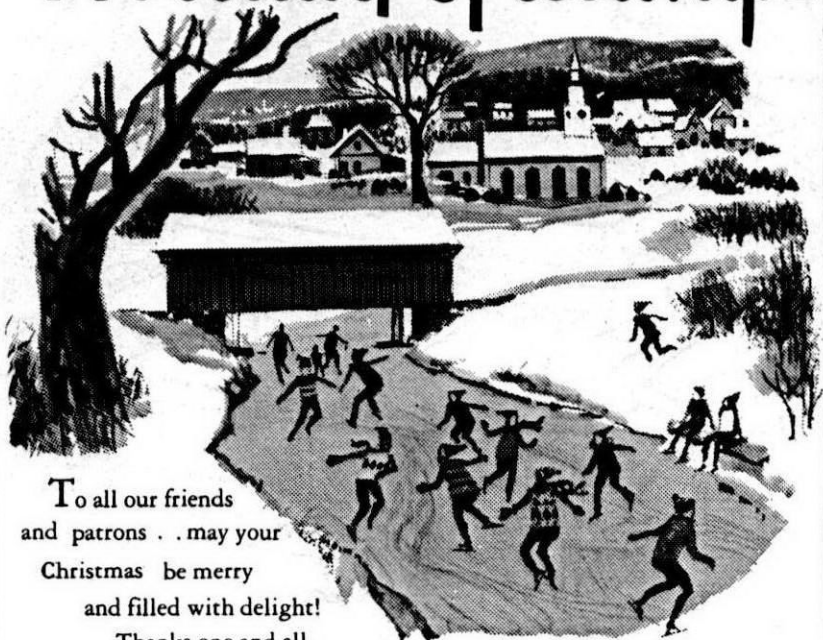


MAPLE SYRUP

DIGEST

Holiday Greetings



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Vol. 20, No. 4

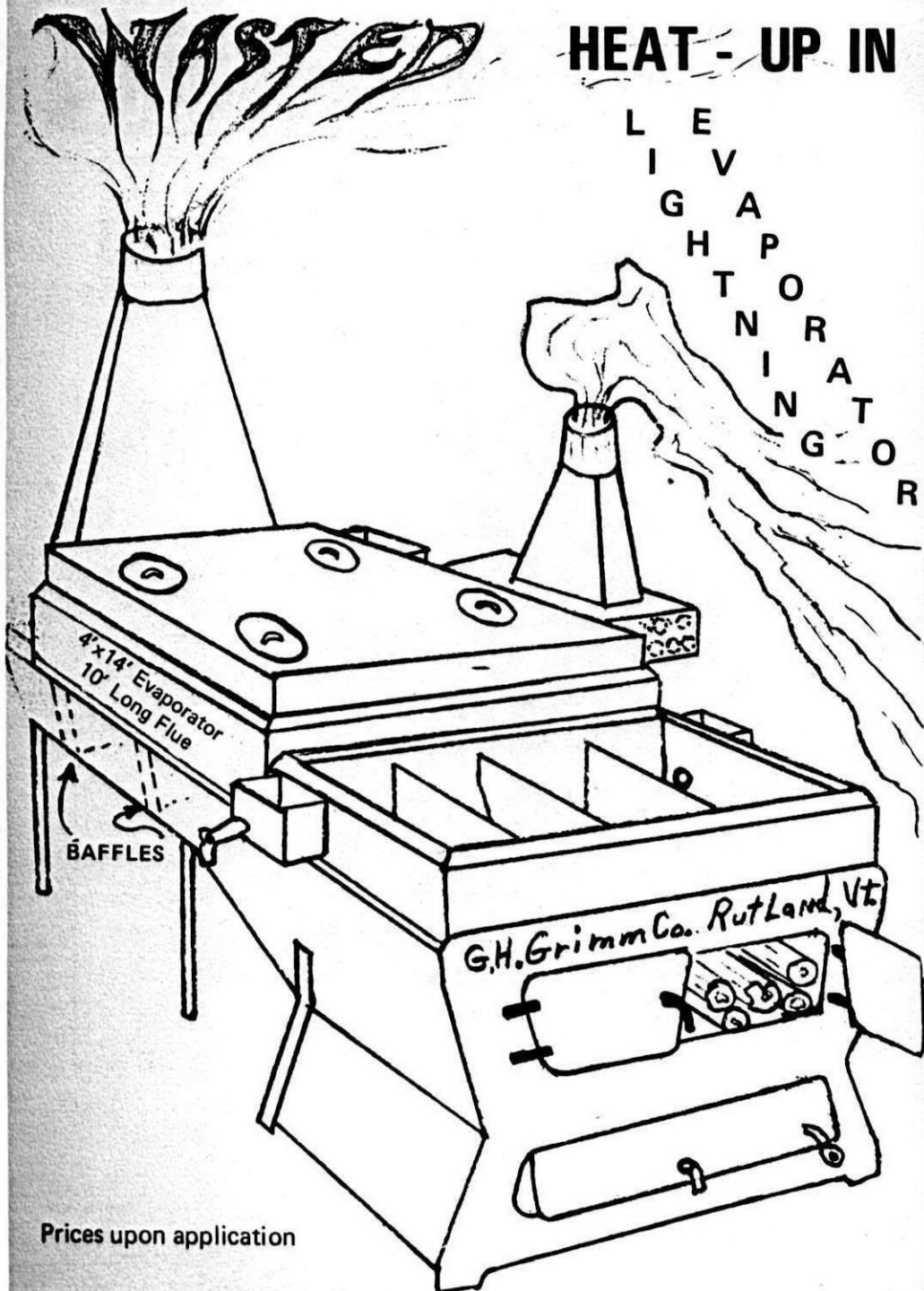
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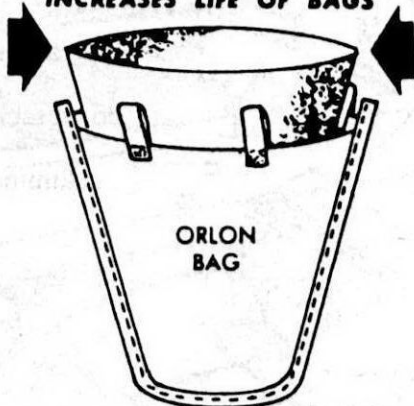
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Editorial

I guess congratulations are in order for the publication of a new journal on maple. We haven't had any information about it officially, but the old country grapevine is still working.

We want to emphasize that the MAPLE SYRUP DIGEST is still the publication of the North American Maple Syrup Council and we are in no way connected with the new journal. The next issue of the Digest is February, 1981 with advertising and article deadline of January 5, 1981.

Mary Lou and I didn't make it to the meeting in Wisconsin this October. First one I've ever missed and only the second for her but it couldn't be helped. However, I want to thank all those who did attend because of their concern about us. It's really nice to know you're missed.

This means I can't give a report on the meeting but we have an excellent one by Mike Girard, Connecticut, who took over the secretary and treasurers duties from Gordon Gowen. His report is in this issue along with a letter from the chairman, Ron Shaw.

We have a Womens Page in this issue which means Mary Lou is able to take care of it again. She's not quite out of the woods yet but we can see a lot of daylight, and I just hope everyone of you have as happy a holiday season as I know I am going to have.

Lloyd

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FROM THE CHAIRMAN

With the 21st annual meeting just completed in October, which was hosted by the Wisconsin Maple Producers Association, those in attendance were treated to great western hospitality the likes of which will not soon be forgotten.

There was a great turn out from all over the maple area, and that makes for a real good meeting. With the number of younger producers and people getting involved in the maple business, there is no need to worry about the industry dying! I feel that at meetings like this one it is hoped that they get a chance to express their concerns and needs to keep the industry active and strong.

Just to say a special "thank-you" to the many producers and people who took the time and expense to share their knowledge and experiences with their fellow producers. This is an example of the kind of people involved in our industry.

A more detailed report of the annual meeting is included in the "digest". Next year, Ontario will be hosting the annual meeting in the Orillia - Barrie area. Committees are now being formed. The International Maple Syrup Institute would like also to have their meeting at the same time and location, which due to extra costs of two meeting places, it is hoped can be arranged.

Just around the corner comes the winter information meetings put on by your state and provincial extension staff. They could use your support by suggestions of topics for the programs.

With the cost of energy and other input costs, I am sure you will find these most important topics to discuss. But most of all, they need your attendance. I am sure you will not go home disappointed.

As I have mentioned before, your directors of the council would like to hear from you on any projects and concerns that they can deal with on your behalf, just contact them.

Also, with this issue of the digest, comes the holiday season and may I at this time on behalf of Ruthanne, myself and our family and the directors of the council extend to you and yours, a very Merry Christmas and a Happy and Prosperous year ahead. And your maple season be just what you wanted!

Sincerely,
Ronald N. Shaw

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MEETINGS

**North American Maple Syrup Council
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International Maple Syrup Institute

The 21st annual meeting of the N.A.M.S.C., was held on October 20 & 21, 1980, followed by the 6th annual meeting of the I.M.S.I., on October 22.

The Wisconsin Maple Producers Council hosted the joint meetings in Wausau, Wisconsin. N.A.M.S.C. Chairman, Ronald Shaw, opened the meeting and noted that this year's meeting was to focus on "Energy and the Maple Syrup Industry". Mr. Adin Reynolds extended a warm Wisconsin greeting to all.

Directors from every member state were present and the Province of Ontario.

Reports on syrup production were given by each delegate, as well as the highlights of state and association activities for the past year.

Generally, Maple Syrup production

everywhere averaged 50-75% of a normal crop. The price of syrup varied with market demands and supply of syrup on the local level was inadequate in many states.

The Maple Digest report was given by Roger Sage, in the first time absence of Editor Lloyd Sipple, who was unable to attend due to personal reasons. The Digest reports that it has weathered the year financially in the black. The advertising rates have been raised 20%, starting with the December issue, in light of increased costs to produce the Digest.

Further discussion on the Digest included, the encouragement of all states to have more input into the contents of the Digest, that all member states make sure the mailing lists are updated on a yearly basis, and that financial obligations are kept current. It was also noted that the quality of the contents in the Digest has improved substantially over the past year.

Production statistics for the Province of Quebec were presented by

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Jean-Pierre Potvin, who stated that an estimated 31,500,000 pounds of pure maple syrup was produced during the 1980 season from approximately 14,747,500 taps.

Research Presentations

Mr. Lewis Staats was coordinator for a series of talks on Tubing and Silviculture. Among these presentations, Harry Yawney, from the Akin Lab, gave a summary of maple genetics. Mr. Yawney announced that the E.P.A. has approved and certified the use of "Sevin" against the Forest Tent Caterpillar in the sugarbush. Mr. Yawney noted that sap from treated sugarbushes has been tested and that no residue from the spray had been found in the sap.

Mr. Bob Gregory reported on Sap Sugar Concentration in maple trees and Ray Cells and their effect on sap sugar content. A report on Vacuum Pumping and the effect pumping has on volume and sweetness of sap was presented by Mr. Fred Lang. Dr. MariaFranca Morselli, gave a presentation on quality of maple syrup from sap stored at different temperatures.

Evaporation Methods

Coordinator for these presentations was Dr. Mel Koelling of Michigan. Dr. Koelling introduced Mr. Paul Sendak, N.E.F.E.S., who explained the Reverse Osmosis concept and R.O.'s advancement in the maple industry since the

1960's. Also, Mr. Sendak outlined the advantages and feasibility of the R. O. unit to the syrup producer. Mr. Bill Coombs, Vermont, Mr. Dave Near, Michigan and Mr. Bill Robinson, Ontario each spoke on their experiences and success with Reverse Osmosis in their sugarhouses.

Results of research on the open pan, oil fired Tubular Evaporator and the sterilization of maple sap with a water purifier, were presented by Mr. W. J. Langenberg of the Kemptville College of Agricultural Technology in Ontario.

Presentations on the Vapor Compression Evaporator were given by Mr. Paul Percy and Mr. Steve Dorsey. Both gave a detailed description of the V.C.E. units they are using in their Vermont sugarhouses.

Mr. Scott Wood of Wisconsin explained the use of sawdust and wood-

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chips as fuel through the use of a special design arch, based on the principal of wood gasification. Fuel costs to produce a gallon of syrup were cut substantially and the method proved successful in his sugarhouse.

N.A.M.S.C.

The election of Officers was held Tuesday and the results are as follows: Both re-elected for a 2nd term were Ron Shaw, Chairman and Russ Davenport, Vice Chairman. Michael Girard was elected Secretary-Treasurer replacing Gordon Gowen, who has served since 1975.

The N.A.M.S.C., was invited to Ontario in 1981, and the Council voted to accept the invitation.

I.M.S.I.

The I.M.S.I. meeting was called to order Tuesday midmorning and reports from President Harold Tyler and Executive Manager Claude Tardif, preceded a maple marketing report by The Richardson and McElveen Co. of Chicago, Ill. Their presentation on promotional and public relation activities was given, describing their accomplishments during the past year.

Ken Bascom from New Hampshire reported on the importance of direct marketing to the syrup maker and packager as well as the effects local advertising and promotion has on syrup sales.

Gil Croteau of Quebec noted the importance of proper labeling, wherever syrup is marketed and Juan

Reynolds spoke on the role of the distributor and the importance of availability of pure maple products to the consumer.

It was voted to increase the membership fee to the I.M.S.I from ½ cent per lb. of syrup to ¾ cent per lb. of syrup handled. The cost of 2500 logo stickers is now \$30.00 and the association membership will remain at \$1.00 per member. Equipment dealer membership fees will increase 50%.

Election results are as follows: Re-elected to the Board of Directors were Don Greene, Alain Austin and Gilles Croteau. Elected President was Andre Breault, Vice President Charles Bacon. Claude Tardif will continue as Executive Director.

Gordon will be available to help producers and associations with I.M.S.I. affairs in the United States.

Vinyl signs (with adhesive back) are now available to members at no charge. They are imprinted with the Logo and the words "Pure Maple Products For Sale". Members may receive these signs by writing to Mr. Gordon Brookman, South Dayton, New York 14138.

Over 275 people attended a very enjoyable banquet Tuesday evening. Special guests included, Wisconsin Maple Syrup Queen, Miss Penny Kakes and Wisconsin Alice in Dairyland, Miss Vicky Leah Scharlau.

Mr. Gary Rhode, Wisconsin Secretary of Agriculture, was the guest speaker and Phil Moore (G.H. Grimm Co.) presented a most entertaining magic show.

On Wednesday, lunch in Aniwa, and a visit to the Reynolds' Sugarhouse, completed a most enjoyable stay in Wisconsin.

Michael A. Girard
Secretary, N.A.M.S.C.

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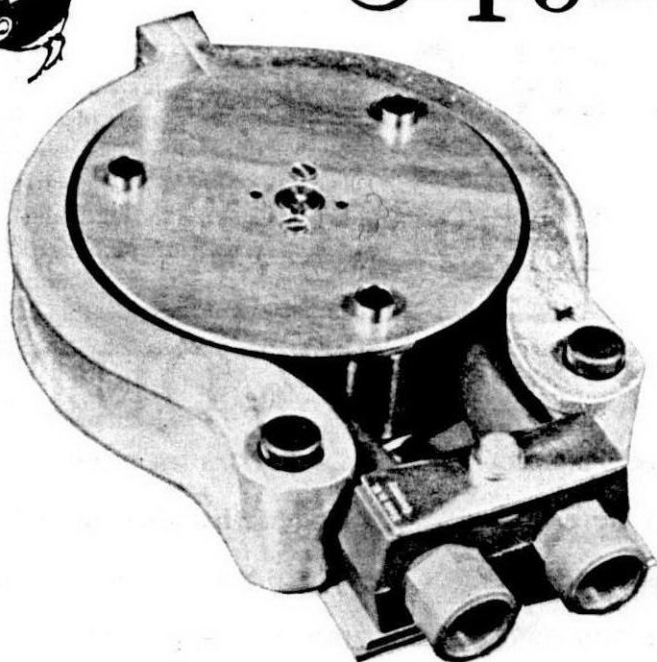
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Women's Page

Maple Syrup Goodies for Christmas Gifts

Editor, Mary Lou Sipple

Maple Fudge

- 2 cups maple syrup
- 1/2 cup light cream
- 1/2 cup chopped nuts
- pinch of salt

Combine syrup, salt and milk. Boil to 238 degrees (soft ball) without stirring. Remove from heat and cool to lukewarm. Beat until creamy, add nuts and turn into greased pan. Cut in squares.

Maple Popcorn Balls

- 1 1/2 cups maple syrup
- 1/8 tsp. cream of tartar

Boil syrup to hard ball (265 degrees) Remove from stove, add 1 tablespoon butter and pour over 2 quarts of popped corn. Shape into balls.

Maple Pralines

- 2 1/2 cups maple syrup
- 3/4 cup evaporated milk
- 2 cups pecan halves
- 1/8 tsp salt
- 2 tablespoons butter

Cook sugar, salt, milk and butter over low heat, stirring constantly, until sugar is dissolved. Add pecans and cook over medium heat to soft ball (234 - 236 degrees) stirring constantly. Remove from heat, let cool 5 minutes. Stir rapidly until mixture begins to thicken and coats pecans. Working quickly, drop teaspoonsfull on greased cookie sheet, forming patties. If candy stiffens and is rough looking before all is used, soften and restore gloss by adding a little hot syrup. Makes 4 dozen patties.

Maple Date Balls

- 2 cups maple syrup

- 1 pound chopped dates
- 2 cups chopped nuts
- 1/2 pound butter
- 1 tsp. vanilla
- 4 cups Rice Krispies

Cook syrup, butter and dates 6 minutes and remove from heat. Stir in vanilla, nuts and Rice Krispies. Cool and roll into balls then into powdered sugar.

These recipes are all from a book compiled by Martha Davenport of Shelburne, Mass. Of course, good old maple syrup straight in the can is an excellent gift by itself - but fussin' a little shows you care!

NEW YORK STATE

MAPLE QUEEN CONTEST

This past year the American Maple Museum brought back the State Maple Queen Contest. We realize it was small and not without problems, but we do want to make it a yearly event again in conjunction with our opening of the American Maple Museum and induction into the Hall of Fame.

In order to make it successful we need every maple producing County and/or Association to send a contestant. Now is the time to plan for this next year. We hope you will discuss sending a contestant this next Spring.

The State Maple Queen Contest will be held in May each year. This year's contest will be part of the Grand Opening of the new building housing the American Maple Museum.

If you have any questions or suggestions, send them to the American Maple Museum, Croghan, N. Y. 13327.

BOB LAMB'S CORNER

Some of you may wonder why I write articles like these for the Digest. It's simple.

1. To help the beginner.
 2. To try to be of some help to the average producer.
 3. To help the Digest by paying for the same space I use, just as if it were an advertisement.
- The big guys I can't help — they are smarter than I am. I learn from them.

Let's talk about storing tubing:

The life span of maple tubing depends more on the method of storage during the off season than anything else. If it is left in the woods the year around, you can expect less than one half the life span you will receive if it is taken down and stored properly. These are the facts and each producer should choose his own method through his experience. The way to use tubing is the way that suits your needs best.

The tubing we are making now is almost good for a lifetime if it is stored properly, in a cool, dark place away from insects and rodents. Here's why—

Temperature: Terrific summer heat such as is found close up under a roof is bad for any plastic. It gradually loses some of its additives and becomes brittle. Such storage should be avoided.

Darkness: The ultra violet rays in light hits the tubing and are changed into visible light rays as they penetrate the tubing. These rays retard the growth of bacteria but they also slowly destroy the tubing. Tubing stored in darkness will last much longer.

Insects and rodents: Mud wasps are probably the worst offenders. They can plug spouts, tees and the ends of

lines faster than you can clean them out. Rodents like to chew the tubing or at least remove the strings and tags used for identification.

The worst storage is up under a hot roof with plenty of windows to admit light and no screens to keep out insects and rodents. The best place is on the ground floor or basement with plenty of shelves and enclosed to keep out light, insects and rodents.

I stress using shelves because they will keep you from piling it so high the bottom rolls will be crushed. Also, if you hang it up, be sure to use a rounded surface like an 8" stovepipe to keep it from kinking.

Of course, here we can tell you that theoretically, after the tubing is kinked or collapsed and re-installed on the trees it will return to its original shape after a few warm days. This is called memory. It's also a lot of baloney. Sooner or later, depending on how bad it's kinked and how good it was to start with, it will fail to return to its manufactured shape.

There is lots of tubing still in use that has seen over 20 years of service. It has never had any special care and has been stored in as many ways as you can imagine. But they weren't all bad or this tubing would be long gone. I think this proves that if you take care of your tubing properly, it will last just about as long as you want it to.

I realize this is a very critical article. It advocates methods of storage that only 10% of the producers are using. However, I like to see people get their money's worth. Selling is only part of the responsibility a salesman has.

Bob Lamb

This is a paid advertisement

Thanks

Wisconsin hereby thanks ALL you wonderful people attending the Maple Conventions held here October 20-22.

We hope you liked us, because we sure liked you. You left a fine impression on our people, and we hope you took back a good feeling of our Wisconsin.

Again our thanks for coming.

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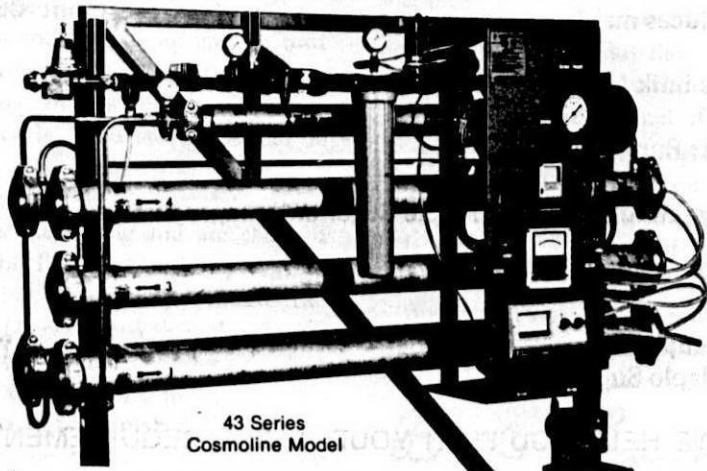


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by
Steve Dorsey

The maple industry is pressed with a frightening energy problem. All of us who produce syrup realize that we are faced with a challenge. We must trim our energy costs by improving our production methods or be prepared to quit sugaring if we fail to keep our costs within reason.

There are many efficient methods we could use to concentrate our sap. This article will introduce you to a few of them, so they won't appear so complicated or unfamiliar the next time you come across them.

When we fire up our evaporators every Spring we are using a method that has been around since the 1890's. Whether we use wood or oil the process is really the same. We heat the liquid up and then boil it. When the sap boils, water as steam leaves the sap and goes through a hole in the roof—at least it's suppose to. By this method we manage to separate an enormous amount of water from the diluted sap.

Unfortunately, it takes a lot of heat

to boil water. It takes about 970 BTU of energy to evaporate 1 pound of water. Multiplying out 8.3 pounds per gallon for water and 40 gallons of water for one gallon of syrup we see that it takes about 320,000 BTU's to make one gallon of syrup. Actually since our evaporation system may be roughly 60% efficient we actually use up about 530,000 BTU's to make one gallon of syrup. That is a lot of heat, it is equivalent to about 4 gallons of oil, and we all know that that's a lot of money.

The system we use to evaporate the water out of the sap is definitely not the only method available. There are many other systems which use far less energy. In other words, we don't have to spend anywhere near the energy we're presently spending to make syrup. One interesting question then, is how much energy do we have to spend? The question can be answered using the laws of chemical thermodynamics. Using them we have found that the minimum energy necessary to separate the water from sap to make 1 gallon of syrup varies between 100 and 110 BTU's depending on the sugar

Cont'd, on page 20

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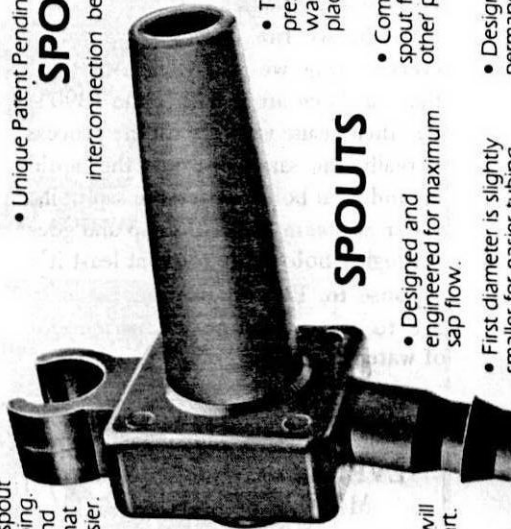
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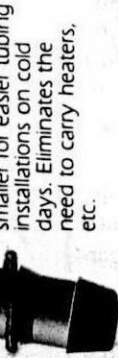
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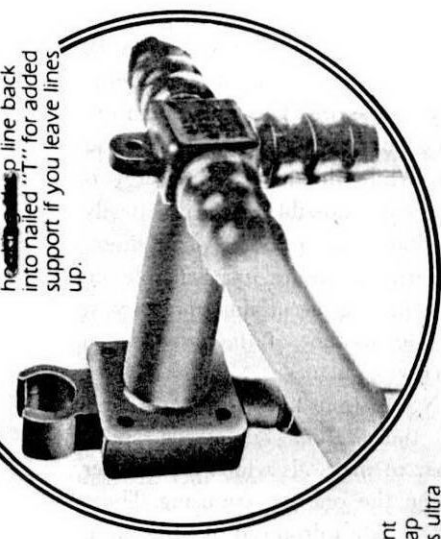
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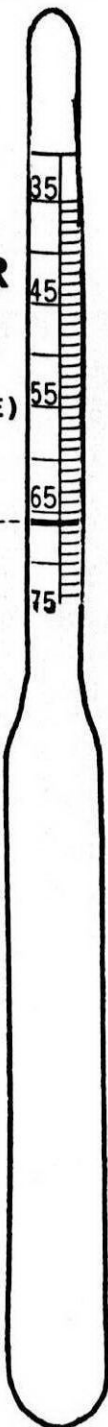
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Cont'd. from page 17
content of the sap. Our conventional method uses 4800 times the minimum energy necessary! This may seem disturbing, but don't let it bother you too much. While the minimum energy is theoretically possible, it is practically impossible. Furthermore, while chemical thermodynamics is a valuable aid in determining the minimum energy, it gives you no hint of the process you must use to achieve that low energy use. No system known to man can reach that value, but there are a number of methods which do a better job than the one we are using. These methods didn't drop out of some complicated equations. All of the energy efficient water removal systems came about by people wrestling with the idea of energy conservation. They started over 100 years ago, and came up with many interesting answers.

There are dozens of efficient methods known. They are multi-effect evaporators, multi-stage flash distillation, vapor compression evaporation, freezing, super critical distillation, reverse osmosis to name just a few. Most of them, for one reason or another, are not very promising for maple sap. Freezing for instance, is just a bit too complicated. Multi-stage flash evaporates fairly little of the liquid which passes through the process. For sugarhouse use the sap would have to pass through the machine over and over again to accomplish any worthwhile concentration. Since we like to pass sap through our evaporators as quickly as possible MSF doesn't appear to have the proper characteristics for sap evaporation.

Of the many methods currently workable, there are three which appear to have the most promise for us. These

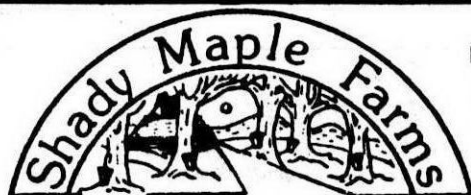
are multi-effect (ME), reverse osmosis (RO), and vapor compression evaporation (VCE). I'm concerned with thermal processes. RO is not a thermal process so I won't mention it any further.

The thermal processes always employ some clever little trick to re-use the heat we put into the system. When we boil sap our steam goes through the roof and it takes our heat with it. We use the heat a single time and our system is called single effect. The problem is that our steam is at 212 degrees. Our sap boils at 212 degrees or higher and syrup boils at 219 degrees. It doesn't take a fancy engineering degree to see that steam at 212 degrees will not boil syrup at 219 degrees. What we have to do is get the steam temperature and pressure higher or get the boiling point of the liquid

(which is determined by the pressure) lower. ME and VCE do either of these or even both.

Consider this. Let's boil some sap in a pressure cooker at 20 pounds pressure. The sap will boil at 260 degrees at that pressure. If we run the steam from the pressure cooker through pipes in sap at atmosphere pressure the sap will boil. Now we've done it. We've used heat to evaporate some liquid, and then reused that heat in the steam to evaporate more liquid. We've used the heat twice and this is called a double effect evaporator. If we want to we can break it up further and have another vessel or stage, at 10 pounds pressure. We can go from the first to the second pressure vessel and then to the atmospheric boiling. Now we have a triple effect evaporator. Because of various losses here and there a three

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effect evaporator generally will not do quite three times what a single effect type will, but it will come close to that, and for the same energy input

If for some reason you don't want to have pressure vessels, you can do the same thing by using an evaporator at atmospheric pressure for the first effect and then feed that steam to a second effect where sap is under a vacuum. This is a so called vacuum evaporator. To get the vacuum in the second vessel you have to remove any air with a small vacuum pump. To remove the steam the liquid gives off in the second vessel you use a condenser through which you pump a lot of cold water. The steam will condense on the condenser and keep the vessel under a vacuum. Vacuum evaporators can be made double effect, triple effect or more. A vacuum evaporator is really no different than the ME evaporator as described above, in fact it IS a ME

evaporator. The difference is the pressure at which the different vessels operate at.

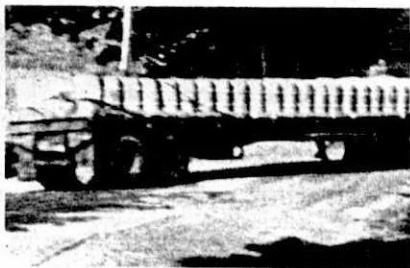
A different situation exists with a VCE. There we boil the liquid at atmospheric pressure to get the machine started. Next we boost the pressure and temperature of the steam off this boiling liquid by passing it through a compressor. This steam is then passed through pipes in the boiling liquid to boil off more liquid. Once it is started very little additional heat is necessary to keep the cycle going. We simply keep pumping the steam off the boiling liquid into the pipes in the boiling liquid. The energy is spent driving the compressor and that energy is 15 to 30 times less than what you would spend boiling the liquid single effect. Many thousands of these machines were built during the second world war for the military to distill fresh water from the sea water in the Pacific war

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VCE's are the simplest of the energy efficient evaporation systems but not necessarily the cheapest. They have a tremendous advantage over ME evaporators that a single VCE can be equivalent to a ME with 15 to 30 effects. In other words, VCE's are incredibly efficient. Another advantage over ME is that there are no high pressure involved—the steam is compressed to just a couple pounds pressure.

A vacuum ME, of course doesn't involve high pressures, but one disadvantage is that the condenser re-

quires enormous amounts of water to operate, and the entire machine takes up a great deal of space for its capacity. On the other hand a vacuum unit imparts little color or flavor to the syrup so that a higher quality product can be produced than with conventional evaporators. The color and flavor can be controlled by reheating in a final step when finishing off syrup.

Both of these systems offer much longer life than a conventional maple evaporator. There are few moving parts with either system. Both of these systems have worked with sap in the

New York Maple Schools

Energy costs have nearly doubled compared to last season. A new grading law for New York State conforms with federal regulations. Sugar bush management, plastic tubing and vacuum pumping will all be discussed at the regional maple schools scheduled for this January.

Gordon Brookman may be able to attend and discuss marketing and International Maple Syrup Institute activities in his new capacity with I.M.S.I. Meetings are scheduled as follows and start at 10:00 A.M.

<u>Date</u>	<u>Host County</u>	<u>Location</u>
1/15/81	Alleghany	Masonic Hall, Andover, N. Y. Lunch \$4.00.
1/16/81	Chautauqua	Ross Grange Hall, Faulkner, N. Y. Pancake Lunch
1/17/81	Wyoming	Strykersville Fire Hall, Minkel Road, Strykersville, N. Y. Pancake Dinner
1/20/81	Cortland	Cortlandville Grange Hall, Rts. 281 & 222 in Cortland, N. Y. Lunch Provided
1/21/81	Chenango	Municipal Building, Sherburne BYOL — Milk & Coffee free.
1/22/81	Delaware	Delhi Grange Hall
1/23/81	Otsego	Parish Hall (rear of St. Mary's Church), 31 Elm St., Cooperstown, N. Y. BYOL — Beverage Provided.
1/26/81	Warren	Consult County Agent
1/27/81	Clinton	Miner Center Auditorium, Chazy, N. Y. Lunch available in Cafeteria \$2.68.
1/28/81	St. Lawrence	Basement Room, Canton Free Library Park Street, Canton, N. Y. — BYOL
1/29/81	Lewis	Consult County Agent

past and the 1981 season will see several of each type in use in sugar-houses across the country. It is likely that the use of these systems will become more widespread in the maple industry as fuel prices continue to increase.

Our industry is facing some changes, and changes, no matter how simple they first appear, always seem to pose all kinds of unforeseen headaches and problems which need solving. If you are considering an alternative system, proceed carefully and stay well informed. As producers we have always managed to offer advice and information to one another to prevent anyone else repeating our mistakes. This

will be a great asset in solving our energy problems. In the hundred or so years that these systems have been in use most of the bugs have been worked out. The problem is becoming familiar with the processes and adapting them to our use. This is where the free exchange of information between us will help the most.

In the midst of the turmoil which can crop up whenever we make changes it may be difficult to see the light at the end of the tunnel. But there is a time not far in the future when many of us will be making better quality syrup using far less energy and wondering why we took so long to make the change in the first place.



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Water Turbine

by
William Moulton
St. Johnsbury, Vermont

As more sugar makers add vacuum systems to their pipelines, one of the most common problems to overcome is power. Electricity is fine but gasoline engines have not proven satisfactory for continuous use. If you have a suitable brook, the answer may be a water turbine.

Background:

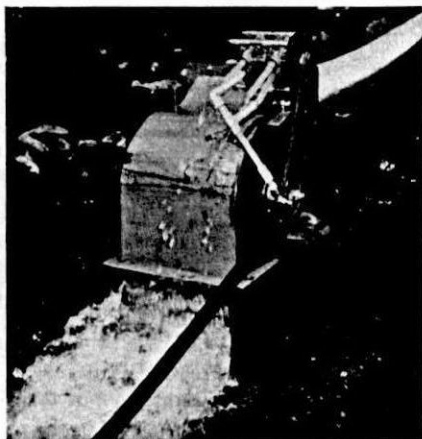
Since the Sapsucker Vacuum Pump had relatively low horsepower and R.P.M. requirements and did not have to be protected from freeze up, I contacted Dale Minick of Sugar Camp, Inc., and discussed the possibility of a joint project. Dale agreed to provide two Sapsucker heads and construct a prototype water turbine. I would take it from there and do the field testing in Vermont.

Objectives:

Our objective was to develop a system that worked and to determine the minimum requirements for that system. If the water turbine system was to be of any practical use to the sugar maker, it had to be competitive in price with other power units, simple to install, portable and adaptable for other uses.

Hardware:

The prototype turbine that Dale Minick shipped to me was a 12" diameter Banki made almost entirely of steel and weighed 55 lbs. with two Sapsuckers mounted on it. I added a plywood base and inlet cover with two 4" diameter holes cut in it. For the penstock I used 4" diameter PVC sewer drain pipe because it was cheap, easy to handle, and available.



Setup:

The basic approach was to locate the turbine at a low point in the brook and run two 4" pipes, side by side, far enough up the brook to get the head needed to run the system. Testing showed that in order to operate two Sapsucker heads at 500 R.P.M. the Banki turbine requires enough water to fill two 4" pipes with a head of eight feet.

Problems to Consider:

1. The 4" pipes running up the brook should be kept as straight as possible. On a permanent installation you might consider stringing a steel cable between trees and suspending the pipe from it.

2. Locate the turbine so the water coming out of it can flow back into the stream without causing erosion and fasten it securely.

3. Getting the 4" pipes to run full and not suck in air at the upper end can be overcome by putting a 45° elbow on the pipe and pointing it down into the stream. This causes a siphoning action.

4. Ice and sticks will plug the turbine if the pipe is not screened. I settled on 1" chicken wire. Around the inlet I put plywood boxes, about 1

foot wide and flared so they would direct water into the pipe. The screen was stapled over the open end of the plywood. Also, screen a section of the brook three or four feet above the boxes and clean it once a day. The 45° elbow was located inside the plywood box.

5. If you plan on a permanent installation, have the upper section of the pipe flexible so you don't have to put it into the brook until the last minute. This will eliminate most of the icing problems and save wear and tear.

6. Make sure you have enough head. You need 8 feet from the inlet at the upper end to the turbine, plus about 2 feet for the height of the turbine, or a total of 10 feet. Our brook had a 7% slope which meant going upstream 110 feet.

Alternative Uses:

The Banki water turbine could be

used for irrigation pumping and powering electric fences. I plan to see if it will generate enough electricity to run the lights in a sugarhouse. I'm sure that once someone has a turbine they will be tempted to find alternative uses.

Costs:

The cost of installing a similar water powered system would be about \$665 (\$275 for the turbine, \$280 for two Sapsucker heads, and \$110 for the 4" PVC pipe). A gasoline or propane powered system would cost about \$560 plus fuel.

Anyone interested in obtaining a water powered vacuum system should contact Dale Minick, Sugar Camp, Inc., R2 Box 337, Rapid City, MI 616-331-6328. For more information about the tests I ran, contact me at the Dept. of Forests & Parks, 180 Portland Street, St. Johnsbury, VT. 802-748-8787.



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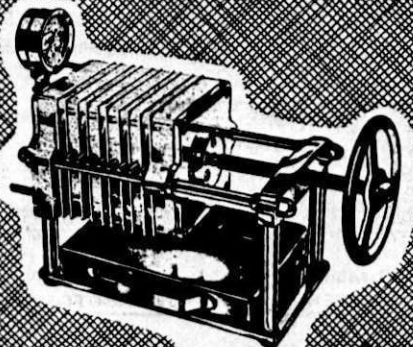
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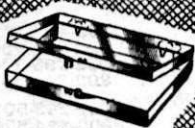


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Justus 'Dutch' Asthalter, Neversink, NY, PO Parksville, 12768	(914) 292-8569
Frank Barney, Sherman, NY 14781	(716) 761-6071
W. Barry Branon, 54 Cogan Ave., Plattsburgh, NY 12901	(518) 563-1063
Lansing Burdick, 335 East Rd., Stephentown, NY 12168	(518) 733-5591
Campbell's Maple, Smyrna, NY 13464	(607) 627-6653
Charles R. Emerson, RD 1, Alfred Station, NY 14803	(607) 276-6481
Claude Sisson, Sr., Central Bridge, NY 12035	(518) 234-3194
Ralph VanBrocklin, RFD No. 2., Canton, NY 13617	(315) 386-3036
John Wiggers & Sons, North Clymer, NY 14759	(716) 355-2511
Neil C. Wright, 28 Liberty St., Camden, NY 13316	(315) 245-1519
J. Curtis Dom, PO Box 56, Wellersburg, PA 15564	(814) 324-4414
Northeastern Pennsylvania Maple Producers Association Court House, Honesdale, PA 18431	(717) 689-2353
Potter-Tioga Maple Prod., Assn., Coudersport, PA 16915	(814) 274-8540
Robert McConnell, Coudersport, PA 16915	(814) 274-9143
H. W. Russell & Sons Maple Farms, Rome, PA 18837	(717) 247-7361
Sugar Bush Supplies, 2611 Okemos Rd., Mason, MI 48854	(517) 349-5185
Kinney & Hodgkins Maple Supplies, Throldike, ME 04986	(207) 568-3683
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Wyman W. Manes & Son, East Orwell, Ohio 44034	(216) 583-2388
Richards Maple Products, 545 Water St., Chardon, OH 44024	(216) 286-4160
O. C. Stevens & Son, Maple Lane Farm, Mt. Gilead, OH 43338	(419) 946-3300
Reynold's Sugar Bush, Inc., Aniwa, WI 54408	(715) 449-2057
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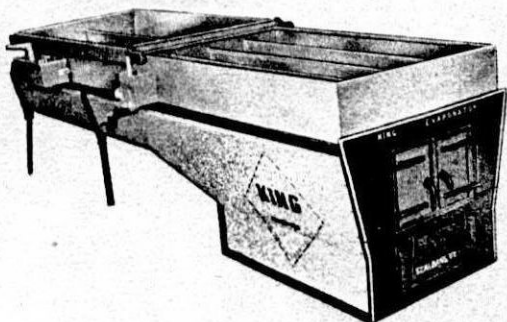
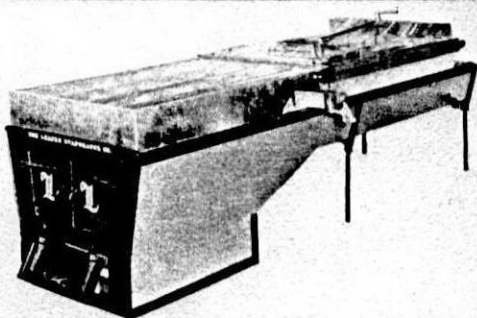
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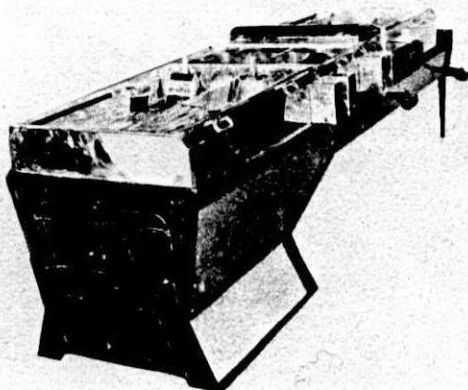
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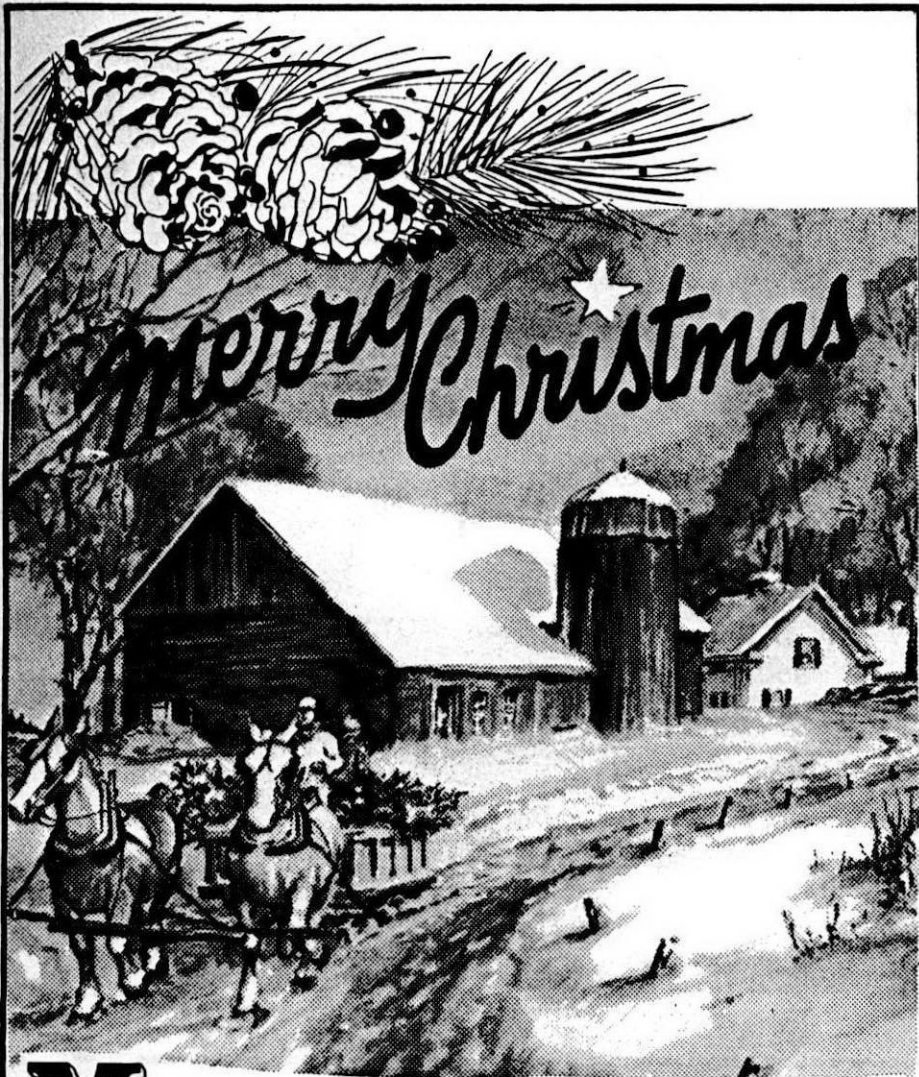
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