, or sometimes her young poults, and frequently the hen herself as well falls a prey to some enemy.

After the mating season has arrived and before the hens show a disposition to hunt for nests a bright morning can be very profitably spent in makink nests for them. Select sheltered nooks by stump trees, brush piles, fences or buildings, giving them if possible a southern exposure. Very often an old coop, barrel or door can be used to good advantage. Place it so that the nest is fairly dark and quiet. Put in some straw or nesting material. Quite frequently where such a practice is followed one has little difficulty with turkeys, and very often with a little experience one can have them make their nests where they are wanted, and the turkey hens are none the wiser and are perfectly contented.

POULTRY NOTES

THE Provincial Department of Agriculture has recently published in French a valuable treatise on practical poultry-raising in Quebec. Bulletin No. 4 is the latest to be published by the Department and it will serve materially in the development and improvement of our poultry industry.

The poultry department of Macdonald College distributed in the month of April over four hundred settings of hatching eggs to school children. These were distributed through the demonstrators who are organizing school fairs where the chickens hatched from these eggs will be exhibited. The following centres received the eggs:—Aylmer, Shawville, Howick, Huntingdon, Cowansville, Ste. Anne de Bellevue, Lennoxville and Ayer's Cliff. The children are taking a great deal of interest in this work and successful poultry exhibits are assured.

The Ottawa Poultry Association is planning an excursion to the College on May 23rd. The Montreal Poultry Association is also intending to come out some Saturday afternoon in May or June, and the Sherbrooke Poultry Association may run an excursion to the College in June.

The Poultry Division of the Central Experimental Farms has recently published a bulletin on "How to tell the Age of Hens and Pigeons". The information in this bulletin, No. 16, Second Series, was prepared by Mr. Victor Fortier, Assistant Dominion Poultry Husbandman. The bulletin is of value to poultry breeders in particular.

ANNUAL MEETING OF POULTRY AUTHORITIES

THE seventh annual meeting of the American Association of Instructors and Investigators in Poultry Husbandry will be held on the 5th, 6th and 7th of August at Macdonald College, Ste. Anne de Bellevue, Que. This Association is composed of poultry-men who are connected with Agricultural Colleges, Experiment Stations, State, Provincial and Federal Governments in the United States and Canada. It is an international association of wide repute, and since its inception some six years ago it has done much to further the interests of poultry culture in America. Through the organization of this Association the educational and investigational phases of the poultry industry have been well outlined and defined, and the Association is also concerned in the commercial side of the business.

The annual meetings of the Association are held at Agricultural Colleges in various parts of the country. This year the Poultry Department of Macdonald College will have the honour of entertaining the Association. The officers for the present year are:—

President—Prof J. C. Graham, Mass. Agr. College, Amherst, Mass.

1st. Vice-Pres.—Prof. W. F. Kirkpatrick, Conn. Agr. College, Storrs, Conn.

2nd. Vice-Pres.—Mr. M. A. Jull, Macdonald College, Que.

Secy.—Treas.—Prof. H. R. Lewis, N. J. Agr. College, New Brunswick, N. J.

Directors, 1912-14 :—Dr. Raymond Pearl, Me. Exp. Station, Orono, Me.; Prof. J.E. Halpin, Wis. Agr. College, Madison, Wis.; Director T. E. Quisenberry, Exp. Station, Mountain Grove, Mo.

1913-15 — Prof. W. R. Graham, O. A. College, Guelph, Ont.; Prof. Jas. E. Rice, Agr. College, Ithaca, N. Y.

CARE OF MANURE

AMONG the farmers visited in the Prairie Provinces in the Agricultural Survey work, in 1913, not one was found to be giving any care to prevent the waste of barnyard manure. In Ontario, so often called the "Banner Province," 93 per cent exercise no special care to prevent waste. In the Maritime Provinces, greater care is taken, about 40 per cent of the farmers visited having either manure sheds or cellars for storing the manure. Ontario may well copy this leaf from the book of the Eastern farmer's operations.

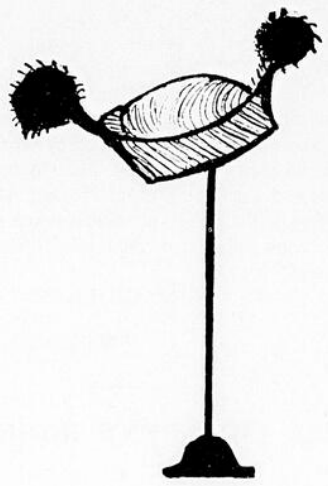
Prevention is better than cure. Prevent loss of the manure already being produced and it will not be so necessary to buy the expensive fertilizers to build up the sick and worn-out soil. Prevent the loss of the liquids by using some sort of absorbent. Prevent loss from heating by piling and mixing carefully in flat piles, not too deep, and keep tramped.—*F. C. Nunnick* in March *Conservation.*

WOMAN'S WORLD

THE SPRING HATS

AS someone remarked to me, almost every style and shape of hat is being worn this spring, except last year's.

We find the majority of the new hats have bandeaux and are plenteously endowed with ribbon, flowers, lace, jet ornaments, feather mounts, beads etc.



The most popular hats are those that fit close to the face, with one high side, and sailor shapes (usually with bandeaux). For the most part the trimming is in the front or on the side; we find no, or few, ornaments at the back, except when the front and back trimmings are identical as is the case with a great many of this season's hats.

All kinds of ribbon ornaments are very much in vogue. Small fans made of pleated ribbon are used and long twisted stems with loops or pleating coming out at the top. These either lie flat on the brim or shoot off the high side of the hat.

Jet is a favourite among this season's trimmings, some elaborate picture hats being entirely covered with it; but no mistake will be made if we combine flowers and ribbon (plaids, moirée, flowered and corded are all used) for the serviceable ready-to-wear hat, which of course we want smart but inexpensive.

Silk crowns prevail, many being made of two strips of ribbon joined through the centre with a cord. We also find a number of spring hats entirely made of silk, usually taffeta, although we shall find some of moirée and an occasional one of satin—the latter, however, is generally combined with straw.

H. GIBBON

FOODS AND FOOD PREPARATION

Lesson IV

FRUITS (continued)

THE warm days of spring have come and the wild flowers are peeping out from mossy beds.

The heavy clothes of winter, that were so pleasing last season, look so "stuffy" now that we cannot give them their final brushing and lay them away quickly enough. We feel just the same about our diet. We turn from the heavy foods, very grateful in winter days, to cool refreshing things in keeping with the spring. It is therefore a pleasure to continue our last day's lesson on Fruits, and to send out to our friends "some favourite recipes".

GRAPE-FRUIT.

Grape-Fruit is so named because it grows in clusters suggesting the grape. In selecting the fruit, secure one of good weight for the size. It is almost sure to be juicy and of good flavour.

To prepare a Grape-Fruit. Cut the grape-fruit in halves, cross-ways. Remove the seeds and with a sharp and pointed knife, separate the pulp from the skin, cutting around the entire circumference of the fruit. Then make cuts to separate pulp from tough portion which divides fruit into sections, so that each section is perfectly free. Sprinkle liberally with sugar. Allow to stand fifteen minutes in a cold place before serving.

In preparing grape-fruit for luncheon, it is sometimes preferable to cut out the centre and fill the space with sugar: a maraschino cherry may be added if desired.

A new and very acceptable way of serving grape-fruit is to chop mint finely and sprinkle it over the top of the grape-fruit.

If the pulp of the fruit is to be combined with other fruits, it is desirable to keep the pieces as large and unbroken as possible. To do this, remove the skin in quarters, discarding any particle of the thick white skin: separate carefully into sections; cut a slit in the membrane covering each section: remove membrane and all seeds, and leave the fruit in one large piece or break in smaller pieces.

Grape-Fruit Salad. The following recipe is delicious:—

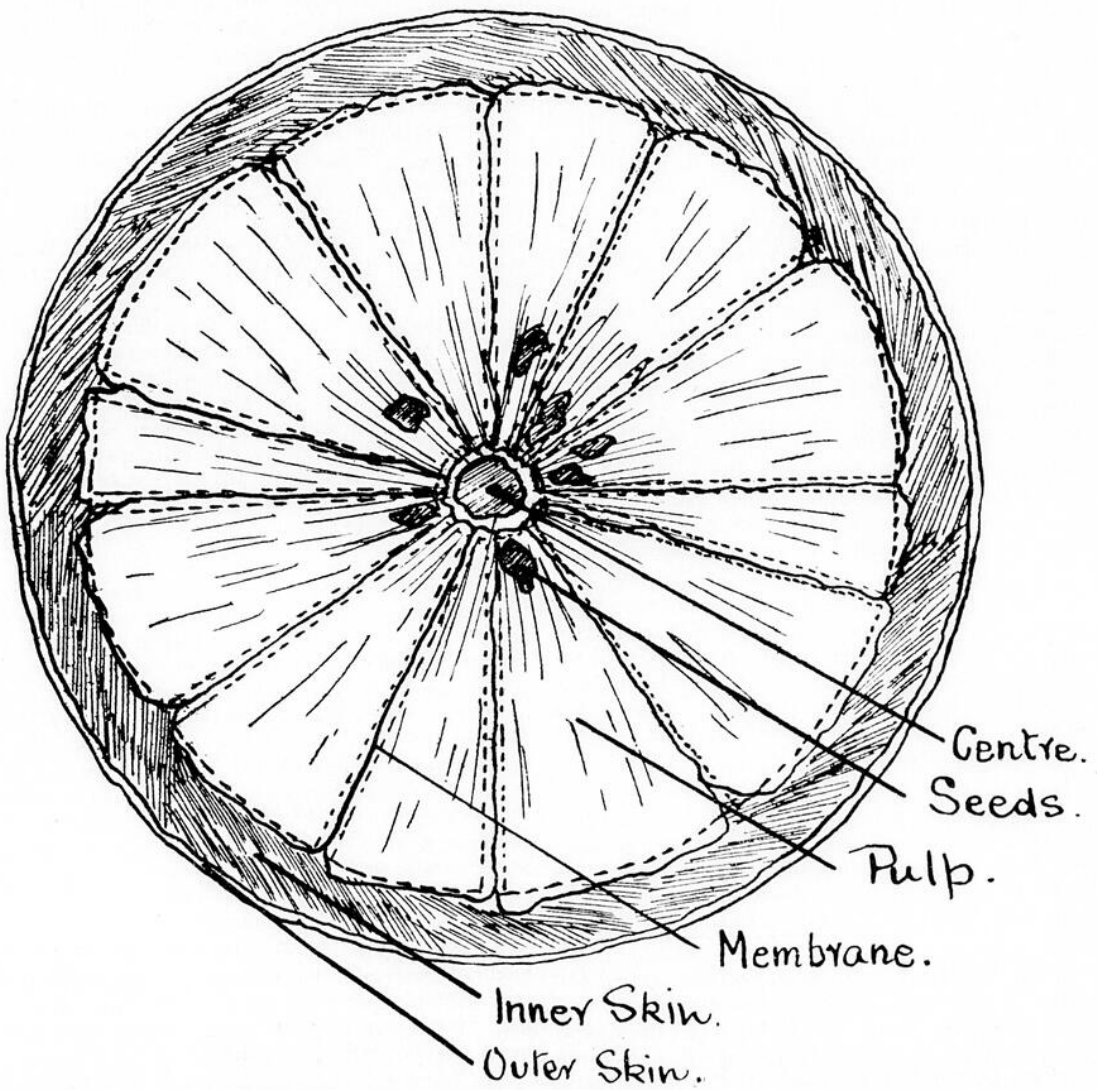
2 Grape-Fruit.
1 Red Pepper.
2 Green Peppers.
1 Cupful of diced Celery. ("Good Housekeeping" April 1911).

Remove the pulp from the grape-fruit as described above. Remove the stems and seeds from the peppers and shred finely. Mix together grape fruit, peppers and celery. Combine with a French dressing made the usual way--but using grape-fruit juice instead of vinegar. Place the mixture on a bed of watercress or small crisp lettuce leaves.

RHUBARB.

Do not neglect to have rhubarb on the bill-of-fare as often as possible, while it is in season. It is excellent for toning up the system. If forced to buy rhubarb which is not as fresh as desired, cut a slice off the roots, remove the leaves and stand in water until it becomes crisp—one to three hours.

Strawberry rhubarb is the best to use for cooking.



Grape-fruit dotted lines indicating cutting of fruit for the table

STEAMED RHUBARB.

Wash and cut in pieces without removing the skin. Put it into a granite double boiler without water and steam until soft. Do not let it go to pieces or it will lose its flavour.

If the family do not care for rhubarb cooked in the ordinary way or become tired of it, try this !

Baked Rhubarb. Wash the stalks, skin—unless very young and tender, and cut into inch pieces.

1 heaping quart of inch pieces.
3 cups sugar.
3 oranges.
½ teaspoon blade mace.
1 doz. cloves.
A tiny bit of stick cinnamon.

Put the rhubarb in a deep baking dish—earthen or granite. Sprinkle the sugar and spices over it (the mace should be broken into small pieces). Wash the oranges and pare off the rind *thinly* in small bits. Scoop out the pulp of the orange, rejecting seeds and inner skin, and add the bits of rind and pulp to the baking dish. If the oranges are very juicy no water is needed; if they are not, add two tablespoons of cold water and set in a hot oven. Cook until the rhubarb is soft and the syrup clear.

Try a short-cake filled with the above mixture, or split a fresh sponge cake, spread between the halves and serve with whipped cream.

PINEAPPLE.

June is the month for pineapples. Instead of paring and slicing the pineapple, try this !

Cut off the top and shred out the inside with a silver fork. Add sugar to suit the taste and return the mixture to the inside of the pineapple and allow to stand several hours in a cold place before serving.

It is not generally known that pineapple may be preserved without cooking. Use the following method and retain the delicious flavour of the fruit.

Cut up the pineapple in dice or shred it with a silver fork. Add an equal quantity of sugar to the amount of pineapple used and allow it do stand 24 hours, stirring occasionally to dissolve the sugar. Put in sterilized self-sealers and keep in a cool place.

BAKED BANANAS.

If the raw banana is indigestible, use this recipe.

Peel bananas and arrange in a baking dish. Sprinkle sugar liberally over the fruit and add just enough water to cover the bottom of the dish. Cover closely and bake in a moderate oven until very tender.

APPLE MARMALADE.

This is most tempting and easily made, as well as a change from the usual orange and grapefruit. Chilled and served with whipped cream and cake it is delicious for supper on summer evenings.

Peel and core apples. Slice into eighths and drop in a basin of water. To every pound of apples allow one pound of sugar, ½ ounce of whole ginger and ½ a lemon. Lift the apples, dripping, into the preserving pan and boil with sugar, lemon rind and ginger until quite clear. Add the lemon juice about 20 minutes before preserve is done. Put in sterilized self-sealers.

FRUIT SALADS.

Many pleasing salads may be made by blending fruits in the summer. To those who object to mixing fruit salads with a mayonnaise or a salad dressing, a salad mixed only with lemon juice or pure fruit juice or a number of fruit juices will be most pleasing.

Pick over small fruit, such as raspberries and strawberries. If pineapple is used cut it small and thin. Bananas must be peeled and sliced thin. Oranges must be broken into sections and again divided. Do not leave on any particles of the white skin.

Prepare the fruit. Put it into a basin and pour over it a syrup which has been made by boiling a cup of sugar in a ½ cup of water for 15 minutes. Add juice of 2 lemons and cool. Before serving, carefully lift out the fruit from the syrup, arrange it prettily in your salad dish or on individual dishes if preferred. Put enough of the lemon syrup over it to moisten.

WYMAN CLUB SALAD.

Pick over and wash 1 pint of cranberries and cook with 1 cupful water and 1 cupful sugar, until tender. Remove from the fire; press the juice through a sieve. Soften one tablespoon granulated gelatin in 4 tablespoons cold water. Add the hot cranberry juice, and stir until the gelatin is dissolved. Pour a layer into a mould wet with cold water. Add a layer of diced celery and chopped nut meats as soon as the jelly becomes firm enough to hold them. Repeat, having the last layer of jelly. When cold cut in squares and serve with mayonnaise, garnishing with sprigs of parsley or white celery tops.

F. CAMPBELL

HOW TO PUT AWAY LAST WINTER'S SUIT

REMOVE dust by careful brushing with a soft brush of hair. In the skirt, follow along the seams, the foot-binding, and any pleats there may be. The collar and cuffs of the coat require special care.

Remember that moths are easily attracted by dust and stains in dark corners.

To remove spots from the fabric. For spots made by many food stuffs, for example, sugar, soft water, cold or warm, will be sufficient. For some others try warm suds made with soft water. Apply in either case with a piece of goods as nearly like the fabric you are treating in sort and color as possible, and rinse with plain soft water applied in the same way.

An excellent cleaning mixture that will not spot a delicate fabric is:—

Sulphuric ether,	1 drachm,
Chloriform,	1 "
Alcohol,	1 "

Mix with one quart of deodorized benzine. Apply this, using a fine soft cloth, to spots to be rubbed off.

Now that the suit is free from dust and stain, hang it in the open air for a few hours on a sunny day with some wind. The sun will act as a disinfectant, and the breeze will have a freshening effect. It is necessary to hang it very carefully in order to have good results. The skirt may be hung, doubled, from the waist band, the coat from a padded coat hanger. It is worth while taking care of these details in order to avoid creasing or marking of any sort.

In choosing a store-room for between seasons, remember that a dry atmosphere is not the best for woollen goods. A little moisture in the air is preferable and adds to the appearance of cloth in giving life to it. The ventilation of the room is a further consideration. If you can arrange to allow fresh air to enter and yet keep out moths you will have managed well. Ordinary cedar boughs scattered about a small store-room are a moth preventive. So are cloths sprinkled with spirits of turpentine or ordinary ground black pepper, and there are many other means to this end. However, it is wise to go through the clothes thus put away at least twice during the summer months.

A test against moths that has stood for a hundred years is a bag of common unbleached factory cotton. Furs well beaten in the open air and then put away in such bags, closely tied, have never been known to be moth-eaten.

The method of hanging your suit will make or mar its appearance next winter.

Pad the coat-hanger well with cotton wool, covered with some thin cotton goods. This will prevent any possibility of rust from the hanger, and will plump out the coat to a proper shape. Stuff the sleeves with soft paper free from ink.

The skirt is hung from the canvas belt at the top, being first doubled smoothly. (Men's trousers are hung from the ankle part. Their coats and waistcoats are treated much as women's coats are).

To remove creases from cloth, crepe de chine, or soft silk clothes or suits. Hang the suits or dresses very carefully, as described above, so that there will be no pressure against them, in a bath-room. Turn on the hot water, until the air of the bath-room is filled with steam. Leave the bath-tub filled with this hot steaming water. Close the room up with the clothes hanging in it overnight. In the morning they will be found to be free from creases and to present a fresh appearance. Men's suits and women's suits are satisfactorily done in this easy way. To anyone trying this experiment for the first time the results are surprising, for the vapour seems to feed the fabrics and renovate them.

N. MACMILLAN,

Macdonald College

THE CHILDREN'S HOMER

II.

THE king of Troy, in the time of Homer's story, was Priam. He had a great many children, the stories say, but we know about only three or four of them. One son was named Paris, and when he was born, his mother and his older sister, Cassandra who had been given the power of prophecy by the god, Apollo, foretold that he would cause the ruin of Troy. In those days certain people seemed to be able to see what was going to happen ahead of time, not very clearly, but still in a general way, so that afterwards it would be remembered,—"This is what she said would happen." So when Cassandra foretold this about Paris, King Priam was frightened, and gave orders that the little baby should be left out on the mountain side to die. But Paris did not die, because some kind shepherds found him, and took care of him, and he grew up as a shepherd himself, not knowing that he was a king's son.

It happened when Paris had grown into a youth, that the gods had a great feast on Mt. Olympus, and one goddess was not invited. She was very angry, and to punish the gods she persuaded Hephaistos, a lame god who was wonderfully skilful at making all sorts of metal things, to make for her a golden apple, upon which was written, "For the fairest".

When the gods were banqueting she threw this apple upon the table, and there arose at once a quarrel, because three goddesses claimed the apple, which has always since been called "the apple of discord". Hera, Athena, and Aphrodite, each was sure she was the most beautiful, and poor Zeus, when they called upon him to decide, was afraid to give it to any one of them, for fear of the anger of the others; he did so hate to be scolded by his wife and daughters. Finally, he said that Paris, the shepherd youth of Mt. Ida, should see the three goddesses and decide, and a day was set for the Judgment.

But before the day appointed each of the three goddesses went secretly to Paris and tried to bribe him to give the golden apple to her. Hera offered him power; Athena, wisdom; but Aphrodite promised him the most beautiful woman in the world. And Paris gave Aphrodite the apple.

Now the most beautiful woman in the world was Helen, wife of Menelaos, King of Sparta. So Aphrodite told Paris to go to the court of Menelaos, and tell him that he was Priam's son. Menelaos was

OF GENERAL INTEREST

STANDING CROPS, 1913

WE are in receipt of the report of the competitions in standing crops for seed grain for 1913. Competitions were held by 61 agricultural societies and the total number of competitors as follows:—In oats there were 48 competitions, with 698 competitors; 5 potato trials with 71 competitors; 3 of Indian corn with 42 competitors; 3 of wheat, 28 competitors; 1 trial of barley with 12 competitors, and 1 of clover with 4 competitors.

The progress of the movement of the standing-crop competitions for seed grain is shown in the following table, dating from 1908, when they were first held.

Years	Numbers of agricultural societies that opened competitions in standing crops for seed grain.	Number of competitors.
1908	18	171
1909	43	599
1910	45	591
1911	54	570
1912	61	782
1913	61	855

Mr. H. Nagant, editor of the Journal d'Agriculture, summarizes the comments of the judges in an introduction to the report. The chief obstacles in the way of the production of seed grain appear to be carelessness in the selection of seed and the prevalence of weeds and smut. Short rotations, including hoed crops, or at least summer plowing, are recommended to eliminate the weeds and treatment of the seed with formalin to deal with the smut difficulty. Farmers are recommended to buy seed corn in the ear, to select seed potatoes carefully and to protect the potato plant from disease by spraying with Bordeaux mixture.

The growth of interest in the competition is a good index of the increasing appreciation of our farmers of the importance of pure and selected seed. Our readers should get the report from the Provincial Department and read the comments applying to their home counties.

DAIRY VALUE

IN the commercial world it is reasonable to assume that what you pay and what you get determine value; a low price, in itself, does not spell value; price and quality, together, determine value.

As applied to the dairy herd, how does this work out? A farmer does not necessarily buy a cow because the price is low, he wants quality; in this case quality may be interpreted to mean dairy capacity, or ability to produce plenty of good milk. If he does not purchase, possibly the heifer coming into milk has been raised at rather too high a cost so that her dairy quality is impaired. She may not be of the right stock, that is, from a dam of deep milking qualities and a sire of known ability, and all may have suffered from lack of the right feed.

The other part of the value side of every dairy cow, that is, what you get from her, is right in the dairyman's own hands. He can easily determine each cow's value, or dairy quality, by keeping individual records of production. Then if he wishes to part with a good cow, her selling price is enhanced by reason of that certificate of value, her record, which helps to fix the price. Right buying is true economy; the factory patron with the highest conception of value will buy, or raise, right, and will know by his own simple records that each cow in the herd separately, not averaged in a lump, fits his ideal of value. Fix a good standard, make each cow pay. Milk and feed record forms are supplied free by the Dairy Commissioner, Ottawa.

C. F. WHITLEY,

Dairy Div. Ottawa

TREES

By M. Blanche.

In serried rank or lonely state,
  Like veterans they stand,
Through starry night, through storm-swept days,
  To sentinel the land.

I know not if I love them best
  When fledged with springtime green,
Or when, with silvan vesture clad,
  They deck the summer scene.

And yet when autumn touches them
  With dyes unknown to art,
Beneath that gorgeous color-spell
  I needs must yield my heart.

But, ah! I know I love them well
  When, all white winter through,
With gray and lacelike tracery,
  They etch the curving blue.

ANNUAL MEETING OF THE QUEBEC SOCIETY FOR THE PROTECTION OF PLANTS

At Macdonald College, March 27th.

THE sixth Annual Meeting of the Quebec Society for the Protection of Plants was held at Macdonald College on Thursday, March 27th. Among the members present were Mr. J. C. Chapais, St. Denis-en-bas; Father Leopold and Brother Benjamin of the Oka Agricultural College; Rev. Dr. Robert Campbell, Montreal; Mr. A. F. Winn, Westmount; Professor F. E. Lloyd, McGill University, Montreal; Mr. Arthur Gibson and Mr. J. M. Swaine, Assistant Entomologists, C. E. F., Ottawa; Dr. F. C. Harrison, Professor W. Lochhead, Prof. W. P. Fraser, P. I. Bryce, Dr. Hamilton, Professor Bunting, and others from Macdonald College. Letters of regret at their inability to attend were read from Dr. C. G. Hewitt, Rev. Abbe Huard, Brother Victorin, Rev. Dr. Fyles and Mr. Eastham.

Following is a list of the addresses and papers read at the meeting:—

Report as Delegate to the Ontario Entomological Society—J. C. Chapais, St. Denis-en-bas.

The White Cystopus of Crucifers—J. C. Chapais.

Bacillus nigrofaciens, a Bacterial Parasite of the White Grub—J. Vanderleck, Macdonald College.

Necessity for the Publication of a Flora for the Province of Quebec—Rev. Bro. Victorin, Longueuil.

Tuber Diseases of the Potato—J. W. Eastham, Assistant Botanist, C.E.F., Ottawa.

The Injurious Flea-beetles of Quebec—A. Gibson, Asst.-Ent., Ottawa.

Spraying Items and Notes—Rev. Father Leopold, La Trappe.

Insects of 1913—E.M. DuPorte, Macdonald College.

Notes on Shade Tree Insects—J. M. Swaine, Asst. Ent., Ottawa.

Injurious Insects of Quebec—J. A. Beaulieu, Asst. Ent., Ottawa.

President's Address, "Insects and Disease" — W. Lochhead, Macdonald College.

Some Important Storage Roots of Vegetables—W. P. Fraser, Macdonald College.

Foul Brood Disease in Bees—F. W. L. Sladen, Asst. Ent., Ottawa.

Some Beneficial Hemiptera (Bugs)—P. I. Bryce, Macdonald College.

Injury and Abscission—Prof. Lloyd, McGill University.

The following officers were elected for 1914—15:—

President—Professeur W. Lochhead, Macdonald College.

Vice-President—Mr. Auguste Dupuis, Director of Fruit Experiment Stations, Village des Aulnaies, P. Q.

Sec.-Treas.—J. M. Swaine, Assistant Entomologist for Forest Insects, C. E. F., Ottawa.

Curator and Librarian—P. I. Bryce, Assistant in Biology, Macdonald College.

Directors—Rev. Dr. Thos. Fyles, Ottawa; Rev. Father Leopold, La Trappe; Rev. Father Victorin, Longueuil; A. F. Winn, Esq., Montreal; Prof. L. S. Klinck, Macdonald College; Rev. Abbe Huard, Provincial Entomologist, Quebec, Que.; G. Chagnon Esq., Montreal; Dr. Hamilton, Macdonald College.

Delegate to the Royal Society of Canada—Professor Lochhead, Macdonald College.

---

very kind to Paris and made him welcome at his court. Paris was a handsome youth and people always liked him, but he was not very brave nor honorable, because, one time, when Menelaos was away, he carried off Helen and a great deal of treasure to Troy. Naturally, when Menelaos came home, and found his wife and treasure gone, stolen by a man he had liked and trusted, he was very angry, and all his friends and kinsmen were angry as well, ready to fight for him to get Helen back.

Paris had taken Helen to Troy, and although his sister Cassandra said again that he would cause the ruin of Troy, yet his father Priam received him, when he knew he was his son, and Paris and Helen were safe inside the walls of Troy when Menelaos and his friends decided to get her back.

Menelaos had a brother, a very rich and powerful king, who lived at Mycenae, in a great palace of which the ruins can still be seen. Over the great stone gate of this palace was a carving of two big lions which has lasted all these years, and was for a long time the only sign of Agamemnon's palace, but lately men have dug away the earth that had gathered over the ruins there, and found many interesting things, gold ornaments, and cups, and swords. Of all the leaders who went to bring back Helen from Troy, this brother of Menelaos, King Agamemnon, was the chief, but there were many others, also, of whom Homer tells us.

Think of the messengers running from place to place in Greece, to tell the kings what Paris had done: it would take many weeks, for the messengers must go on foot, and Greece is a mountainous country. The men of that time had beautiful strong horses to draw their two-wheeled wooden chariots, but they do not seem to have ridden on the horses' backs; instead, men were trained to run very fast and very far. We can imagine these runners coming to the kings with the news about Paris, and how each king agreed to go with his ships across the sea to Troy, and help Menelaos to fight against the Trojans.

MARGARET GRAY

Last distribution of the Automatic Stitcher of "Le Canada". Dont delay for there is only few dozen to spare.

If it's for a Permanent Job, put up

Frost Fence

There are several factors that make FROST FENCE the **permanent** fence.

The starting point of any fence is the wire used. We are not satisfied to take the assurance of any wire manufacturers in the country. **We make our own wire,** and every foot of it is best full-gauge No. 9 Hard Steel Wire. That's why we can make strong claims for FROST FENCE durability.

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Any FROST Dealer can give you more facts and show you more proof.

Write us direct if you can't get FROST FENCE. We may need an agent in your district. 53

Frost Wire Fence Co., Ltd.

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FOR SALE—A Canadian Stallion registered under the No. 1299, 5 years old, weight 1200 lbs., brown hair, good roadster and good worker. Sold with guarantee. PHILIAS DUBE, St. Mathieu, Rimouski Co., P. Q.

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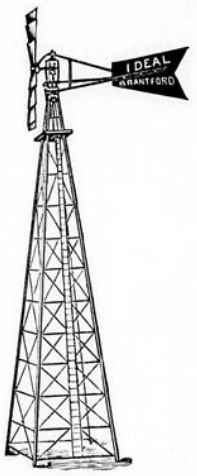

Our Double-Geared "Ideal" Pumping Windmill has double strength. If pull-in wire breaks in storm mill goes out of gear. Wheel and Vane galvanized after made.

Our towers are girted every five feet and are double braced, and braces locked to girts where they cross.

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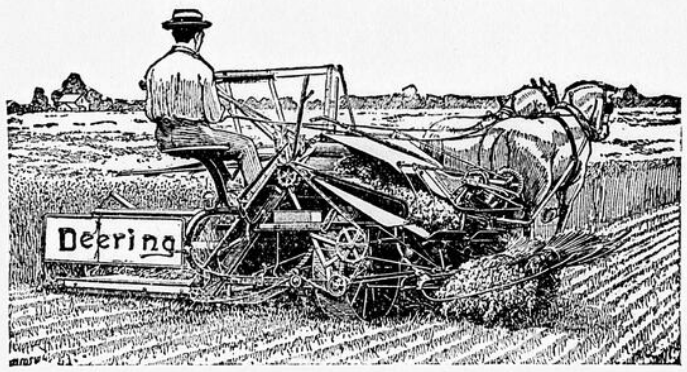
THE LAWRENCE-WILLIAMS CO., Toronto, Ont.

Deering New Ideal Binder



A Deering New Ideal binder will go into any grain field and cut, bind and deliver all the grain in that field. Any Eastern Canadian farmer can prove this statement to his full satisfaction by studying Deering binder features and trying the machine.

The reel is adjustable for tall, short, down or tangled grain. The special T-shape cutter bar enables the operator to tilt the platform close to the ground when necessary. The bottoms of the guards are almost level with the bottom of the platform, preventing trash being pushed in front of the knife.

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Hamilton, Ont. London, Ont. Montreal, Que.
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These machines are built at Hamilton, Ont.

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10¢

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IS IN A CLASS BY ITSELF!

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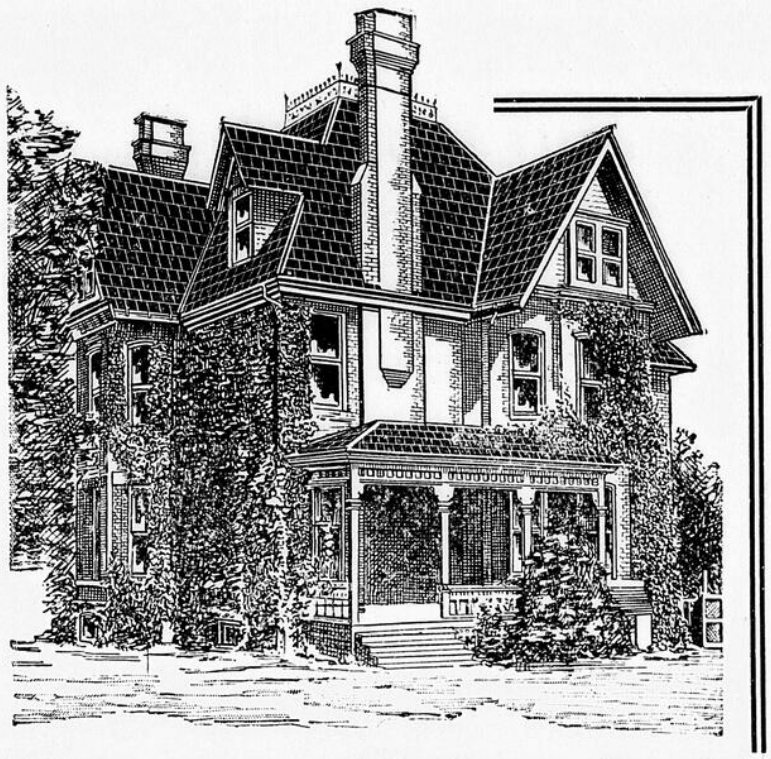

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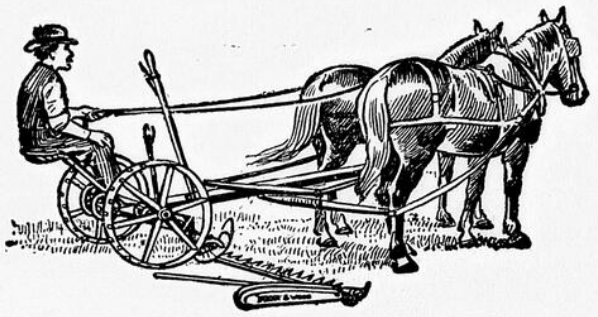

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Internal-Gear **All-Steel**

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To farm without the aid of these two valuable Haymakers is to work under a heavy handicap. Their use, for a single season, will prove this to your complete satisfaction.

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The cutter-bar of the FROST & WOOD MOWER is driven by **internal** gears. "Lost motion" is completely done away with—tooth-wear and friction reduced to the lowest point. Roller-Bearings at every vital point make this MOWER unquestionably the easiest running machine of its kind on the market.

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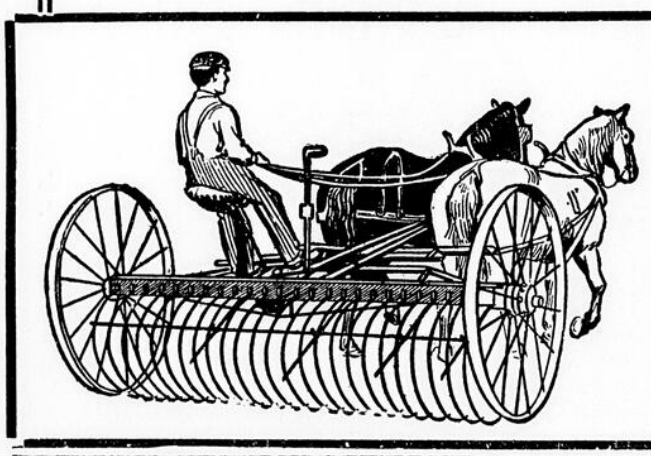

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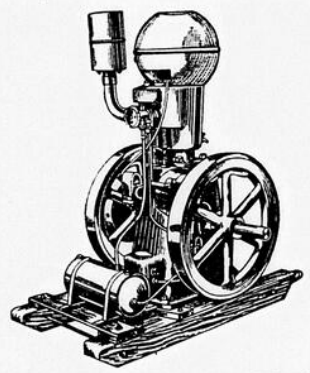

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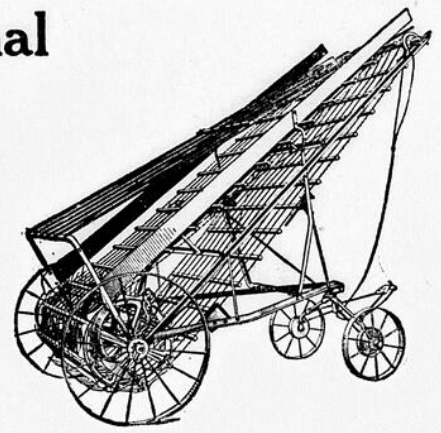

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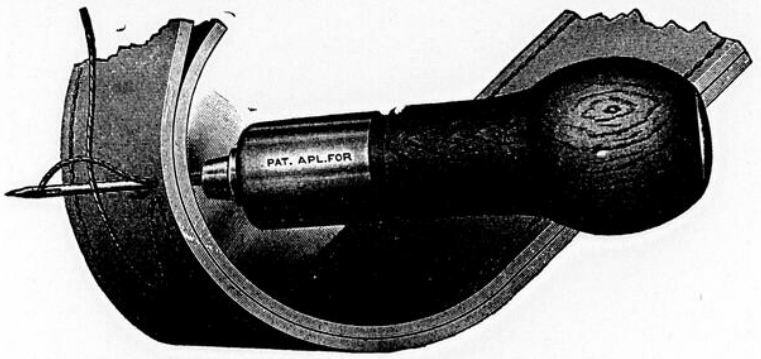

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5	37	22	8, 9, 10, 10	.20
6	40	22	6½, 7, 8½, 9, 9	.23
7	40	22	5, 5½, 7, 7, 7½, 8	.25
7	48	22	5, 6½, 7½, 9, 10, 10	.25
8	42	22	6, 6, 6, 6, 6, 6, 6	.28
8	42	16½	6, 6, 6, 6, 6, 6, 6	.30
8	47	22	4, 5, 5½, 7, 8½, 9, 9	.28
9	48	22	6, 6, 6, 6, 6, 6, 6, 6	.31
9	48	16½	6, 6, 6, 6, 6, 6, 6, 6	.33
9	51	22	4, 4, 5, 5½, 7, 8½, 9, 9,	.31
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10	51	22	3, 3, 3, 4, 5½, 7, 8½, 9, 9	.33

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6	42	16½	7, 7, 8, 10, 10	.21
7	42	16½	6, 6. 7, 7, 8, 8	.24
7	26	8	3, 3, 4, 5, 5, 6	.25
8	48	16½	4, 5, 6, 7, 8, 9, 9	.28
9	36	12	3, 3, 3, 4, 5, 6, 6, 6	.29
9	50	16½	3, 4, 5, 6, 7, 8, 9, 9	.30
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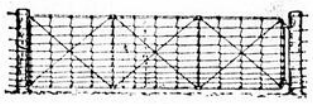

48	10-ft. op'ng.	4.00
48	12-ft. op'ng.	4.20
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