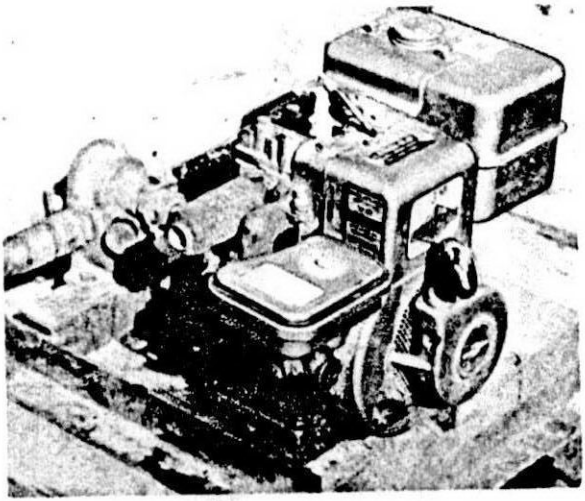
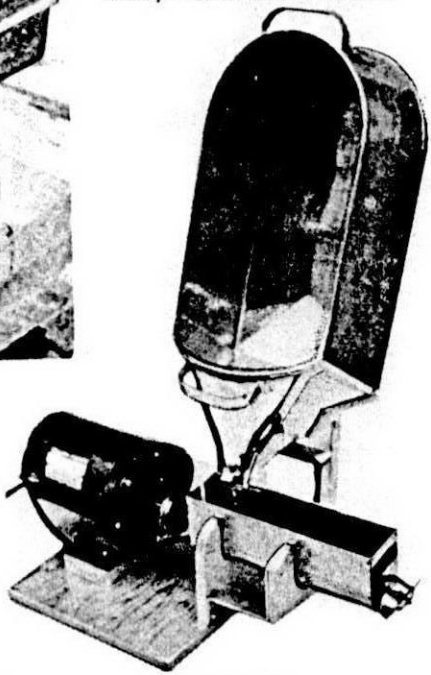
NATIONAL MAPLE SYRUP DIGEST

Vol. 14, No. 2 July, 1975

MAPLE CANDY MAKER

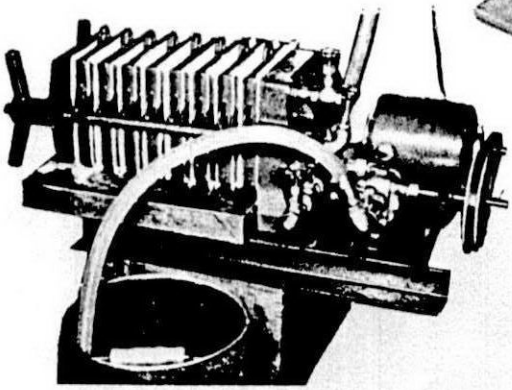
Time saver and profit maker. Brings out maple flavor in candy. Stainless steel const.





SAP PUMP SUCKER FOR EFFORTLESS GATHERING

Pump and engine 50 ft. 1 inch Dia. Rubber Hose

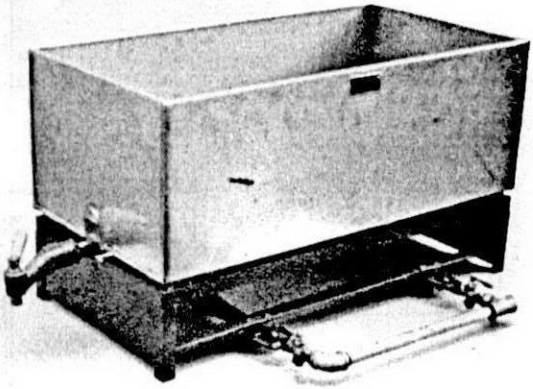


MAPLE SYRUP FILTER PRESS

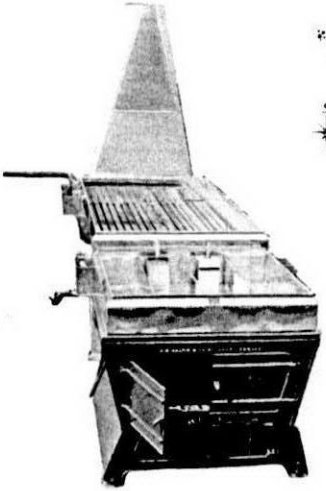
Takes out all dirt and sugar sand. Electric motor operates a bronze gear pump to push hot syrup thru filter and lift it to any height. Capacity 2 gallons per minute.

GAS FIRED FINISHING PAN

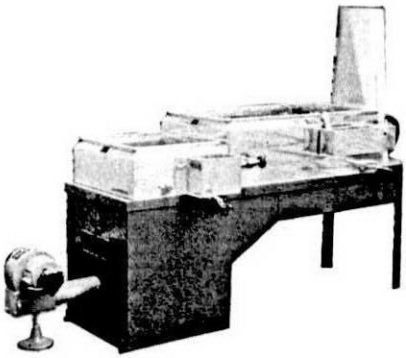
A new gas fired finishing pan for the smaller sized evaporators. Also ideal for making cream and sugar. Rugged base and fittings.



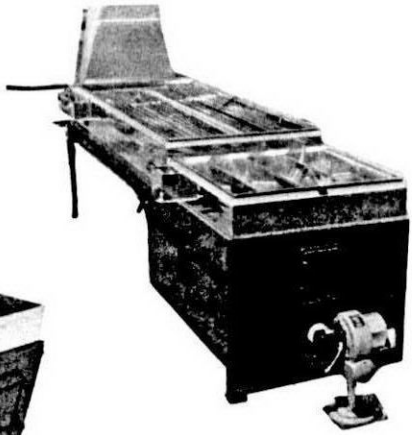
WOOD & OIL BURNING EVAPORATORS



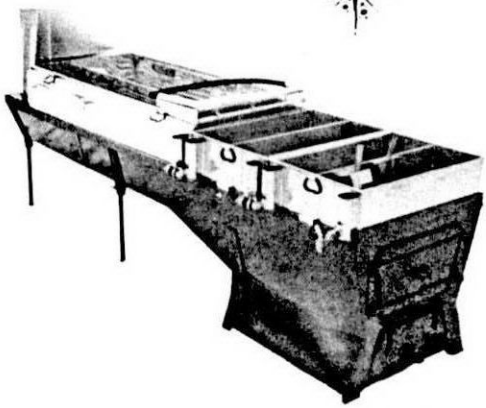
4' x 12' WOOD LIGHTNING



2' x 6' OIL LIGHTNING



4' x 14' OIL LIGHTNING



3' x 10' GRIMM EVAPORATOR

G.H. GRIMM CO.

RUTLAND, VERMONT 05701

AC802 775-5411 773-9519

NATIONAL MAPLE SYRUP DIGEST

Printed by . . . . York Mail-Print
Bainbridge, N. Y.

Edited by . . . . . Lloyd Sipple
Bainbridge, N. Y.

NATIONAL MAPLE SYRUP DIGEST

Published by: Lloyd H. Sipple
R.D. # 2
Bainbridge, N.Y.

Published four times a year.
(Feb., July, Oct., Dec.)
Postage
Paid at Bainbridge, N.Y. 13733
Mailed outside our circulation area for $2.00 per Year.

York

Printed by:
YORK MAIL-PRINT, INC.
Corner of Pruyn & Parsons Sts.
Bainbridge, New York 13733

COVER PICTURE–

Gordon Brookman sugarhouse, So. Dayton, N.Y. Sugar bush mostly old trees with large crowns. The bush was grazed for many years, but young trees are now being nurtured to replace the old in time.

Photo:– USDA Soil Conservation Service.

DIGEST ADVERTISING RATES

2 Page Spread	$242.00
Full Page	132.00
½ Page Vert. or Hor..	.71.00
Column Inch	.10.00
Classified	.30 per word

Deadline for copy –
First of month preceding issue.

Editorial

Another season has come and gone and, while it didn't bring the bumper crop we hoped for, it was better than it has been for several years. From the reports we've received, both official and unofficial, it will average out at about 90% of normal for quantity (see U.S.D.A. crop report following editorial). As for quality, this year's crop will have to be labeled "vintage". The flavor was excellent and most areas reported 90% or over would grade Fancy or A. This should help straighten out the dark syrup surplus.

Sales seem to be as good or better than usual in spite of the recession, which brings another point to mind. If there is a recession, how come you have to wait 2 years for delivery on some merchandise, that is if you can buy it at all. If there's such a high unemployment rate, why doesn't someone get up off his butt and hire some of them and make a few things the public will buy instead of cars, refrigerators and TV sets. Syrup cans were in short supply and no one dared take an order for a new evaporator after New Year's Day. If you need any new equipment or supplies for next year, you better order early - and I don't mean next January.

I'd like to thank all you folks who responded to my plea for contributions last February. If you didn't, it's not too late to do it now. Just hunt up the self-addressed envelope we put in the last issue or use a plain one addressed to: The Maple Syrup Digest, Bainbridge, N.Y. 13733, and please make your check payable to the Maple Syrup Digest.

REPORT FROM THE CHAIRMAN

Kenneth Bascom, Chairman
North American Maple Syrup Council

The report just received from the USDA Crop Reporting Service indicates that most maple producers enjoyed a favorable season. Here in N.H. it was a long season with production reaching the highest total in many years. A significant part of this increase is due to numerous small operations springing up all over the state and our N. H. Maple Producers Association membership is at an all time high.

At the same time it appears that the volume of syrup still in the hands of producers is less than that held a year ago, an encouragement for all involved to attempt even higher production next year. Should this trend continue we may anticipate future marketing problems.

With this in mind we are keeping a hopeful eye on the newly formed International Maple Syrup Institute. Now collecting dues from its charter members it is preparing to promote pure maple on a scale hitherto unknown in our industry. This looks like a strong step forward and deserves the support of all producer organizations.

An up-dated report on the Institute and some new developments in maple research are to be points of discussion at the October meeting of the North American Maple Syrup Council. This year's meeting will be held on October 28th and 29th at Blackwater Falls State Park, Davis, West Virginia. Will see you then!

Ken

MAPLE REPORT - 1975

From USDA Statistical Reporting Service

MAPLE SYRUP: PRODUCTION, PRICE AND VALUE, 1974 AND 1975[1]

STATE	PRODUCTION		PRICE		VALUE	
	1974	1975	1974	1975	1974	1975
	1,000 gallons		Dollars		1,000 dollars	
Maine[2]	7	9	12.70	14.20	89	128
Massachusetts	25	31	11.20	12.00	280	372
Michigan	98	98	10.70	11.20	1,049	1,098
New Hampshire	53	71	12.00	12.80	636	909
New York	334	366	9.60	10.00	3,206	3,660
Ohio	88	114	9.45	10.00	832	1,140
Pennsylvania	77	97	9.40	9.60	724	931
Vermont	325	353	9.60	10.50	3,120	3,707
Wisconsin	80	62	10.40	10.50	832	651
United States	1,087	1201	9.91	10.50	10,768	12,596

[1] Preliminary.

[2] Does not include quantities produced on non-farm lands in Somerset County, Maine.

YOU ARE INVITED

TO ATTEND THE 5th ANNUAL ONTARIO MAPLE SYRUP TOUR

JULY 24 - 25, 1975

This year's tour to be held in the Sundridge - North Bay Area.

For further information, please contact:

ONTARIO MAPLE SYRUP PRODUCERS' ASSOCIATION

1200 Bay Street, 9th floor
Toronto, Ontario M7A 2B2

John Butler, Secretary-Treasurer (416) 965-7701

COMING EVENTS

ONTARIO MAPLE TOUR

The fifth Annual Ontario Maple Tour will be held July 24 - 25, 1975 in the Sundridge–North Bay area. For information, contact: Ontario Maple Syrup Producer's Assoc., 1200 Bay St., 9th floor, Toronto, Ont. M7A 2B2.

NEW YORK MAPLE TOUR

The 1975 New York State Maple Tour will be held as far west as you can go without leaving the state. It will be held in Chautauqua County with an optional side trip into Erie County, Pennsylvania, the second afternoon.

The tour will start in the vicinity of Forestville, N. Y. New York producers will receive more information from their Cooperative Extension Service. Out of state producers may write to Prof. Fred E. Winch, Jr., Fernow Hall, Cornell Univ., Ithaca, N. Y. 14850.

VERMONT MAPLERAMA

The 1975 Vermont Maplerama, an annual maple event for all sugar makers and their friends, will be held in Addison County this year on Friday, August 8 and Saturday, August 9. Registration will begin at Middlebury Union High School at 10:00 a.m. on the 8th. Proposed features will include display, discussion, and live demonstration of sap pre-heaters, visit to a modern poultry farm and sugaring combination, Maple breakfast, audience participation in a modern tubing layout system using different brands of plastic tubing, a unique sap-pumping operation display, sugar bush management in the Starksboro area, and observation of maple equipment and agricultural exhibits at the Addison County Farm and Home Field Days. A newly built sugar house at the Addison County Farm and Home Field Days site will have displays and exhibits for everyone to see and enjoy. This sugar house will be equipped with an evaporator and will offer every visitor the opportunity to become more aware of maple activity within Vermont and Addison County.

For reservations and further information contact Lucien Paquette, County Ext. Agent, Agricultural Center, R.D. No. 3, Middlebury, Vt. 05753. Telephone: 802-388-4969.

NORTH AMERICAN COUNCIL

The annual meeting of the North American Maple Syrup Council will be held on October 28th and 29th at Blackwater Lodge, Blackwater Falls State Park, Davis, West Virginia 26260.

Directors, alternates, and associate directors will receive details by mail. Other interested persons may obtain information from Gordon Gowen, Secretary, Alstead, N.H. 03602, Telephone 603-835-6531.

Letters to the Editor-

Dear Sir:

I think it's about time you stopped referring to dark syrup as a "problem". The only problem with it is that producers have given it a bad reputation by charging lower prices for it, and pretending that there is something wrong with "B" or "C" grade syrup. The shade of syrup one likes is purely a matter of personal preference. I know many people who prefer the flavor of dark syrup over light. Why don't we stop this silly practice of charging lower prices for the darker grades of syrup.

Think it over. R. Stanton
Huntsburg, Ohio

FROM WIANT'S SUGAR CAMP
8450 Rte. 287
West Liberty, Ohio 43357

Dear Mr. Sipple:

This year we tried 120 taps on a vacuum line. We built the "milk can" vacuum clump unit described in the Digest several issues ago. We discovered that when we pulled the sap into the releaser, there was enough air induced into the line that the sugar water in the milk can bubbled so violently that enough water vapor went into our vacuum pump that it froze up. (An old IH single cylinder pump).

We then moved the sap intake to the top of the can—just below the taper. Before brazing the coupling in place, we fitted a strut ell turned down. This took care of that particular problem. Also, we ended up using a styrofoam float, as we were not able to build a copper float that did not crack when the pressure in the can was reduced. Perhaps if a breather were installed in the copper float it would overcome this problem, but the styrofoam was very adequate. This float was made from 6 pieces of foam 1-1/4" thick cut 6" square with the corners rounded to permit entry into the can. It was bolted together with three 3/8"x8" bolts. This gave the float enough weight to work properly on the operating rod.

This second bit of information concerns the preheater discussed in the February, 1975 issue. We use a 4' x 14' evaporater, with a hood, and oil-fired. Under the 8' flue pan hood we installed 50' of 1" copper. The best recorded temperature we found was 135° and it ranged down to about 93°. This is far from the results at the University of Vermont. Fifty feet of 1" copper will hold just over 2 gallons, and since our rate of evaporation is about 200 gallons an hour, the water can only be in the preheater about 40 seconds. We'll be a long time effecting a savings at this rate, but we do have a lot of clean-up water from the condensation run-off.

Our season has been over about 10 days and it was the most successful season we've ever had—and I judge about 90% would grade fancy - weather just right.

Hope I haven't bent your ear too much, but just want to tell you the Digest is just great!

Yours truly,
Charles Wiant

DEAR EDITOR –

My wife, she sez you are interested in unusual events concerning sugar bushes, so before I forget it I'll tell you about our operation in Section 37, south of Knockemstiff. That was the

year that snow snakes were plentiful.

The institute for the Preservation of Wild Animals informed me that snow snakes could be trained so I ordered special harnesses for 511 snakes with the intention of using them for gathering sap. You could order anything from Sears and Roebuck in those days. I figered we would have to tap low to make it easier for the snakes to get to the sap. I sure regretted it. The buckets froze to the ground and we had a terrible time breaking harnesses. We had to hire 3 men to do nothing but repair snakes' harnesses.

Now let me tell you something, that was the prettiest sight to see them snow snakes in line come slithering up to the storage tank, each with his own bucket held on with the harness. Yes sir, we had us a real thing going until the EPA found out about it. They received the complaint from the Township trustees because of the continuous blocking of the Township road from trash sliding out of the woods. You see, as the snakes slithered they melted the snow under their bellies which immediately froze after they passed by. This made things pretty slippery in our woods. In fact, everything that wasn't fastened down slid out of the woods onto the Township road. You never saw so much stuff come sliding out of the woods; bottles, branches, old tires, trash, etc., stuff you never drempt was in a woods.

The Humane Society got mad too when they found out that we were not paying minimum wages to the snakes. To avoid confusion and having the law on our backs we decided to quit and release the snakes. It was toward the end of the season anyway. We traded the 511 harnesses for plastic tubing. Tubing worked so well we gave the idea to several companies to begin production in a big way. That is how plastic tubing got started.

Archie

IF YOU MAKE MAPLE SYRUP

YOU NEED OUR CATALOG

HERE ARE JUST A FEW OF THE ITEMS AVAILABLE

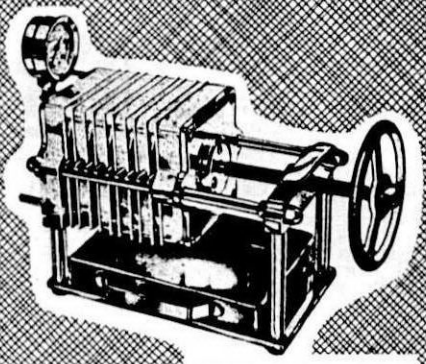
MODERN SAP COLLECTION
Throw-Away Bag

Trouble With Moldy Syrup?
Use FERMIBAN
Inexpensive!

TAPERED BUCKET BRUSHES
Full Size

REFRACTOMERS
For Extreme Accuracy
In Syrup Testing

Old Fashioned Earthen Jugs
All Sizes
2 Oz. Up To One Gallon



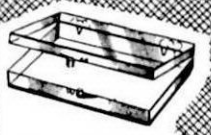
PRESSURE FILTERS FOR
SPARKLING CLEAR SYRUP

POLETHYLENE LINERS
For Leaky or Rusty Buckets

CANDY CUPS

GOLD FOIL
Pressure Sensitive
NAME STICKERS

Light Weight
Big Capacity
GATHERING PANS



Plastic As Well As Paper
CANDY BOXES–Many Sizes

Glass Jugs
Bottles - Decanters
Plastic Bottles
and Jugs
All Styles and Sizes
of Syrup Cans

Non Toxic Paint
For Buckets and Tanks

ALL MAKES
OF EVAPORATORS

SEND FOR A
FREE COPY
OF OUR CATALOG

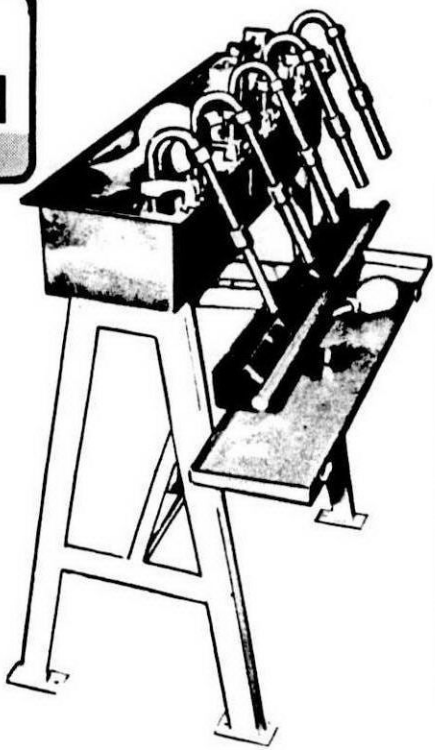
REYNOLDS
SUGAR BUSH INC.

ANIWA, WIS. 54408 Ph: 715-449-2057

WANT TO CUT DOWN ON TIME & LABOR ?

Here is what You Need

A SIPHON



MASTER MODEL J

Bottle Can Jug Filler

SIMPLE YET AUTOMATIC. REQUIRES NO ELECTRICITY
EXCEPT FOR HEATING ELEMENT – NOW AVAILABLE.

Bottle Fills To Any Level Desired And Then Stops. You Can Put On The Cap While Another Bottle Is Filling. A New Model With Only Two Filling Tubes Is Very Popular. Fills As Fast As You Can Cap And Label. All Stainless Steel.

OUR CATALOG SHOWS LOTS OF THINGS!

NUTRITIONAL VALUE OF PURE MAPLE SYRUP

MARIAFRANCA MORSELLI, Ph. D.
Research Associate, Department of Botany
Proctor Maple Research Farm
University of Vermont, Burlington, Vt.

Pure maple syrup is a "natural" food, processed by heat concentration of pure maple sap, which is the nutrient liquid utilized by the plant for the annual growth of its tissues.

In the boiling, concentrating and filtering process the nutrients remain in the syrup (2, 3, 5). There are quantitative differences in syrup's nutritive composition, due to metabolic and environmental differences among maple trees and differences in the methods of sap collecting and syrup processing (5). The packaged pure maple syrups contain most of the substances useful in the human diet (4):

Sugars:

Are an important source of energy. The main sugar in pure maple syrup is sucrose, which is the sole sugar in the Fancy grade syrups. The darker grades of syrup contain a small and variable amount of fructose and glucose (2, 3, 5). In order of sweetness, sucrose is less sweet than fructose, slightly sweeter than glucose. Maple syrup caloric value is 40 calories per tablespoon, equal to molasses, while corn syrup's caloric value is 60 per tablespoon, and honey's is 45 per tablespoon (5, 6).

Minerals:

Have specific and nonspecific nutritional functions in the body metabolism. In pure filtered maple syrup the main minerals present are: calcium, potassium, manganese, magnesium, phosphorus, iron (2, 3, 5).

Vitamins:

Are essential to maintain health; they cannot be manufactured by the body (except Vit. D) so they must be acquired through food or taken separately.

In maple syrup trace amounts of vitamins are present, mainly B_2 riboflavin), B_5 (pantothenic acid), B_6 (pyridoxine), PP (niacin), biotin and folic acid (1).

Amino Acids:

Are the building blocks of the proteins. In maple syrup many amino acids are present in trace amounts (5).

1. Hannawacker, Marianne. 1969. Ph. D. Thesis. Darmstadt, D. 17.
2. Leaf, A. L. 1964. Science. 143: 963-964.
3. Maple Sirup Producers Manual. Rev. 1971. USDA Agr. Res. Serv. Agr. Handbook 134.
4. Robinson, C.H. 1967. Proudfit-Robinson's Normal and Therapeutic Nutrition. MacMillan, N. Y.
5. Unpublished data. 1974. The Proctor Maple Research Farm, Botany Dept., University of Vermont.
6. Watt, B. K. and A. L. Merrill, 1963. Composition of Foods. USDA Agr. Handbook No. 8.

MAPLE CREAM FROM COMMERCIAL GRADE SYRUP?

Jim Fruth
Thelon Natural Products, Inc.
Emily, Minnesota 56447

We've heard some humorous B.S. coming from some of our southern maple states, most of it being so obviously untrue that no one could possibly mistake the real truth of the matter. Who has ever heard any wild tales coming from Minnesota? Surely we must have a few yarns to spin too! But what of such an absurd statement as suggesting that Maple Cream can be made from commercial grade syrup? Dark syrup is virtually no problem in Minnesota, that is, at Thelon Natural Products, Inc., Emily, Minnesota.

The results of the quantitative analysis of each and every batch of syrup produced in 1975 results in the glowing fact that we must do something different than the rest of the industry and concludes a three-year study where we suspected this difference.

The lightest syrup we made this year was Medium Amber. Samples were taken from this and all other grades, down to two grades darker than dark amber and the range of invert sugar contained in each ranged from .5 to 4, all being suitable for making cream. The last batch of the season, the result of emptying the last drop out of everything, showed an invert content of 5 (this is the batch that we use for making stirred sugar). This last batch had the color of molasses and was produced from sap that was definitely cloudy and foaming.

This sounds preposterous to the people who tell me that they cannot get their commercial grades to crystalize into sugar. It will sound even more preposterous when you learn of my sanitation practices, practices so bad that any responsible sugarmaker would be shocked!

When I started my sugaring operation I invested my last dollar, only to be greeted with three successive years of crop disaster. The first year's failure was the result of ignorance, but was able to plead "bad weather" in the next two years. Because we produced so little syrup, barely enough to pay expenses, I had to find a job to support myself immediately after cooking the last batch of the season. Extra time was taken, only, to clean the evaporator and finishing equipment. The tubing in the woods was left hanging and not even drained. The wildest imagination could tell you of the condition of the tubing at the start of the next season.

Armed with no work force and nonexistent finances, the tubing was flushed out at the beginning of the season, unfortunately, with the first runs of the season. Approximately the first 500 gallons of sap was run on the ground. Justifiably, a microscopic slide would show the entire season's sap to be teeming with bacteria.

My set-up is 99% tubing, all under the closed system. The land is relatively flat. I use a self-developed "in-line" vacuum that is extremely efficient and registers a vacuum at the furtherest tree on the largest system where 1,200 taps are handled by a single pump. The taphole pellet is used. Sap is stored in the

woods in open tanks to make use of the maximum amount of sunlight irradiation. Lamb's tubing is used throughout, except for 1" vacuum lines where opaque black poly, low durometer tubing is used. On weeping flows the sap is pumped to the sugarhouse at the end of the day and heavier flows necessitate oftener pumping. This year I tapped 4,000 taps.

In the 1974 season we produced only the molasses colored commercial graded and filled all of our candy and sugar requirements from that grade.

Considering my sanitation practices, commercial grade syrup could easily be expected to be the norm, but what do I do that is different from anyone else that allows me this extraordinary use of the dark syrup?

The answer lies on page 20 of the February, 1973 issue of the Maple Digest! 100% of all sap that is pumped to the sugarhouse is treated with an ultraviolet-irradiation unit! After treating, the sap is stored in open, round bottom sap tanks. Should sap be stored for longer than one day, it is re-pasturized in the same unit. Tanks are covered only in case of rain.

The U. V. unit that I employ is identical to the one listed in the Digest with the exception that I use 2½" pipe for inlets and outlets to minimize splashing and back-up. To be sure of effectiveness, I pump through the trough at 4 gpm. The principal behind using the U.V. trough is that all molds, yeasts and bacteria are destroyed before entering the evaporation process. At normal sap storing temperatures, the microbial growth wildly multiplies until irradiation. Without U.V. the process continues. The key factor in microbial growth is that a virtual explosion takes place during the time the sap is being warmed before, or during, its entrance to the evaporator. This is, especially,

a problem in the smaller evaporators that let a lot of sap in at one time and slightly less of a problem where the sap is being fed continually, as in the larger evaporators.

According to my findings, so far, it is my belief that the ideas for preheating large amounts of sap will produce even larger amounts of commercial grade syrup because of the explosion growth factor of microbes at preheat temperatures. The use of Ultraviolet Pasturization would eliminate this!

The results of these findings could do much to bring up commercial grades of syrup to more usable forms, and could set new standards for the price of syrup on the wholesale level. Today, syrup is priced according to color; tomorrow, syrup would be priced according to invert sugar content, regardless of color.

There is one added advantage, and these are the results of a taste test that I conducted: I purchased the finest soft sugar candies that I could find and served them along with soft sugar candies made from commercial grade syrup. The dark candy was eaten first and some light candy was left!

USING A SUGAR REFRACTOMETER

George M. Keiser
Forestry Technician, USDA Forest Service
Northeastern Forest Experiment Station
Burlington, Vermont

The amount of sugar in maple sap is important to the producer in managing his sugarbush and in selling the sap. To find the percentage of sugar in the sap, an instrument called a refractometer is used (fig. 1).

The refractometer is simple, easy to use, and accurate. A drop of sap is placed on the dark circular area on the cover of the instrument (fig. 2). The cover is then closed, and the reading is observed through the eyepiece.

However, improper techniques can result in inaccurate measurements.

The first step is to focus the refractometer scale. To do this, adjust the eyepiece until the scale is clearly in focus. You can place a piece of tape about the body of the instrument and the eyepiece to keep them from moving. Calibrate the refractometer before taking a reading. Place a drop of distilled water on the dark circular area. Close the cover and put the eyepiece to your eye. You will see a dark area and a light area (fig. 3). Turn the calibration adjustment screw until the line between the light and dark areas falls on zero. The refractometer is now ready to take sugar readings.

Fig. 1.— Using a refractometer to measure sap sugar concentration.

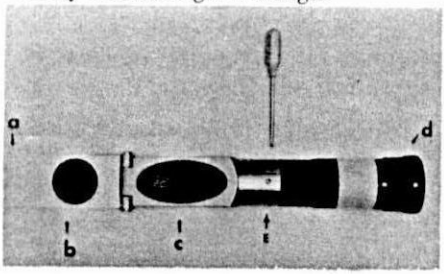


Fig. 2.— The sugar refractometer: (a) cover; (b) dark circular area where drop of sap is placed; (c) glass prism; (d) eyepiece; (e) small adjustment screw used in calibrating instrument.

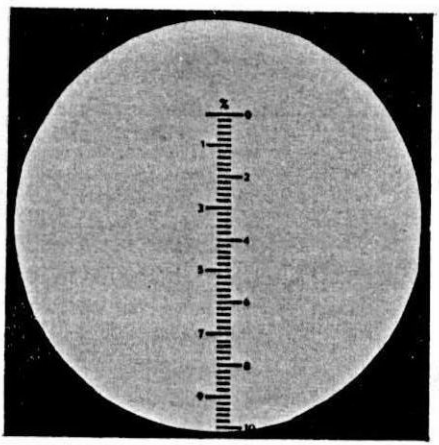


Fig. 3.— View through the eyepiece of a refractometer. With a drop of distilled water, the meter is calibrated by bringing the shadow line onto zero.

Dry the cover and glass prism with a clean, soft, grease-free tissue. Then place a drop of sap on the cover plate and close it over the prism. Look into the eyepiece and read the sugar percentage where the line between the dark and light areas crosses the scale.

Check the calibration with distilled water after every 15 readings. If only a few readings are taken, with more than one half-hour between readings, calibrate the refractometer for each reading.

Sap sugar readings can be taken if the sap is flowing more than one drop every eight seconds. The testing droplet should be as fresh as possible. A droplet hanging on a spout for some time may lose water by evaporation into the atmosphere. The refractometer reading would then be inaccurate, indicating a too-high sugar content.

For more detailed information about use of the sugar refractometer, refer to *Testing sugar maple sap for sweetness with a refractometer*, by H. Clay Smith and George M. Keiser, USDA Forest Service Research Note NE-138, 4 p., illus, NE Forest Expt. Sta., Upper Darby, Pa., 1971.

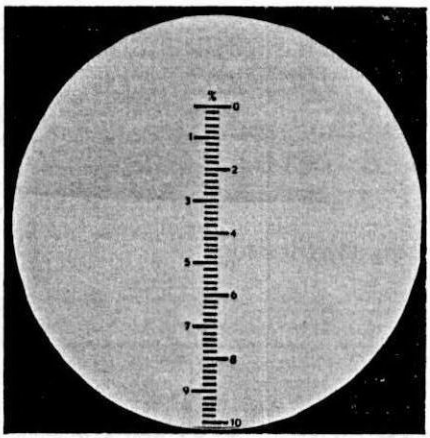


Fig. 4.— A sap reading. The sap has a sugar content of 3 percent.

EVAPORATEURS

Lightning

EVAPORATORS

YOUR FASTEST WAY

TO MAPLE SYRUP

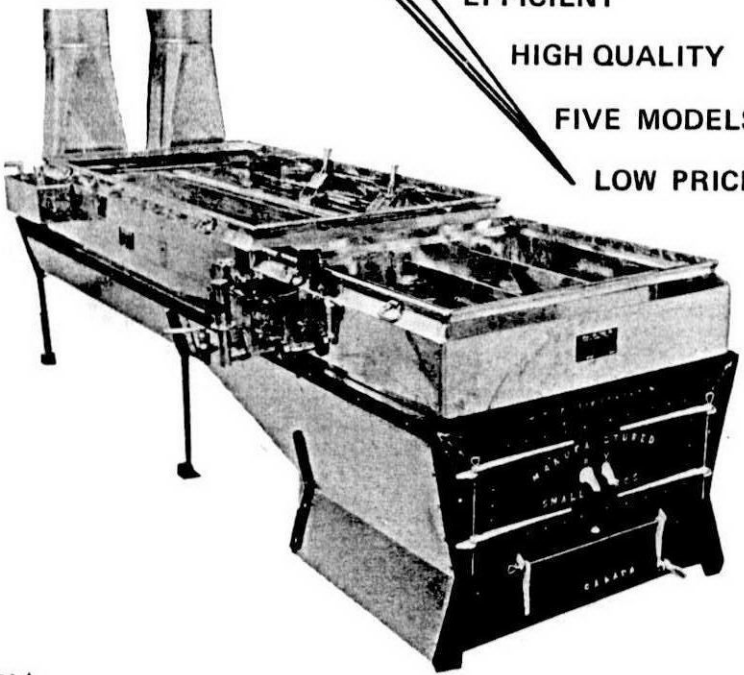
RAPID

EFFICIENT

HIGH QUALITY

FIVE MODELS

LOW PRICED



THE MODERN EVAPORATOR FOR PROGRESSIVE PRODUCERS SEEKING QUALITY PRODUCTS WITH SPEED OF OPERATION.

MANUFACTURERS OF A COMPLETE LINE OF MAPLE SYRUP SUPPLIES.

Phone Or Write For Your Nearest Distributor.
Catalogues Available Upon Request.

SMALL BROTHERS INC.

Dunham, Quebec, Canada. Telephone (514) 295-2441

BUCKETS vs. TUBING

A LABOR & COST COMPARISON

John E. Guntner
Dept. of Forestry & Forest Products,
V.P.I. & State Univ., Blacksburg, Va.
Melvin R. Koelling
Dept. of Forestry, Michigan State Univ.
E. Lansing, Michigan

Many maple syrup producers are encountering increasing difficulties in hiring and maintaining a sap collection labor force. Furthermore, the labor that is available for this type of work is often characterized by producers as being poorly motivated and willing to expend only a minimum amount of physical energy.

To counteract this problem, forward-looking producers are considering alternatives for reducing their sap gathering requirements. Some think that replacing buckets with tubing may be the answer, particularly since it has been shown that higher sap yields can be obtained with tubing. But getting to the nitty-gritty of the issue, is tubing more profitable than buckets? This is the question that we set out to answer.

In early 1972 we recruited cooperators from among Michigan maple syrup producers for a study that was funded by a cooperative agreement between Michigan State University and the Northeastern Forest Experiment Station of the USFS at Burlington, Vt. These cooperators were separated into two equal groups. The first group consisted of sugarbush operators employing the conventional bucket system of sap collection, while the second included those utilizing vacuum pumped plastic tubing networks. Operations for both groups were distributed over a 500- to 3,000-tap range.

Data were collected for two maple seasons, 1972 and 1973. Combined data for the two seasons gave a data base that was drawn from a sample of 20 bucket systems and 21 tubing systems.

Each cooperator was interviewed concerning his maple operation. Following an inventory of equipment, each cooperator was instructed in the use of standardized time and cost record-keeping forms. Each cooperator then estimated his daily labor inputs to the nearest quarter-hour and recorded them on the forms provided. Records were also kept on the gallons of sap gathered each day, percent soluble sugar in sap, and amount and kind of power used.

Analysis of the two seasons of data produced some interesting results. However before discussing these results, we would like to stress that the study was limited to sap production only. That is, the process involved in getting the sap from the tree to a central collection point at roadside. The evaporation process was not considered in this study.

EQUIPMENT INVESTMENT

If we assume we are starting a new operation and must purchase all new equipment, the most important question regarding sap collection is "Which requires the lesser capital investment for the same number of tapholes, buckets or tubing?"

This may come as a surprise to some, but the answer is tubing. For example, the total equipment investment (1973 dollars) for a 1,000 taphole standardized bucket system is $3,438 ($3.44 per tap). For a standardized tubing

Table 1. – Average Annual Labor Time for Sap Production by Activity.

ACTIVITY	Labor Time Per Tap			
	Bucket System		Tubing System	
	Minutes	% of Total	Minutes	% of Total
PREPARATION	.1	1	.2	2
SET UP				
Tapping	1.1	9	1.0	14
Layout and Installation	1.3	10	3.2	42
Collection Tank Placement	.2	2	.2	3
Subtotal	2.6	21	4.4	59
GATHERING				
Collection	7.6	60	–	–
Maintenance	.1	1	.8	10
Subtotal	7.7	61	.8	10
TAKE-DOWN				
Collection System	1.0	8	1.3	17
Collection Tanks	.2	2	.2	3
Cleaning and Storage	1.1	8	.8	10
Subtotal	2.3	18	2.3	30
Totals	12.7	101	7.7	101

system, the investment in equipment for the same number of tapholes is $1,991 ($1.99 per tap). The difference between the two systems is considerable ($1,447 or $1.45 per tap).

Comparable differences exist for all sizes of operations within the range studied, thus it can be concluded that the investment in equipment for a given sap production operation is less for tubing than for buckets.

LABOR INPUTS

Daily records of labor inputs obtained from cooperators show a considerable (39 percent) savings in labor for tubing systems over buckets (see Table 1). Total labor time per tap for the complete sap production process averaged 7.7 minutes for tubing, which included preparation, setup, gathering, and take-down. For bucket operations, the average labor time per tap was 12.7 minutes (5.0 minutes more).

Considering each activity separately, there is very little difference in preparation time between the two systems. Buckets are favored in the set-up phase, primarily because it takes about two and one-half times as long to layout and install the tubing systems (3.2 min.) as it does to distribute and hang the buckets (1.3 min.). Setting up the system is the most time-consuming phase of sap collection with tubing.

Table 2. – Average Total Annual Cost Per Taphole by Collection System.

COST ITEMS	Bucket System		Tubing System	
	Dollars	Percent	Dollars	Percent
Fixed Equipment	.44	35	.33	36
Equipment Operation and Maintenance	.08	6	.02	2
Labor[a]	.58	46	.40	44
Material Expense	.02	2	.02	2
Taphole Rental	.10	8	.10	11
Management[b]	.04	3	.04	4
TOTAL	1.26	100	.91	99

[a] @ $2.00 per hour plus Social Security and Workmen's Compensation.
[b] @ $3.00 per hour.

However, the largest difference between the two systems occurs during the gathering phase of the operation. Note that it takes 7.7 minutes per tap to gather with buckets, but only .8 minutes with tubing. Gathering is 61 percent of the total labor input for buckets. But more significantly, it takes as much labor with buckets just to gather sap, as it does to complete the total sap production process with tubing.

Taking down the system requires approximately the same amount of labor regardless of system employed.

AVERAGE TOTAL ANNUAL COST

With bucket systems requiring larger equipment investments and more labor inputs than tubing, it stands to reason that the cost of producing sap should be greater for buckets than for tubing. This is indeed the case.

From Table 2 we note that total annual costs averaged $1.26 per taphole for the 20 bucket operations, while the average for the 21 tubing operations was 35 cents lower, or $.91. Table 2 also presents a breakdown of these average total annual cost figures into their component parts. These are fixed equipment, equipment operation and maintenance, labor, material expenses, taphole rental, and management costs.

The first item, fixed equipment, is the cost of owning the equipment, whether the equipment is operating or not. In computing this cost, a depreciation period of 10 years was used for all equipment except buckets and snowmobiles. Life expectancies of 20 years for buckets and 4 years for snowmobiles were assumed. The interest rate (9.755%) was a composite rate which included the cost of capital (8.5%),

insurance (.275%), and shelter for the equipment (1.0%).

Equipment operation and maintenance costs are the variable equipment costs including fuel, lubricants, repairs, and maintenance. Labor costs are self-explanatory. Out-of-pocket expenses for such items as drill bits and cleaning agents are included under the material expenses heading.

Another cost is that of owning the land and trees or renting tapholes. We chose the taphole rental approach.

The final cost item, management, reflects the value of the producer's time for such activities as thinking, planning, coordinating, bookkeeping, etc. Physical labor performed by the producer is not included here.

As expected, the fixed equipment and labor costs are higher for buckets than for tubing. Fixed equipment averaged $.44 per tap annually for buckets and $.33 per tap for tubing, while $.58 per tap and $.40 per tap were the average annual labor costs for buckets and tubing, respectively. Most of the other costs are essentially the same except that equipment operation and maintenance is $.06 less for tubing than for buckets. This reflects the savings to be realized from operating and maintaining a vacuum pump in lieu of operating a farm tractor.

Additional Economic Analyses

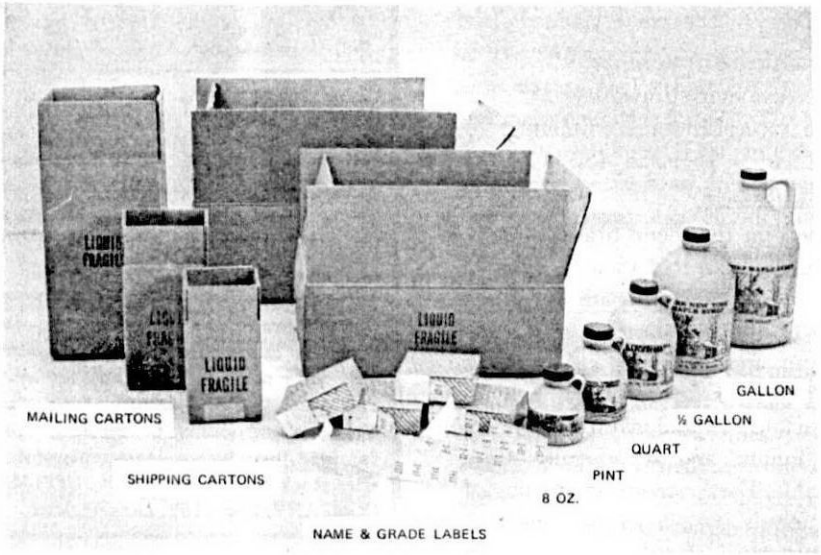
Break-even analyses have also been conducted to determine the minimum sized operation needed to just break-even (that is where revenues = expenses), and marginal analyses were carried out to determine the size of operation that will realize maximum profits. However, these analyses tend to be somewhat complex, and are omitted from this discussion. These and all other results of the study are presented in *Maple Sap Production Economics in Michigan* by John E. Gunter and Melvin R. Koelling. To obtain a copy of this

publication, the interested reader should write:

Department of Forestry
Michigan State University
126 Natural Resources Building
E. Lansing, Michigan 48824

CONCLUSIONS

Based on these and other findings, it is our opinion that vacuum pumped plastic tubing networks are to be preferred to bucket collection systems in Michigan and probably elsewhere as well. Tubing is favored because it requires a lower capital investment, fewer labor inputs, and is generally more profitable. Furthermore, the timing of labor inputs is such with tubing that the operator is freed of most of the worries of sap collection when the sap is flowing heavily and can concentrate his efforts on the demanding task of boiling sap. This is not the case with buckets. Furthermore, if these aren't sufficient reasons for employing tubing, the producer can, through the use of proven techniques obtain increases in sap yields over those attainable with buckets, thus increasing profits. While it is true that tubing requires a new and more complex set of technical skills, all the available evidence indicates that tubing is the better alternative.



BACON'S UNBREAKABLE HIGH-DENSITY POLYETHYLENE JUG has finally been recognized as one of the better containers for keeping high quality Maple Syrup. See report in December 1974 issue of the Maple Digest. Enough said!!

The Dealers and Associations listed on the following page can supply their customers and members with a complete line of "Bacon Jugs" from 8 oz. to one gallon – Individual Mailing Cartons for pint, quart, half gallon and gallon jugs – Shipping Cartons for 12 8 oz., 12 pint, 12 quart, 6 half-gallon and 4 gallon jugs.

Unbreakable Polyethylene Jugs are printed for Pure New Hampshire, Vermont, New York, Maine, Pennsylvania, Ohio and "all state" Maple Syrup – CUSTOM PRINTING, too.

For the NEW Vermont Maple Sugar Makers Association jug, contact: CLARK BROTHERS, Wells, Vt.
VERMONT SUGAR HOUSE, So Royalton, Vt.

See your dealer or write

BACON'S SUGAR HOUSE

JAFFREY CENTER, NEW HAMPSHIRE 03454

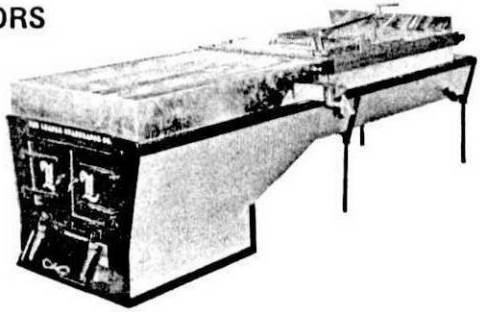
(603) 532-8836

DEALERS & ASSOCIATIONS CARRYING BACON'S JUGS

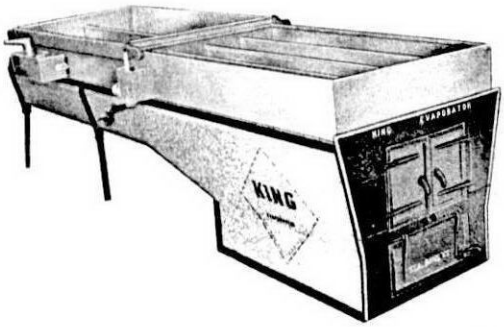
N. H. Maple Producers Assn., Warehouse, Rt. 106, Loudon, N.H. (603) 783-9961
Richard Moore, RFD No. 8, Concord, N.H. 03301 . . . . (603) 267-8217
R. N. Johnson, Walpole, N.H. 03608 . . . . . (603) 756-3321
Berkshire Pioneer Maple Producers Coop.
Russell Davenport, Shelburne Falls, Mass. 01370 . . . . . (413) 625-2866
Lesure Farm, Ashfield, Mass. 01330 . . . . . (413) 628-3268
Agway, Inc., Box 181, Lyndonville, Vt. 05851 . . . . . (802) 626-5538
Clark Brothers, Wells, Vt. 05774 . . . . . (802) 325-3203
Edward Eurich, Waitsfield, Vt. 05673 . . . . . (802) 496-3854
Harry Jorgensen, W. Woodstock, Vt. 05091 . . . . . (802) 457-2261
H. W. Leach, Waterville, Vt. 05492 . . . . . (802) 644-2488
Leader Evaporator Co., St. Albans, Vt. 05478 . . . . . (802) 524-4966
W. S. Mitchell, Inc., Newport, Vt. 05855 . . . . . (802) 334-2800
Stuart Newton, R. D. No. 2, St. Albans, Vt. 05478 . . . . (802) 524-5620
Vermont Sugar House
Exit No. 3, I. 89, South Royalton, Vt. 05068 . . . . . (802) 763-8809
Justus "Dutch" Asthalter
Neversink, N.Y., P.O., Parksville, N.Y. 12768 . . . . . (914) 292-8569
Frank Barney, Sherman, N. Y. 14781 . . . . . (716) 761-6071
W. Barry Branon, 31 Tremblay Ave., Plattsburg, N. Y. 12901 . (518) 563-1063
Campbell's Maple, Smyrna, N. Y. 13464 . . . . . (607) 627-6653
Charles R. Emerson, RD 1, Alfred Station, N. Y. 14803 . . . (607) 276-6481
Leo W. George & Sons (716) 591-1531
Rt. 77, Bennington, P.O. Strykersville, N. Y. 14145 . . . . (716) 591-1766
Kenneth Jordan & Son, Franklin, N. Y. 13775 . . . . . (607) 829-5634
Puszcz Brothers, Great Valley, N. Y. 14741 . . . . . (716) 699-2113
Claude Sisson, Sr., Central Bridge, N. Y. 12035 . . . . . (518) 234-3194
Ralph VanBrocklin, RFD No. 2, Canton, N. Y. 13617 . . . (315) 386-3036
John Wiggers & Son, North Clymer, N. Y. 14759 . . . . . (716) 355-2511
Neil C. Wright (315) 245-2450
28 Liberty St., Camden, N. Y. 13316 . . . . . (315) 245-1434
J. Curtis Dom, P.O. Box 56, Wellersburg, Pa. 15564 . . . . (814) 324-4414
Northeastern Pennsylvania Maple Producers Assn.
Box 549, Honesdale, Pennsylvania 18431 . . . . . (717) 689-2353
Potter-Tioga Maple Producers Assn. (814) 274-8540
Robert McConnell, Coudersport, Pennsylvania 16915 . . . (814) 274-9143
H. W. Russell & Sons Maple Farms, Rome, Penn. 18837 . . . (717) 247-7361
Sugar Bush Supplies
Box No. 1107, 4109 West Saginaw, Lansing Mich. 48904 . . (517) 372-1149
Kinney & Hodgkins Maple Supplies, Cumberland Ctr., Me. 04021 (207) 829-5565
Kinney & Hodgkins Maple Supplies, Yarmouth, Me. 04096 . . (207) 846-4570
Titcomb's Dairy, Farmington, Maine 04938 . . . . . (207) 778-4959
Wyman W. Manes & Son
Sycamore Valley Farm, East Orwell, Ohio 44034 . . . . . (216) 583-2388
Richards Maple Products, 545 Water St., Chardon, Ohio 44024 (216) 286-4160
O.C. Stevens & Son
Maple Lane Farm, Mt. Gilead, Ohio 43338 . . . . . (419) 946-3300
Reynolds' Sugar Bush, Inc., Aniwa, Wisconsin 54408 . . . (715) 449-2057

LEADER EVAPORATOR

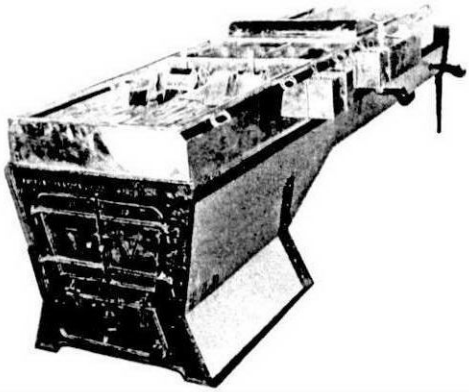
LEADER SPECIAL EVAPORATORS
MONITOR TANKS
WARNER SPOUTS



KING EVAPORATORS
KING TANKS
SOULE SPOUTS



VERMONT EVAPORATORS
VERMONT SPOUTS



We wish to thank our customers for their cooperation during our recent acquisition of Vermont Evaporator Co.

CO. INC. – SINCE 1888

M ANUFACTURED ITEMS OF HIGHEST GRADE
AND FINEST QUALITY

A TTENTION AND CARE GIVEN THROUGHOUT ASSEMBLY.

P ERSONALIZED HANDLING OF EACH ORDER.

L ONG ESTABLISHED FIRM DEDICATED TO SERVICE

E VAPORATORS – A WIDE RANGE OF –

LEADER – KING – VERMONT

As in the past we will continue to offer the Maple Producer the the best possible in maple sugar utensils.

When you think of Maple think of:

Leader Evaporator Co. Inc.

Box 588 St. Albans, Vermont 05478
802-524-4966 or 802-524-3931

MODERN ???

WE WERE

1 FIRST WITH TUBING

1 FIRST WITH THE ELECTRIC TAPPER

1 FIRST WITH PELLETS

1 FIRST WITH THE ELECTRONIC DRAW-OFF

AND NOW— WE BRING YOU AN ELECTRIC WARNING DEVICE THAT RINGS A BELL WHEN ANY ONE OF YOUR PANS GETS TOO LOW, AND LIGHTS UP A PILOT LIGHT TO TELL YOU WHICH PAN.

YOU BE THE JUDGE

R. M. LAMB

Box 278, Liverpool, N.Y. 13088

Phone 315—457—1410