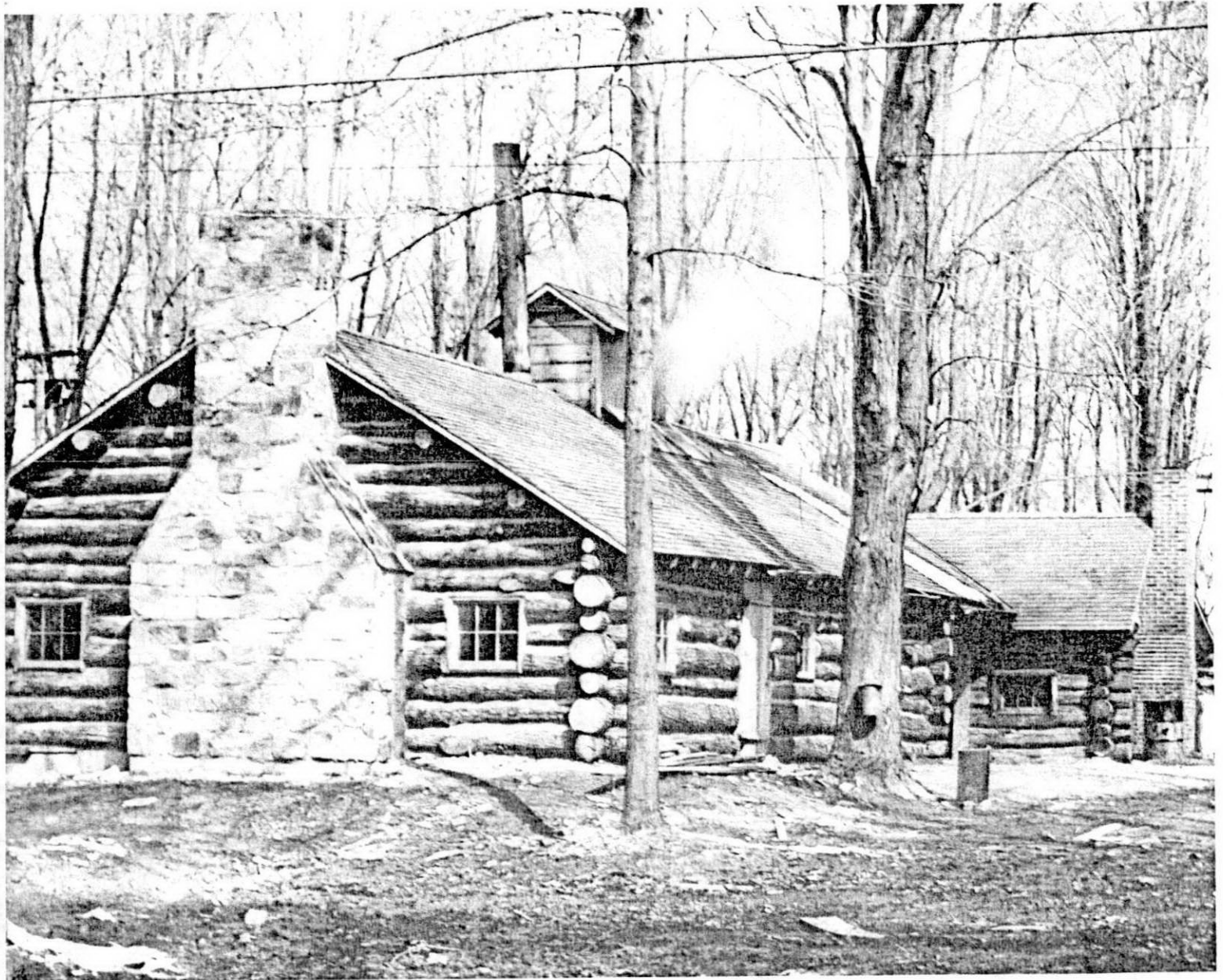


National Maple Syrup • DIGEST •



Vol. 2, No. 2

BAINBRIDGE, NEW YORK

FEBRUARY 1963

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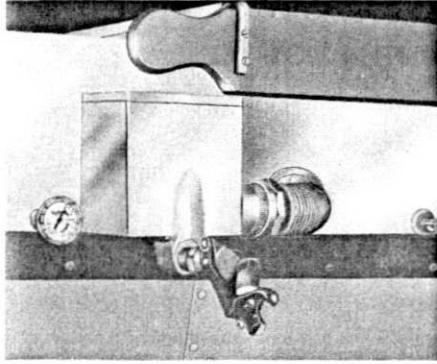
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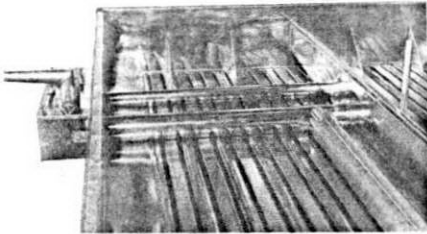
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HAUCK OIL BURNERS
for the Maple Sugar Industry

GAS FIRED FINISHING UNITS
Prices available on request

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ANOTHER KING EXTRA FREE—Furnished FREE 3" diameter DIAL Thermometer installed in the front pan on all orders for complete evaporators. The installation also includes fittings in the heater pan for convenient recalibration.



THE FAMOUS KING DOUBLE ACTION AUTOMATIC SAP REGULATOR—This exclusive feature is now installed on all KING evaporators 30 x 8 and larger. A simple float and arm device with partition between and pipes to flue pan from both sections make sure sap level stays as you want it.



MAPLE SYRUP CANS—Printed cans are now available imprinted with "Vermont" or "New York" as well as blank for All State use. Please state which can is wanted. All cans complete with inner seals and caps.

NOTE: To properly pasteurize, Maple Syrup requires a temperature of at least 190°F. Any can that will not hold 237 cubic inches of 190° Maple Syrup is TOO SMALL. Our cans are calibrated for 237 cubic inches as recommended by the Vermont Dept. of Agriculture. — All "F" Style - Oblong —

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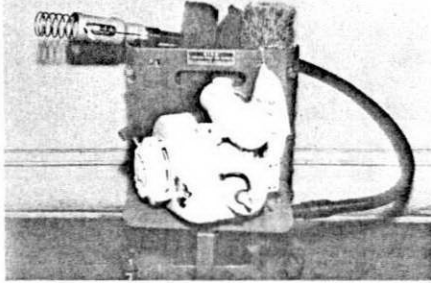
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Costs 30% less than metal buckets and covers.

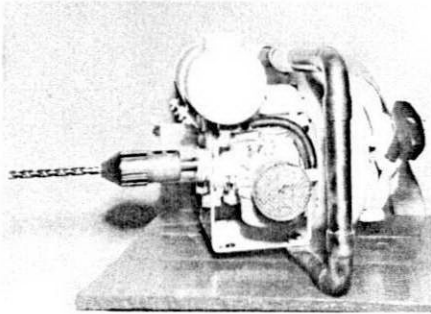
Over 20% more sap per tap hole.



PORTABLE POWER TREE TAPPERS

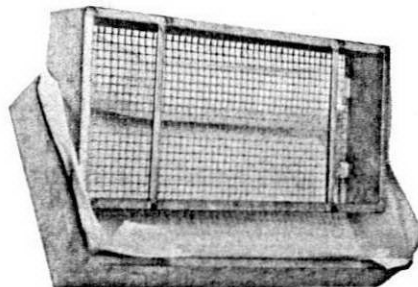


The KING—Complete with speed reducer, bucket washing brush, 7/16" Greenlee bit, half round bit file, stop button, and adapter for grinding and polishing tools.

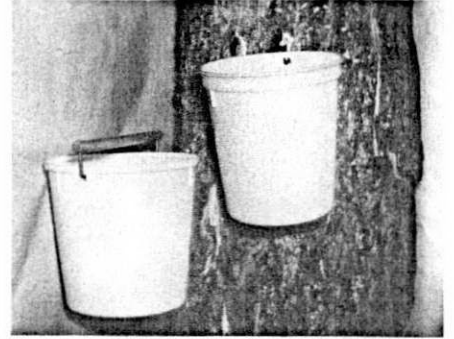


The QUEEN—Complete with handles, strap, chuck, 7/16" Greenlee bit, half round bit file.

KING SAP FILTERS



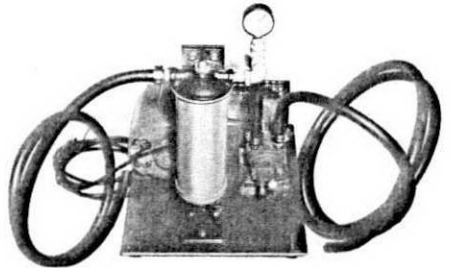
KING SAP FILTER—A combination of two galvanized baskets with filter paper, permits only CLEAN sap to enter the storage tank. Eliminates clogged feed lines and plugged regulators. Baskets manufactured in TWO lengths, 47 inches and 51½ inches. Both are 24" wide and 6" deep. —Specify Length when ordering—



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Nylon Sap Spouts for above, per hundred \$12.60
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Model CCG1-60 A complete filtering unit with filter tube, hose, pump, ¼ H.P. sealed motor and pressure gauge.

This unit offers several advantages such as ease in filter changing, LOW initial cost, portability and compactness, as it is mounted on casters and is self-contained. Filtering capacity 60 gallons per hour.

Pressure filter complete w/pump, hose & filter tube (as shown) \$245.00
Extra filter tubes, each 1.80

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Easier Cleaning — No Shrinkage

Flat Style, 18" x 36" \$5.00
Flat Style, 36" x 36" 7.75
Cone style, 5 quart 4.25
Cone style, 8 quart 5.50

PELLETS

SapFlo Maple pellets for increased sap yield per tap hole.
Bottle of 500 \$7.50
Myverol (for Maple Fluff & Candies) Per lb. \$3.50

EVAPORATOR HOODS

There is considerable interest in Evaporator Hoods, and we are prepared to manufacture hoods to individual specifications.

As these are custom orders each unit will be priced according to size.

We would recommend construction of aluminum for light weight and ease of installation.

GEO. H. SOULE Co. Inc.

St. Albans, Vermont

World's Largest Maker of Maple Sugaring Equipment

LOWLAND LOGIC

The other day, I got to thinking about what a wonderful job the Extension Service is doing for the Maple Industry. If it wasn't for them, driving thousands of miles in the worst sort of weather to hold schools and institutes all over the country, half the syrup produced would still be made in flat pans, with no ventilation in the sap house, no concrete floors or any other improvements.

They hold meetings, and tell the producers what they should do to improve their products. And where do they get their ideas from? Wherever they can. Some come from the research foresters, some from the U.S.D.A. Laboratory in Philadelphia and some from research stations in state colleges who are working under Federal contracts. But a lot of their ideas come from the producers themselves.

When they hear about some fool idea someone has tried and found workable, the county agent looks into it and passes it on to the Extension Forester who in turn passes it on to all of the producers who attend the next meeting. And they never laugh at any new idea, no matter how outlandish it sounds. Remember, if it hadn't been for Thomas Edison, we'd be watching television by candlelight!

But they can only reach the ones who attend the meetings. That's where the "Digest" can help. It's mailed to every producer we know of, and right now, I think we have better than 90% of them!

Now there are probably a lot of good, new ideas that originate in some of the outlying maple states, and it may take quite a while before we hear about them. The western states of Wisconsin, Michigan, Minnesota, Indiana and Ohio are more or less new to this industry and are very progressive. Indiana held its institutes in November, the rest are in progress now. The producers of those states as well as the rest of the northeast who could not attend the meetings would like to know a little about what went on.

We would like reports on some of these meetings from the Extension Forester or the County Agent in charge so that we could print some of them. I know the foresters are busy now but this system of sharing new ideas, whether it's some new piece of homemade equipment or a way to save time or expense, is

the thing that has kept the maple industry alive and progressing, and a good many of our extension men are doing a good job educating the producers.

I'd like to mention some of those men here, but I'm afraid I might forget one or two who have been doing a bang-up job. Anyway, there isn't room in this magazine because everyone who works in extension is working for you. That's what they're getting paid for. So how about you guys giving the extension service a little cooperation, and maybe now and then give them a pat on the back when you think they're done a good job. After all, they're got a thankless job to do, a lot of miles to travel, put in more hours than a truck driver, and the pay is pretty poor for college-graduates, most of them with masters degree.

And what have they got when they have to retire? Probably nothing more than a gold watch and a lot of ideas about what they could have done if they'd gone into business for themselves instead of helping everyone else make a dollar. And before I quit, I want to say one more thing:

If it wasn't for the Extension Service, there would be no "Maple Syrup Digest". I don't see how it could ever be printed without their help.

Editor

"DIGEST"

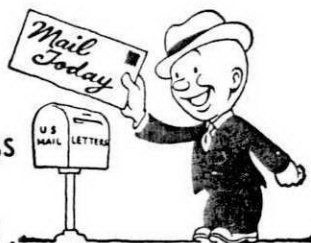
DOLLAR

DEPARTMENT

To date we have received 176 contributions ranging from one to twenty dollars. We're pleased that so many wanted to help us out, but when you divide that number by 8,000 producers --not a very good batting average.

Have we failed to make the "Digest" worthwhile? Or did you forget to send yours.

OUR
ADDRESS
IS
SIMPLE



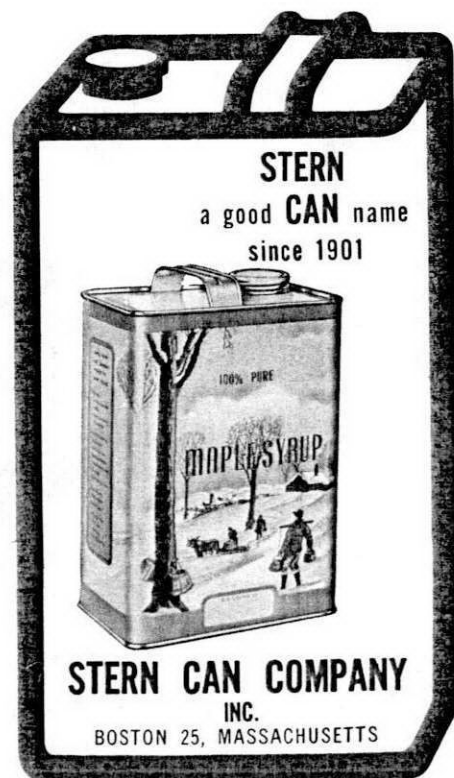
The Maple Syrup Digest, Bainbridge, New York

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LET'S THINK!

During the past several months the maple industry has become concerned with currency devaluation, tariffs and duties which may affect the movement of syrup between markets in the United States and Canada. Actually, if we take a close look at the domestic situation for maple syrup markets, it is found that U.S. production falls far short of meeting the demands of the market and that Canadian syrup must be imported to satisfy the needs of U.S. consumers.

million pounds of Canadian maple and in 1961 this figure increased to 18.6 million pounds. Adding the total U.S. production and the imports from Canada we find that in 1930 the total U.S. use of maple products amounted to 34.8 million pounds and in 1961 it was 33.1 million pounds (see chart) — showing that the total maple use in U.S. had decreased. But let us compare our U.S. populations — 1930 we had about 120 million people in U.S. and in 1961 the population had grown to about

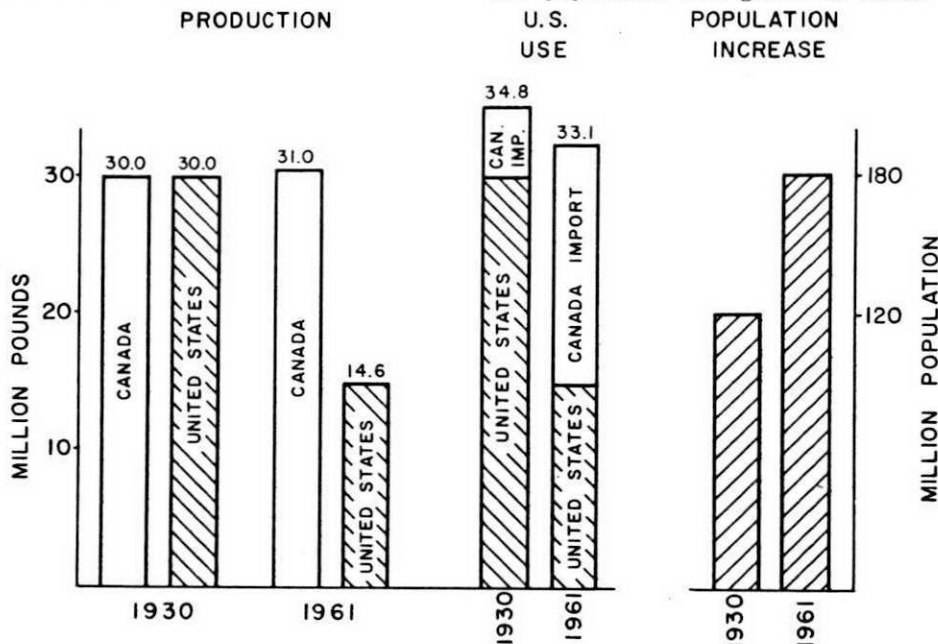


Table I. Production & Importation Vs. Population Increase

According to the 1959 U.S. Census of Agriculture the production of maple syrup in the U.S. declined 30 percent between 1950 and 1959 and the number of producers declined by 62 percent. For example, the production in Vermont during this period declined by 42 percent and the number of producers by 59 percent. This was a period when the demand for consumer goods was high and population increasing at a rapid rate. The demand for maple products has remained stable, but U.S. producers have failed to supply this demand. Consequently, Canadian suppliers have stepped in and filled the needs of the U.S. consumer market for maple products.

In 1930 we made as much syrup in U.S. as was made in Quebec—30 million pounds. Yet in 1961 we made only 14.6 million pounds while Quebec produced 31.0 million pounds. The U.S. Tariff Commission figures show that in 1930 we imported 4.8

million pounds of Canadian maple and in 1961 this figure increased to 18.6 million pounds. Adding the total U.S. production and the imports from Canada we find that in 1930 the total U.S. use of maple products amounted to 34.8 million pounds and in 1961 it was 33.1 million pounds (see chart) — showing that the total maple use in U.S. had decreased. But let us compare our U.S. populations — 1930 we had about 120 million people in U.S. and in 1961 the population had grown to about

180 million; this, then, indicates that the per capita use of maple had dropped drastically — from 4.6 oz. in 1930 to 2.9 oz. in 1961 (note chart).
What does this all mean? The graphs clearly indicate that the increased importation of Canadian syrup has not offset the decline in U.S. production and that the total supply available for the consumer is much less per capita in 1961 than in 1930. This can mean one thing — there is still a shortage of maple syrup. If there is any surplus it is only temporary and local. It means many of us have depended on large bulk buyers to take care of our distribution problems for us which is fine but by and large their big markets are for the darker grades of syrup which go into growing market for “blends” while the smaller marketer has a better potential market for the table grades of maple.

Our Present Problems. We do have some problems but most of these problems are not of our making nor, in the present political climate, are we likely to be aided much in remedying them.

1. CURRENCY DEVALUATION. Canada devalued her dollar earlier in 1962. This resulted in the Canadian dollar being 7½% less valuable than the U.S. dollar. Or to put it another way, you get a 7½% discount for every dollar (U.S.) you spend in Canada whether you buy hay, or wool or maple syrup. This was done to increase the sales of Canadian produce to U.S. and to other dollar countries. Thus, the market price for Canadian syrup, or block sugar, was discounted 7½%.

2. TARIFFS. The *ad valorem* tariff on U.S. syrup entering Canada is 17%—the Canadian customs officer collects 17¢ for every dollar's worth of U.S. syrup and its container (in truth an infinitesimal amount of U.S. syrup crosses the border and why should it?). In comparison with the Canadian tariff the U.S. tariff is 1½ cents per pound for syrup and 2¢ per pound for maple sugar with no duty on the container. With 29¢ per pound syrup, the duty is 5.2%. But since we are a maple syrup deficit area how can we logically ask for an increase in tariff when our present political climate is toward reduction of tariffs generally? In other words, if we sit back and let others produce, we have no rug to stand on.

3. TECHNOLOGY. While the Quebec maple co-op at Plessisville, P.Q., handles the production of 4500 members in a concentrated area, and, has therefore, some really new and up to date equipment for processing, our own bulk buyers are in a much different position. They buy from Wisconsin to Maine and south to Maryland and Indiana. Transportation is a big cost to them. Re-processing is a must in handling these products and though new ideas and methods have been instituted, time and freight rates have worked against them.

Where do we go from here?

Not all the strikes are against the U.S. producer, certainly they are not against the top 25% of them in any given state. These folks are those who have adopted new techniques and have run with them.

PRODUCTION. Although it is generally accepted that it costs more to produce syrup in U.S. than in Quebec, this is open to debate. First, the climate is generally in favor of U.S.—the farther north you go the shorter the spring—it's winter

one day and spring fades quickly into early summer, thus the production per taphole is much less than in our average U.S. bush. Furthermore, modern equipment and production methods can more than offset the present differences in cost of labor. While plastic tubing costs a little more to install it practically eliminates the high cost of gathering sap from buckets. Trucks hauling large loads on good roads are much more efficient than horse and sled. Pumps to handle sap, and even syrup in larger operations, reduce man labor, a high cost item. These are but a few examples of labor saving practices developed in the last five years.

Sanitation (taphole sanitizers, tubing, etc.) has increased sap volume production which in turn has lowered the fixed costs per gallon and virtually has offset "poor crops." Central evaporator plants, too, are approaching assembly line economy.

In general, many producers, using up-to-date techniques, report producing syrup of higher quality, at a lower per gallon cost, than they did five years ago.

QUALITY OF SYRUP. The average U.S. consumer desires a medium amber or light amber table syrup. Here our production methods are making it possible for over 80% of our total production to qualify for this market, higher by several times that of our competition from Quebec. The other 20% is drum syrup grade—this will be in direct competition in the block sugar market.

MARKETING. The secret of marketing is to put the product where the customer can get it with the least possible effort in the form and quantity he desires.

a. **Distribution.** Good distribution is, possibly, the solution to the problems confronting the maple industry. There are two approaches: 1) do it yourself, or 2) let George do it. While this sounds flippant — it is a serious statement. Not every producer is adapted to large scale merchandizing and distribution; but he can help. If many small producers offer syrup at low retail this keeps the price down to a point where others cannot afford to buy bulk syrup and distribute it properly. (A case of cutting off your nose to spite your face.) Other producers who are attempting to do a better job of distribution must grow

to a size, either by producing more or supplementing their production by purchase, where they can spend enough time to distribute their produce to the point where the customer can get it with little effort. The worst thing a producer can do is to panic and dump syrup at cut-rate retail prices because he feels there is a local surplus. "Syrup, like money in the bank, can be stored." In the past, producers have sold at such a low retail price, but demanded such a high drum price that there was no room between for the processor. Such processors are the ones who are best able to distribute maple adequately enough to dispose of more than we can produce or import. Without discrimination it might be well to note a few such larger small processors. They are: Coombs of Vermont, Reynolds of Wisconsin, Embt and Sipple of New York and Keim of Pennsylvania.

b. **Packaging.** A few rules of packaging should be emphasized.

- (1.) Pack the sizes that sell best in your distribution area. It's sort of foolish to pack in gallons when the market demands quarts, half gallons and pints.
- (2.) Pack only top quality syrups of standard density, good maple flavor, clear and of the colors the local trade demands.
- (3.) Attractive labels and containers help. If possible, develop a package and stick with it — it can be yours and will bring you to your customers mind.

c. **Variety in products.** It is nearly essential to develop a "line" of maple products — syrup, cream, sugars, candies, etc. Most retail outlets will buy from producers who will supply a complete "line". Many times the small producer cannot do this — he thus should leave this type of outlet to the producer large enough to handle the needs of such outlets. There are good seasonal outlets for the small producer.

d. **Market all year.** Maple products, once thought to be "seasonal" are now "seasonal" 12 months a year. More and more the consuming public

likes to be able to get maple products for special home use, gifts or souvenirs every month of the year. This means that the size of the maple marketer must grow to satisfy these year long drains. It means that there must be a carry-over from one year to the next to act as a cushion in case of late, poor, or low quality season.

e. **Prices.** There is no need for prices to fluctuate. Set a price, stick to it! Don't panic, don't dump syrup. It stores well—it's as good in '65 as it was in '62 — good marketers seldom have to worry about syrup hold over.

While the U.S. consumer prefers high quality medium or light colored pure maple syrup, there is a large market for the darker grades in bulk packaging to be used in blended syrups and other maple products. Why doesn't a producer concentrate some of his efforts on producing a syrup to meet the needs of this industrial market? Syrup of this type costs less to produce due to the need for less attention to preserving sap and less attention to processing. Another factor in favor of producing syrup of this type is related to producer costs. As long as a producer can recoup his variable costs, it pays him to produce syrup. The fixed costs for building, equipment, etc., will not change with volume of syrup produced, but will be lower per gallon as the total volume increases.

What about the dark syrup?

That 20% of the crop (an average figure) should not frighten too many producers. At best the Canadian economy will expand and the artificial devaluation will eventually be faded out and return to par. In the meantime these factors about dark syrup should be considered:

1. If it is produced as a result of poor practices its production should not be encouraged by an artificially high price.

2. If it is produced at the end of the season after most of the costs have been absorbed its cost of production is much less than for higher grades and so can be sold for much less.

3. American advancement in syrup harvest and syrup processing technology has progressed so far in the United States that it competes favorably with the cheapest labor used in syrup production in Canada.

(Continued on page 12)

ORLON FELT
The Best Maple Syrup Filter

24 x 24".....	\$3.50
24 x 30".....	4.35
24 x 36".....	5.25
30 x 36".....	\$6.55
36 x 36".....	7.75

All prices prepaid—Dealer inquiries invited

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Vermont Maple Industry Council Meets

The Vermont Maple Industry Council held its regular quarterly meeting on November 12, 1962 in the office of the Commissioner of Agriculture in Montpelier. Plans were made to frame a Certificate of Appreciation received from the Girl Scouts of America. The Certificate was received for action taken in providing a maple breakfast for Girl Scouts at the Button Bay National Round-up; and for making a sugar house available, providing maple candy for sale, and arranging for demonstrations of maple sugar making at the Round-up.

A report was received on the marketing meeting called by Commissioner Towne in Montpelier on October 15. Present at this meeting had been representatives from Washington, D.C. and from Maine, New York, and Massachusetts. A principal feature of it had been a talk by Frank Rees of Burlington on the Canadian tariff situation, devaluation of currency, block sugar market, and prospects for drum syrup prices. Senator Aiken had expressed his views on maple marketing, and called for better organization so as to meet requests for large orders while at the same time maintaining quality. Several resolutions were passed having to do with changes in the tariff, grades for syrup, maple market promotion, a possible federal marketing order, and new research to discover additional uses for the darker grades of syrup.

Eric Nye, representative to the National Maple Syrup Council, reported on action taken by the National group in Philadelphia on October 22. He and Linwood Lesure of Ashfield, Mass. were asked to take action to obtain improvement of the Canadian tariff situation. Representatives from New York and Vermont were asked to study grades for maple syrup and to recommend uniform grades that could be adopted by all maple states.

If necessary, Eric Nye and Linwood Lesure will appear before the tariff commission in Washington.

It was reported that Canadian Syrup was coming into New York and Wisconsin at retail prices 20% less than U.S. prices.

Elmer Towne reported that the Vermont State Farm Bureau had gone on record in favor of increasing the U.S. tariff on syrup so that the U.S. tariff is at the same rate as the Canadian tariff. (Canadian tariff is 17% ad valorem.)

It was recommended that the Eastern Utilization Research Laboratory, A.R.S., U.S.D.A., at Philadelphia be thanked for recent Triennial Conference (Oct. 23-25); and that they be asked to do further research on new uses for maple products. One possible approach would be blends with other food products such as milk.

It was agreed that the Vermont maple producer should be encouraged to make Fancy syrup.

Eric Nye reported that it was unlikely that maple market promotion programs could be established in other states because the farmers do not have enough "say" in their legislatures.

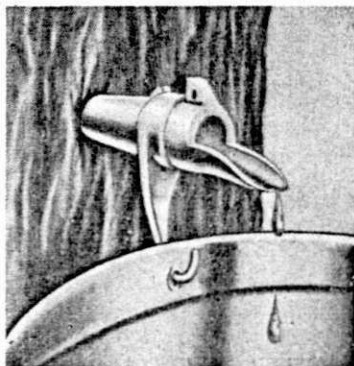
The Council appointed Raymond Foulds and Betty Davis to forward news on Vermont maple to the National Maple Syrup Digest editor.

It was suggested that the "Vermont Maple Memo" letter be sent to the "National Maple Syrup Digest" editor.

The Festivals Committee reported that there had been 27 TV bookings of the film, "The Miraculous Maple Tree", as of October 31, 1962. A total of 714,900 people had seen these TV bookings of the black and white prints. There was no report from the Vermont Development Department on showings of the color prints, but as of July 1 over 200,000

(Continued on page 11)

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We are as near as your TELEPHONE
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SEE-WRITE or PHONE US

The Bulletin Board

Neither Dr. C.O. Willits, members of his staff, nor the U.S. Department of Agriculture endorse or recommend the product of one manufacturer over a similar product made by another manufacturer. If such an endorsement was implied in the advertisement of page five of the January 1963 issue of the **National Maple Syrup Digest** it was unintentional. The recommendations of Dr. Willits was only for the use of germicidal tap-hole pellets and not for pellets of a specific manufacturer.

DROPS IN THE BUCKET

Weather too cold, Sap not running, no drops this month.

NEW YORK MAPLE TOUR

The annual New York State maple tour will be held this year in the central section, centering around Stamford, N.Y. It will be a two-day tour of about eight maple camps and will take place the first week in August. All New York producers will be notified. Out-of-state pro-

ducers are cordially invited to attend and may receive a schedule of the tour by writing to the "Digest" or to Prof. Fred E. Winch, Extension Forester, Cornell University, Ithaca, New York.

COVER

This month we have a picture of one of the most unique sugarhouses in the United States. It is located on the village square in Burton, Ohio, and built of white oak logs. All labor for building and operating is contributed by the maple producers of that area — a real community project.

Last month's cover picture was of Hugh Smith's sugar camp near Richmond, Vermont. We thought it was one of the most picturesque settings we have ever seen; in fact, I'd give a lot to have it in my back yard.

In our confusion we forgot to mention who it belonged to or where it was located. Both pictures taken by Bob Lamb.

VACATION

It's time for the "Digest" to take a little vacation. No more issues

will be printed until November. So until then, we hope you all have a successful maple season with no off-flavored syrup. And don't forget to fill out the questionnaire in this issue and return it to us. IT'S IMPORTANT.

MAPLE PRODUCTS SELL

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We carry a complete line
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We are not saying that we are making as good a pellet as we may be able to make at some future date.

We are saying that, having exhausted all known methods, we cannot make a better pellet at the present time, than the one we have for sale.

During the generations we have been in business, we can state that "Flomor" pellets have done more good for more people's income for less time and expense than any other product we have ever handled.

We strongly advise their use.

"FLOMOR" MAPLE TAP HOLE PELLETS
bottle of 500 pellets \$5.00

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FREEZING SAP*

The concentration of maple sap to sirup requires the removal of vast quantities of water. This can be accomplished by either of two methods, vaporization or freezing. The method commonly used is vaporization, where water is evaporated as steam from boiling sap. When oil is used as fuel, the cost of this operation amounts to \$0.45 to \$0.75 per gallon of finished sirup, which is a considerable portion of the expense of manufacturing maple sirup.

Many sap and sirup producers have observed that natural freezing of maple sap during periods of cold weather increases the sugar content of the remaining liquid at the expense of the ice. The problem of whether it would be profitable to discard this ice from maple sap, or whether it should be partly or completely melted and the melt evaporated with the liquid has never been investigated. A study which was conducted gave the answers to these questions and in addition produced some startling results.

The effects of the rate, extent, and direction (liquid to ice or vice versa) of freezing on concentration of solids were examined. The effect of methods of separating liquid and ice were also studied. The ice and sap or ice and melt were separated by pouring the liquid off, draining the ice as it melted, and centrifuging. Also investigated were such methods as crushing and rinsing the ice with water, and dipping the ice in fresh sap prior to separating and discarding the sap.

Preliminary work was carried out with cane sugar solutions and subsequent experiments were repeated with 2° Brix sap. It was found that the sap tended to freeze first at the top, then at the bottom, and finally along the sides of the container with the zone of freezing gradually extending into the interior.

The recovery of sugar in the melt was established for two conditions: first, where liquid sap was being progressively frozen; and second, where sap was completely frozen and then partially melted. The first condition would be equivalent to the natural situation that occurs immediately following a cold spell where the sap is partially frozen with both liquid sap and ice in the container (bucket or tank). The second condition would correspond to the situation where sap had partially melted after being completely frozen.

The containers of sap were placed in a freezing chamber and then withdrawn at different intervals as the freezing process progressed so as to obtain amounts of ice from 0 to 97%. The liquid sap was removed by pouring after perforation of any upper layer of ice which has formed over the surface of the sap.

Table I shows the effect of freezing on the percentage of the total sugar that is in the sap separated from the ice by draining. It also shows the reduction in oil costs to evaporate a given volume of sap by throwing away the ice as well as the loss incurred through discarding that part of the sugar which was incorporated in the ice. The cost data were computed on the basis of 100 gallons of 2° Brix sap so that the data obtained under the different conditions would be comparable. The following assumptions were made: (a) the finished sirup has a value of \$5.00 per gallon; (b) one gallon of oil, having a market value of \$0.15, will evaporate 13 gallons of water. Under these conditions the maximum cost of evaporating 100 gallons of sap is \$1.15.

Table I shows that when 30% of the sap was recovered as liquid by pouring, the liquid contained 48% of the sugar. Discarding the ice, which contained 52% of the sugar, would result in a loss of \$6.05 of potential sirup. Since the fuel savings would be only \$0.80 the net loss would be \$5.25.

The rate of freezing was found to have no significant effect upon the recovery of sugar. All values from the rapidly frozen series were concordant with the data from the slow-freezing experiment with the exception of the sample which contained 67% ice. Even here, discarding the ice from this rapidly frozen sample resulted in a net loss of \$5.90, which is of the same order of magnitude as net loss of \$5.25 that would ensue from discarding the ice in the preceding entry, where 70% of the sample was frozen.

With the smaller quantities of ice the loss was somewhat diminished, but discarding the ice remaining when the liquid was poured off was never entirely profitable. Even when only 8% of the sample remained as ice, the data showed a net loss of \$0.45. Similar results were found in experiments where liquid sap was freezing or where completely frozen sap was melting. Whether the ice was forming or melting had little effect on the values obtained.

Since all of the sugar was not recovered in the drained ice, exper-

iments were conducted which attempted better recovery. Table 2 shows the results obtained by continuously removing the melt as the ice thawed. This would correspond to a situation where the sap ice was placed on a wire screen and the melted sap collected as the ice melted. This procedure causes a continuous rinsing of the ice by the freshly melting sap.

It will be noted from the data in Table 2 that better recoveries were obtained. Comparing the two procedures, when 53% of the ice had melted, discarding the remaining 47% ice caused a net loss of only \$1.15 as compared to the loss of \$3.10 in the previous experiment when 44% of the sample was discarded as ice. Even with this improved procedure all of the sugar was not recovered in the melt and at no point was it profitable to discard the ice.

Complete recovery of sugar in the melt was achieved when the ice and melt (liquid) were more completely separated by centrifugation. Table 3 shows the effect of separating ice and melt by centrifugation. These data show that for sap containing 70% ice, the gain from lower fuel requirement more than balanced the loss from discarding potential sirup and the net profit was \$0.05. Discarding the ice separated from the melted liquid by centrifuging was profitable when the residual ice was less than 70% of the original sap. The recovery of sugar in the melt increased until the centrifuged ice is 56% of the original weight. At this point, where recovery of sugar was virtually complete, the savings from oil requirement was \$0.65 and the loss from discarded sirup was only \$0.15, for a net profit of \$0.50. Allowing the ice to melt beyond this point before centrifuging diminished the net profit because of the greater fuel requirement.

This process resembles commercial methods developed for frozen concentrated fruit juices, where centrifuges or hydrolic presses are used to separate the concentrate from ice.

To obtain even better separation of sugar from ice and to obtain a still higher concentration of sugar in the melt, the effect of crushing the frozen sap and rinsing with successive portions of 2° Brix sap before centrifuging was investigated. The results are given in Table 4.

The crushing process caused 4% of the ice to melt. This melt contained 20% of the sugar and had a

Brix of 10°, a five-fold enrichment over the original sap. However, discarding the ice would result in a net loss of \$8.20.

Rinsing the crushed ice caused additional ice to melt. When 91% of the sample remained as ice and 66% of the sugar was recovered, the net loss was reduced to \$2.95. It still was not profitable to discard the crushed and rinsed ice.

When these repeated operations left 78% or less of the ice, the savings effected by oil savings versus the loss in sugar appeared to make the process profitable. However, the liquid added during the rinsing operations increased the evaporation costs so much that the results were comparable to those obtained when the melt and ice were separated by centrifuging without rinsing.

Two additional experiments were conducted. One consisted of scraping the surface of the ice, melting this, and determining the amount of sugar that adhered to the surface of the ice. Scrapings from a very thin layer of the ice produced a melt that was 26° Brix. This suggested that dipping the blocks of frozen sap in a fresh volume of sap might wash this sugar off and reduce the amount of sugar which would be discarded as ice. This was tried, but the total amount of sugar removed from the ice by dipping was so small that it was insignificant.

The other experiment was to determine the effect of stirring the sap as it froze. This too proved to have little or no effect on the amount of sugar entrained in the sap ice.

SUMMARY

1. Do not discard ice from partially frozen or melted sap. The value of sugar lost with the ice exceeds the gain from lower oil consumption.

2. Dipping frozen sap in plain water or fresh sap has no advantage.

3. Discarding centrifuged ice which has been crushed or rinsed is advantageous. However, this procedure would not be practical due to the high cost of centrifuging.

4. Discarding the ice from partially frozen sap appears economical only under unusual condition wherein an evaporator house could not process all of the sap supply or a maple farmer could not haul all of his sap run. Under these rarely encountered circumstances it would be advantageous to process only the liquid portion of the mixture since sirup solids are greater in the liquid phase.

TABLE 1. EFFECT OF SEPARATING ICE AND LIQUID BY DRAINING

Ice %	Drained Liquid %	Sugar Recovery %		Sirup From 100 Gal. Sap*	
		Slow Freezing	Rapid Freezing	Reduction in Oil Cost, \$	Loss From Discarded Sugar, \$
97	3		5	1.10	11.05
88	12		18	1.00	9.60
70	30	48		0.80	6.05
67	33		42	0.80	6.70
57	43	62		0.65	4.45
44	56	69		0.50	3.60
42	58		73	0.50	3.20
34	66	77		0.40	2.70
21	79	87		0.25	1.50
8	92	95		0.10	0.55

*Based on sirup at \$5.00/gal., 13 gal. H₂O/gal. oil, oil equals \$0.15/gal.

TABLE 2. EFFECT OF CONTINUOUS SEPARATION OF ICE AND WATER ON MELTING

Ice %	Total Liquid %	Sugar Recovery %	Sirup From 100 Gallon Sap	
			Reduction in Oil Costs, \$	Loss From Discarded Sugar, \$
95	5	38	1.10	7.25
81	19	59	0.95	4.80
65	35	74	0.75	3.05
47	53	86	0.55	1.70
31	69	91	0.35	1.00
21	79	95	0.25	0.55
12	88	96	0.15	0.45

TABLE 3. EFFECT OF SEPARATING ICE AND LIQUID BY CENTRIFUGATION

Ice %	Total Liquid %	Sugar Recovery %	Sirup From 100 Gallon Sap	
			Reduction in Oil Costs, \$	Loss From Discarded Sugar, \$
91	9	45	1.10	6.40
79	21	83	0.90	2.00
70	30	94	0.80	0.75
62	38	97	0.70	0.35
56	44	99	0.65	0.15
45	55	100	0.50	0.00
38	62	100	0.40	0.00
32	68	100	0.40	0.00
25	75	100	0.30	0.00
14	86	100	0.15	0.00

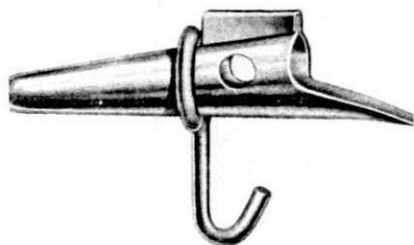
TABLE 4. EFFECT OF CRUSHING, RINSING, AND CENTRIFUGING ON THE SEPARATION OF ICE AND LIQUID

Ice %	Total Liquid %*	Sugar Recovery %	Sirup From 100 Gallon Sap	
			Reduction in Oil Costs, \$	Loss From Discarded Sugar, \$
96	4	20	1.10	9.30
91	14	66	1.00	3.95
85	15	75	1.00	2.95
84	26	84	0.85	1.80
81	25	91	0.85	1.00
78	37	94	0.75	0.70
77	33	97	0.75	0.35
73	47	98	0.60	0.25
71	44	99	0.65	0.05
67	58	100	0.50	0.00
60	55	100	0.50	0.00

*Includes Rinse

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It is the duty of every maple producer to join his local Maple Producers' Association. This can be done at your local maple school or institute this winter. If you cannot attend your meeting and wish to join by mail, send your name to your state delegate as listed on page 2 of this issue or write to the MAPLE SYRUP DIGEST, Bainbridge, N.Y. and we will forward your letter to the proper place. Support your association which is supporting the National Maple Syrup Council. Don't sit back and let "George" do it.

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Other _____

Type of evaporator: Single _____ Multiple _____

If multiple, are they connected in series _____ or parallel _____

Is separate finishing pan used? Yes No

Type of heat used in finishing pan: Gas Steam
 Oil Other _____

Type of ventilation: Flue (Cupola) Tight covers _____

Sugar house is located in the bush _____ on the roadside _____

Utilities available: Electricity Water

Type of instruments used:

Thermometer: Target Dial Other _____

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LET'S THINK

(Continued)

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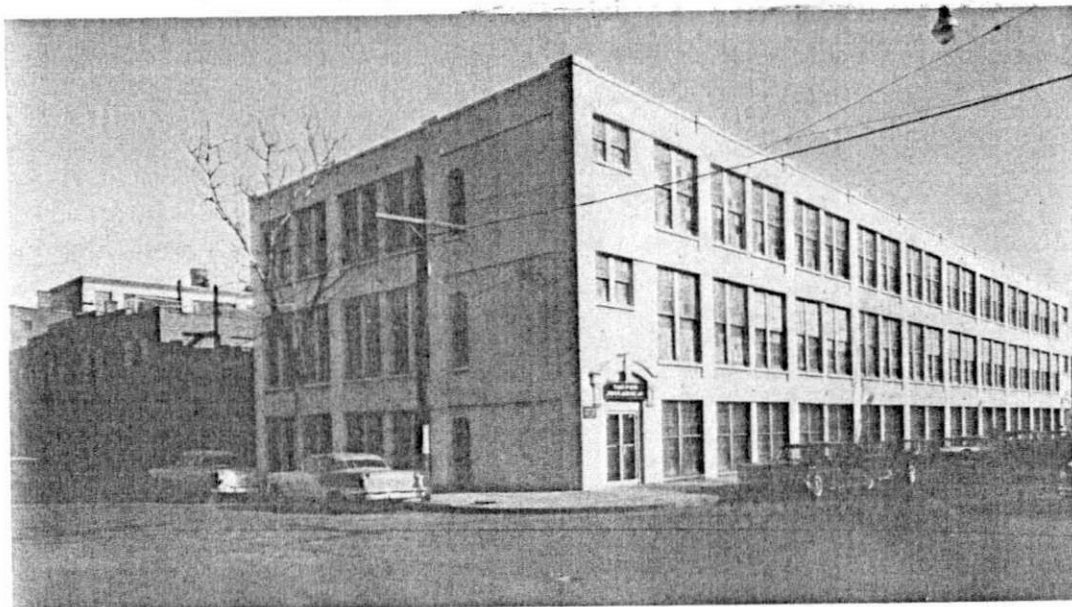
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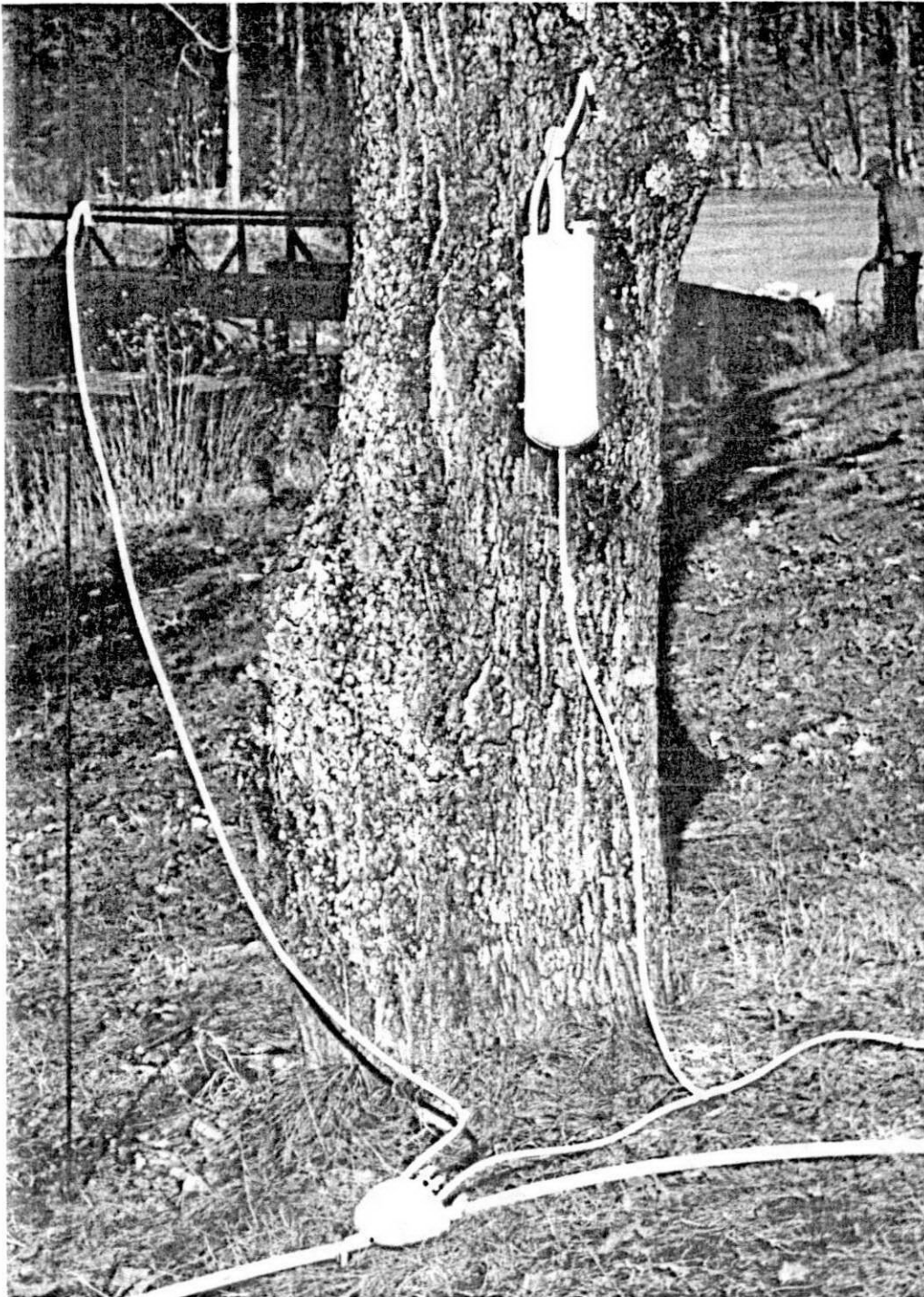
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