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A Year's Progress with South Dakota's Farm Electric Test Line

R. L. Patty

A YEAR'S PROGRESS

with

SOUTH DAKOTA'S FARM ELECTRIC TEST LINE

Extension Service
South Dakota State College of Agriculture and Mechanic Arts
Brookings, South Dakota.

Questions and Answers

Q. What is the South Dakota Farm Electric Test Line?

A. It is a low voltage electric power line built especially for farm service.

Q. Where is it located?

A. In the community around Renner, South Dakota.

Q. What is the purpose of this test?

A. To find out if electricity can be used more efficiently on the farm and in greater quantities. To find out exactly what it costs and the most convenient rate plan for farm service.

Q. Why should greater quantities of electricity be used on electrified farms?

A. Because it is very expensive to distribute and most of the cost to the farmer is for distribution. It costs no more to bring in additional electricity to the farm, and if it can be used to advantage, it means a saving to the owner.

Q. Hasn't the best rate for farm service been known before?

A. No. The power line service to farmers has been very small in the past and no intensive study has been made to determine the best rate plan.

Q. Who is carrying on this study of farm electric service?

A. It is being carried on under the direction of a national committee, a state committee, and a committee of the South Dakota State College.

Q. How long is the Renner test line where the tests are being carried on?

A. Eight and four-tenths miles.

Q. How many farms are there on this farm test line?

A. Seventeen.

Q. When was the line built?

A. The line was built and began operation with the beginning of the year 1924.

Q. How long has the test been running?

A. The test has been running a little more than a year.

Q. What is the voltage and capacity of the line?

A. See page 4 for answer.

A Year's Progress with South Dakota's Farm Electric Test Line

R. L. PATTY

AMERICA uses a great deal of electric service in her cities for lighting appliances and power, but service offered the rural districts from power lines in the past has been limited and poorly organized.

The farmer has not been a desirable customer for the power companies and frequently has accused the power companies of charging excessive rates. One reason for this is found in the high cost of distribution of electric energy. It costs too much money to run a low voltage electric line to a farm just for lighting service. If the power company built the line, the interest, depreciation and line service alone would cost them around $8.00 per month. If they gave the electricity away after the line was built, they would have to get $8.00 per month from some source or the company would lose money in addition to the loss on free electricity. If the farmer builds the line, it will cost him as much or more.

The Remedy

The remedy for this condition is for the farmer to use electricity for other service besides lights if it can be made to pay. Perhaps it can be made to earn its cost and at the same time help pay for the lights. If it can, farm electrification will go forward at a rapid rate and to the advantage of all. If it cannot be made to pay, the idea of power line service generally must be given up until the farms are much closer together and the lighting load for each mile of line is heavy enough to make it pay.

In order to find out exactly what electric service will cost on the farm, when lines are built especially favorable for farm service, test lines have been established.

National Committee Organized

The idea of farm electric test lines did not originate in South Dakota. It started as a national movement. A national committee on "The Relation of Electricity to Agriculture" was first formed. Included on this committee, representing commercial, electrical and agricultural interests, were:

J. W. Coverdale, Chairman, (Agri.)
G. G. Neff, Secretary-Treasurer, (Elect.)
E. A. White, Director, (A. E.)
O. E. Bradfute, (Agri.)
C. E. Hearst, (Agri.)
L. J. Taber, (Agri.)
Marshall E. Sampsell, (Elect.)
Arthur Huntington, (Elect.)
K. A. Pauly, (Elect.)
J. C. Martin, (Elect.)
C. W. Drake, (Elect.)
R. A. Lundquist, (Com.)
R. S. Cosgrove, (Com.)
Theo. Brown, (Com.)
O. B. Timmerman, (Com.)
C. A. Bissell, (U.S.D.A.)
S. H. McCrory, (U.S.D.A.)
J. B. Davidson (A.S.A.E.)

South Dakota's Committee

State committees are organized in the various states for carrying on the tests. Fifteen states are completely organized for the work and several lines are in operation including a test line in South Dakota. South Dakota's state committee consists of:

J. W. Batcheller, Chairman,	Mission Hill
O. A. Rofelty, Secretary,	Sioux Falls
John Frieberg,	Beresford
Dr. J. T. E. Dinwoodie,	Aberdeen
E. W. Anderson,	Willow Lakes
Ben Mekvold,	Renner
Dr. C. W. Pugsley,	Brookings

The Renner Test Line

The South Dakota test line was built by the Sioux Falls branch of the Northern States Power Company, and takes-off from a high voltage line of 22,000 volts, running west from Sioux Falls. It is a 2300 volt, single phase, ungrounded, No. 6 bare copper wire line, built especially for farm service. The line is 8.4 miles long, not counting the stub lines into the buildings. Each farm has a separate transformer. All were three K.V.A. transformers during the year's test. One five K.V.A. transformer has since been substituted on one of the farms where heavier service was desired. The three K. V. A. transformer has capacity enough to carry motors up to five horsepower in size.

Farms on the Line

There are 17 farms on the line averaging two farms to the mile. The owners live on 14 of the 17 farms and three are rented. When the test started, only 12 owners lived on the farms. One owner on the line has since returned to his farm and one of the renters bought the farm on which he was living.

The type of farms on the line is largely dairy. A survey made when the test was started showed an average of 18 milk cows per farm. The average size of farm was 257 acres with an average of 189 acres under cultivation. The average number of hogs of all kinds per farm was 57, the average number of sheep was two, and the average poultry flock 148. Following is a list of the farmers on the line:

Palmer and Melvin Brende, owners	Eugene Riley, owner
Gus Nelson, renter	I. N. Nelsen, renter
B. E. Cornue	J. O. Nessan, owner
A. Christensen	E. Nessan, operator
C. F. Eggers	S. S. Bliss
John F. Wehde	Ben Mekvold
O. T. Nessan	S. P. Brende
Edward Flamoe	C. H. Renner
F. I. Renner	G. L. Renner
A. P. Brende	O. Volden

Objects of the Test

The objects of the test are: (a) to find the exact cost of furnishing the electric service already considered practical to the farm;

(b) to test additional uses of electricity for power and appliances in order to find out if they may become practical; (c) to investigate changes in present arrangement, in present farm operations and customs, and to see if these can be modified in order to use electricity more efficiently on the farm; (d) to study plans of building and financing the service to see which are most satisfactory; (e) and to establish uniform plans of figuring rates for farm electric service in place of the many and varied rates in use today.

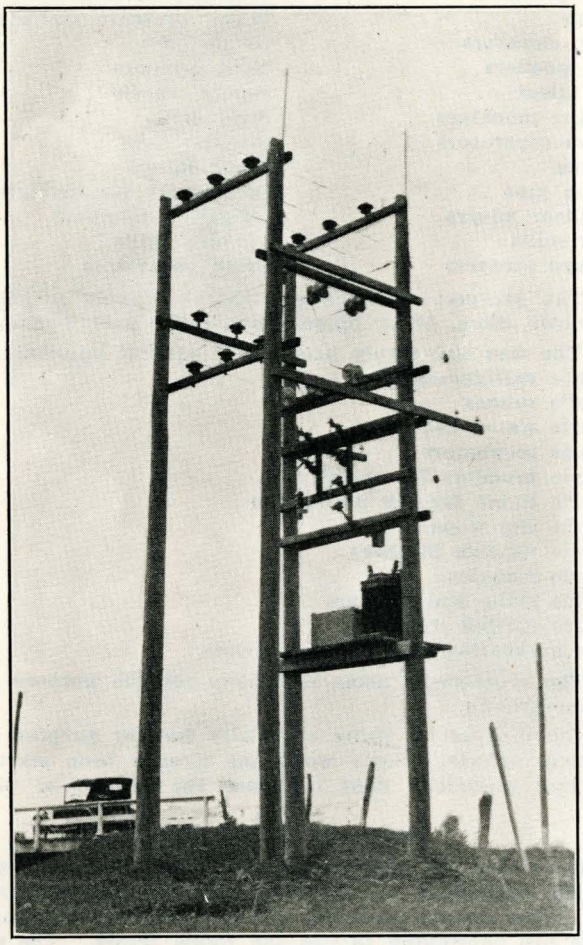

FIG. 1.—THE SUBSTATION ON THE RENNER TEST LINE

This is where the Renner farm line takes off from the high tension line. It is at a point six or seven miles northwest of Sioux Falls. The high tension line is 22,000 volts. The farm line is only 2,300 volts. The large transformer which may be seen on the platform "steps down" this voltage from 22,000 to 2,300 volts. At each farm is another small transformer that steps it down again from 2,300 to 110-220.

Things to Be Studied

Things that will be studied in the tests over the United States include:

(a) The cost and future prospect of lighting farm buildings with electricity.

(b) The cost and future prospect of using electric power for stationary machines such as

Feed grinders	Washing machines
Pumps	Water pressure systems
Farm elevators	Grindstones
Corn shellers	Meat grinders
Silo fillers	Emery wheels
Milking machines	Steel drills
Cream separators	Circular saws
Churns	Wood lathes
Cotton gins	Community planing mills
Fertilizer mixers	Irrigation pumping
Cider mills	Canning mills
Orchard sprayers	Grain separators

(c) The prospect of using electricity for field machine power such as plows, discs, drills, binders, and other field machinery.

(d) The cost and future prospect of electric appliances such as
Electric refrigerators
Electric ranges
Electric water heaters
Electric incubators
Electric brooders for chicks
Electric lights for egg production
Electric flat irons
Electric vacuum cleaners
Electric mangles
Electric grills and toasters
Electric curling irons
Electric shearing and clipping devices.

(e) The prospect of using electricity for the purpose of stimulating plant growth.

(f) The prospect of using electricity for the purpose of stimulating animal growth. Some work has already been started which indicates that electricity does influence the growth of plants and animals.

Equipment on the Line

Lights.—When the line first started there was not a great deal of electrical equipment on the line, but the lighting plans were elaborate. The patrons certainly did not plan on skimping any on lights, and are continuing to use the lights freely. The difference the lights make in the monthly bill is so slight that it is almost negligible. A good sized electric light left on all night (10 hours) would raise the light bill just a trifle over one cent.

The number of electric globes installed on each farm on the line averaged between 33 and 34. Ten of the lights in the barn-

yards were 150 watt lights, and three others were 200 watt lights. Ordinary house lights are 40 to 60 watt lights.

Motors.—About three months after the line was finished, there were 26 motors on the line. The majority of these were used for pumping water and running washing machines. No encouragement to buy equipment was given the patrons during this time except through commercial salesmen. At the end of the year, there were

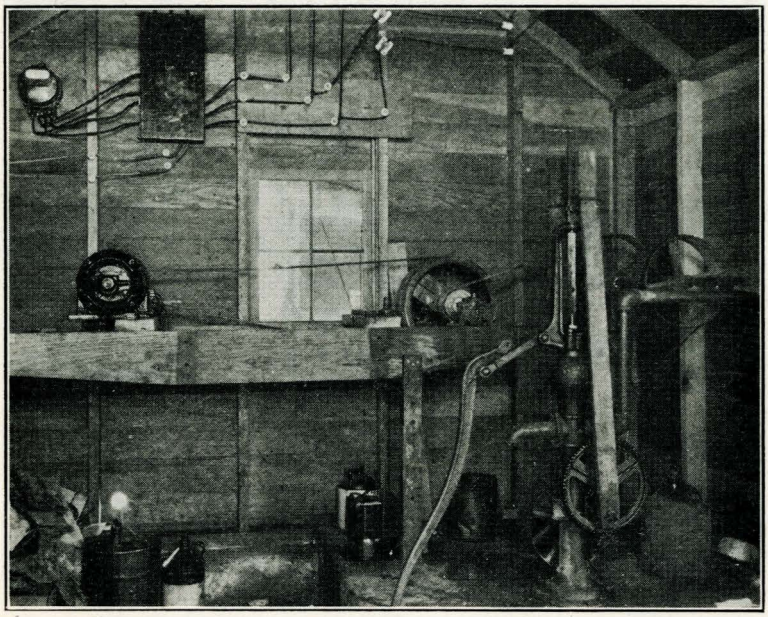

FIG. 2.—PUMPING WATER ON THE FARM WITH ELECTRICITY

Pumping water with an electric motor is an example of efficient service and is not expensive. The size of motor required ranges from a one-third horsepower motor for a shallow well to a one horsepower motor for a deep well. Figured at a three cent power rate, this will cost (for current only) on an average of 27 to 60 cents per month.

49 motors on the line. Seven of these were driving milking machines, five were running electric refrigerators, three were grinding feed, nineteen were pumping water and so on. Some of the utility motors were driving a line shaft and, of course, doing more than one thing.

Appliances.—The electrical equipment that might be listed as electric appliances also increased greatly during the year. The end of the year showed 16 electric flat irons, 6 small electric heaters, 5 electric toasters, 6 electric curling irons, 2 electric ranges (one still on trial), 5 electric refrigerators, and 2 electric fans in use on the line. The total connected appliance load added up to more than 22,000 watts.

Financing the Power Line

The plan of financing being tried on this line is for the power company to build the main distributing line. The power company

furnishes and installs the transformers and meters. The farmer pays for his own wiring on the buildings and furnishes his own motors and appliances. The main line with meters and transformers cost the power company $913.50 per mile. (Two miles of this

FIG. 3.—WASHING CLOTHES WITH ELECTRICITY

The electric washing machine was the first and most popular piece of electric equipment bought by the patrons on the line. Every owner on the line had an electrically driven washing machine within a few months.

line was run on old poles.) The average cost of stub lines was $136.98 per farm. The average cost of wiring the farm buildings was $166 per farm. The average cost of motors and appliances on the farms at the end of the first year was $316.50.

The Rate Being Tested

The rate used in the test for the first year was as follows: The farmer paid a "fixed charge" each month to pay for the interest and depreciation of the main line that was built by the power company. This amount also included a small demand and service charge for keeping the line in repair and reading meters. This fixed charge ran about $8 per month for a customer, varying slightly with the peak load which was thrown on the line during the month. A slight change has already been made in this test rate relative to the "peak load" scale. In addition to the fixed charge of $8, each customer paid five cents per K.W. Hr. for the first 30 K.W. Hrs. of energy used, and three cents per K.W. Hr. for all additional energy used.

The $8 per month represents the high cost of distributing electric energy to the farm. The five cents for the first 30 K.W. Hrs. and the three cents for additional energy used is for the electric energy itself. It is called the energy charge.

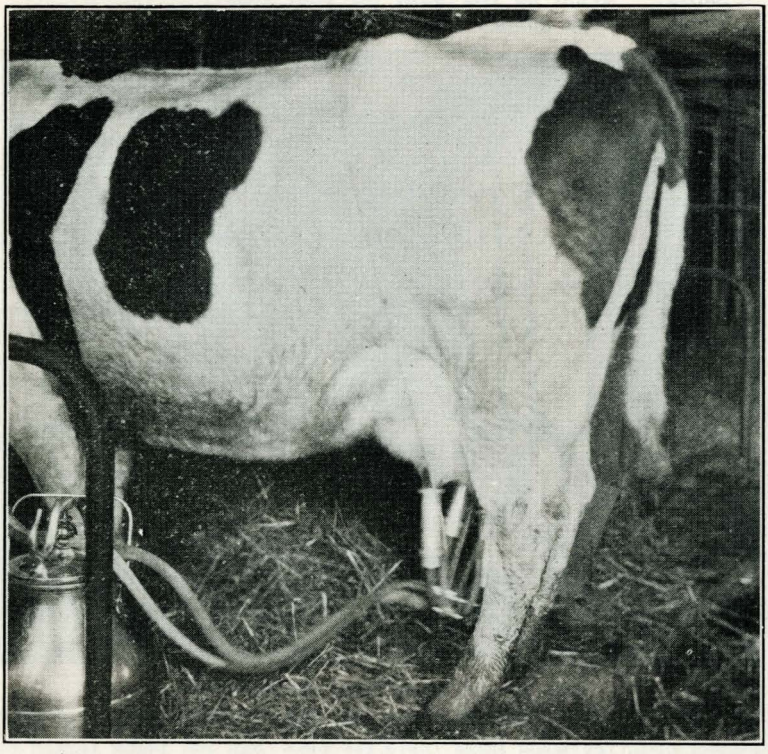

FIG. 4.—AN ELECTRICALLY DRIVEN MILKING MACHINE

There were seven of these on the test line at the end of the first year's test. Patrons who had been using other kinds of power are very enthusiastic over the steady and dependable electric motor power for the milking machine.

Since the 30 K.W. Hrs. just about takes care of the lights in the house, barn, yard, and other buildings, and possible power for the cream separator and vacuum sweeper, the energy used for the large motors, the electric refrigerator, etc., actually costs the patron three cents per K.W. Hr.

The Rate Problem Illustrated

To illustrate just the situation with the patrons on this test line, and with any electric farm service for that matter, let us take the following similar problem. Suppose Mr. Smith, who lives in town, wanted some cobs for kindling. Mr. Jones, a farmer living out 8 miles who had just shelled corn, had cobs to sell. Jones was hauling these cobs to town in a wagon with five pairs of sideboards,

making about 65 inches of cobs in a wagon box. He sold this load for $4. Three dollars of this amount was the cost of delivering the cobs, and only $1 for the cobs. The following conversation takes place:

Smith: "What do you want for your cobs?"

Jones: "Four dollars for a load like this."

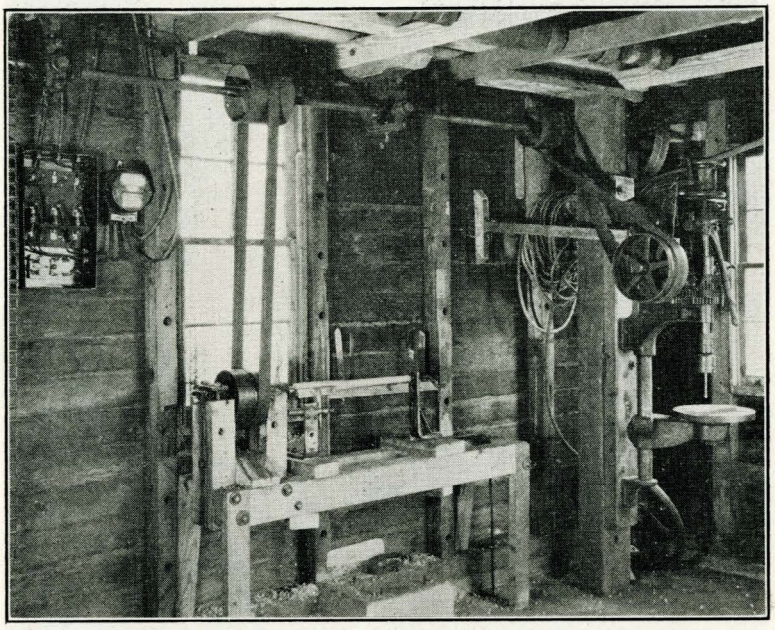

FIG. 5.—AN ELECTRIC FARM SHOP

Only a portion of the shop is shown but the line shaft may be seen up under the ceiling. One utility motor drives this line shaft. It drives the steel drill, the wood lathe (note the boys' ball bat being turned out in the lathe), a grindstone, small circular saw, large meat grinder, and two or three emery wheels. The cost of a shop like this is mostly in the first cost of installation. The cost of the electric current for a year to run this utility motor at the three cent power rate was only $1.56.

Smith: "Well, I only use them for kindling. I guess I could use about one-fourth of a load."

Jones: "But it costs me $3 to deliver them. I would have to charge you $3.25 for only a quarter of a load."

Smith: "Would that many cobs cost me only 25 cents?"

Jones: "Yes, the cobs are only $1 per load. A half load would cost you $3.50, three-fourths of a load would be $3.75 and a whole load only $4. You see, cobs are light in weight and I would just as soon haul a full load as a quarter of a load."

Smith: "Well, according to that, the other three-quarters of a load would cost me just 75 cents."

Jones: "That's right. If you could use more of these cobs it would pay you to get plenty, because that's just what I must charge for them."

Smith: "Well, if that's the case, it will pay me to use more cobs this winter. I can burn cobs in the kitchen range at that price and save money. Bring me a full load."

The problem of delivering electricity out to the farm is just like this. The $8 fixed charge is for delivery. On this test line it is figured at the actual cost to the power companies. The patrons

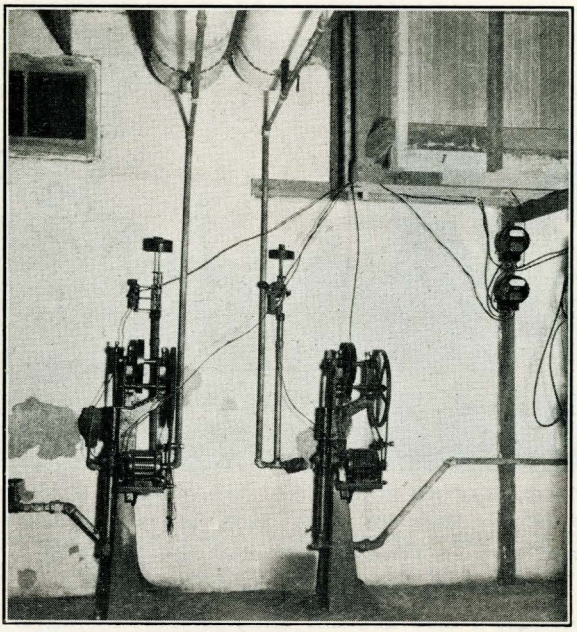

FIG. 6.—MOTORS PUMPING HARD AND SOFT WATER TO KITCHEN AND BATHROOM

A modern bathroom can be had with water pressure without electricity, but when electric power is available it makes a perfect power for this purpose. The pumps start automatically when the pressure at the faucet gets low and stop when the pressure reaches the desired point. The soft water pump on the left used 32.3 K.W. Hrs. of energy during the year and the hard water pump on the right used 76.5 K.W. Hrs. Both motors are one-third horsepower.

have to pay this $8 every month no matter how much energy is used or whether or not they used any, because the interest and upkeep on the line must go on. The actual cost of the energy then, as stated previously, is five and three cents per K.W. Hr. If the motor or electric refrigerator pays at this rate and saves money for the patrons, they would naturally save enough money in this way to pay a good share of the fixed charge. If they manage to do this, the cost of the convenience and luxury of electric service will be extremely small. The tests are expected to answer the question.

Studies Now Being Made

Some of the things that are being studied on the line as classified under the "objects of the test" already mentioned are: (a) the

actual cost of pumping water with electric power as compared to other kinds of power; (b) the cost of running milking machines with electric power; (c) the cost of grinding feed and shelling corn with electric power as compared to other power; (d) the cost of separating cream with electric motor and the advantage, if any, of electric power over hand power in the amount of cream secured; (e) the

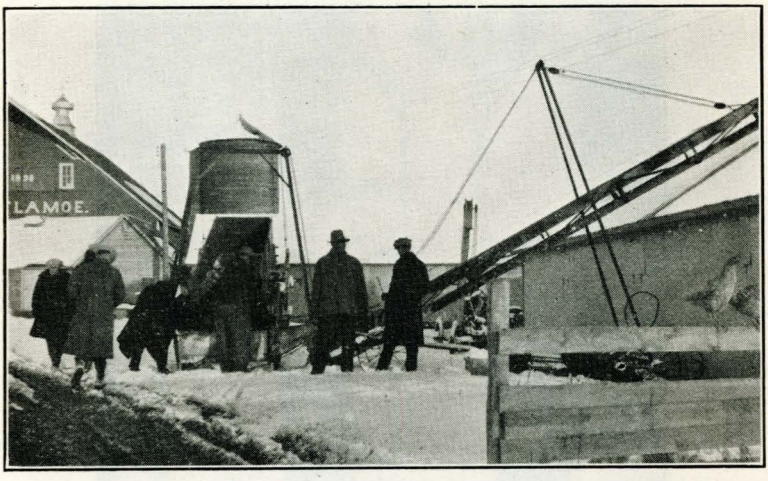

FIG. 7.—ELEVATING CORN INTO THE CRIB BY ELECTRICITY

One of the uses for electricity on the farm that is being tried out on the line is that of driving a grain elevator. A portable five horsepower motor is being used here. A portable motor that can be moved to other jobs would be the only kind that could be practical for this one, as the elevator is only used a few days each year.

cost of operating a hard and soft water pressure system in the home; (f) the cost of cleaning grain with electric power; (g) the cost of running a utility motor on a line shaft having various equipment attached, such as grindstones, emery wheels, meat grinders, churns, circular saws (small), drills, washing machines and separators; (h) the cost of sawing stove wood with large circular saws; (i) the cost of electric refrigeration as compared to ice refrigeration; (j) the cost of electric appliances in the home such as vacuum cleaners, electric irons, toasters and electric ranges; (k) a study is being made with defferent sized feed grinder equipment to find the best size for electric power; (l) some study is being made on the time and labor saved in doing chores with electric service over the non-electric conditions; (m) study was started on heating water for stock in stock tanks; (n) a study is being made as to most convenient line shaft arrangement for utility motors that are to drive several different machines; (o) the best size of motor to use for certain farm operations is being tested; (p) and the effect of electric lights in poultry houses on egg production will be studied next year.

Above all other things of interest that the test will show is the amount of energy these farms will consume. Results to date are given in the table on page 19. This will answer an all important

question as to how many farms there must be to the mile of line before electric service can be supplied or rather distributed at a reasonable cost. In addition to all this, the line itself, the location and

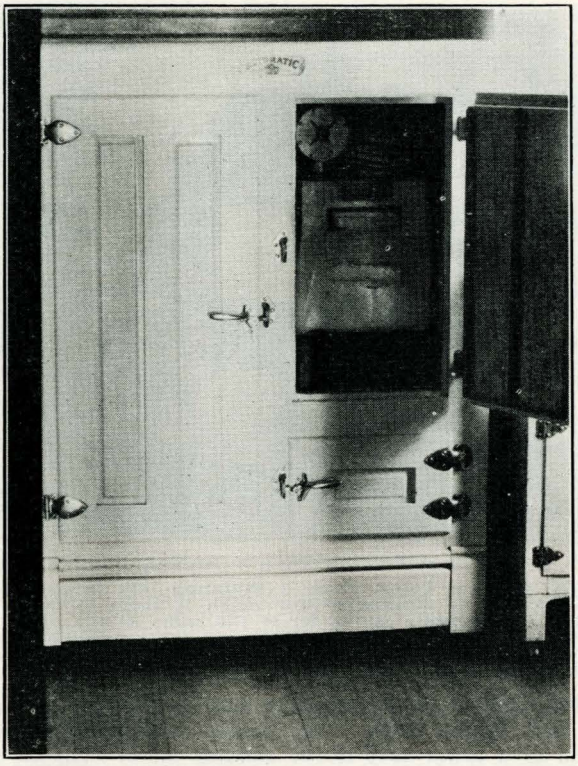

FIG. 8.—THIS IS AN ICELESS REFRIGERATOR IN A FARM HOME

The iceless or electric refrigerator promises to put the old ice house out of business when electricity is available. It runs with a one-fourth horsepower motor and automatically regulates the temperature in the ice box. It costs something for current during the hot months but compares very favorably with the cost of building an ice house and putting up ice. This refrigerator used 289 K.W. Hrs. from July 14 to October 14, in 1924.

size of transformer, the desirable voltage for a farm line, and the installation and wiring is being studied.

Present Results of Tests

The test is not far enough along so that fair figures can be given out on many of the costs and conditions being studied. Following are some of the conclusions that can be drawn at this time:

(a) The table, page 19, showing the amount of electricity used by each farm for each month during the first year, is an interesting one. It shows a remarkable increase in the use of electricity on these farms each month. Notice that the monthly bill increases also, but not in the same ratio.

(b) The heavy use of electricity by some of the patrons indicates that while three-kilowatt transformers may prove large enough for the average farm, they will not be large enough for all of the farms.

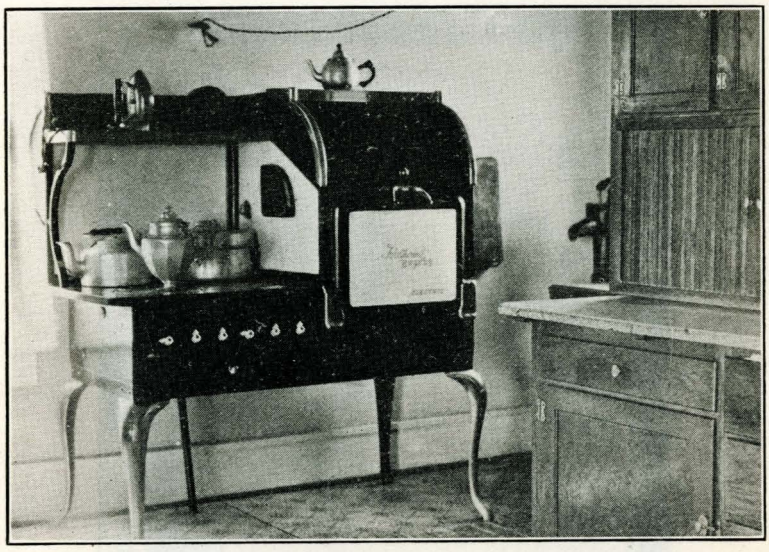

FIG. 9.—AN ELECTRIC KITCHEN RANGE FOR COOKING

This electric range is being given a thorough test in one of the farm homes on the line to determine how much it costs to cook with electricity. It has a separate meter for it the same as the other equipment being tested on the line. The electric range takes a comparatively large amount of electricity and the test will probably show that even at a low rate the electric range must be classed as a luxury as yet.

(c) For such work as grinding feed it pays to use as small a motor as will do the work. The reason is that better service can be had and at a lower rate if the smaller motor runs three or four hours to do the work instead of a large motor running one hour. The load is spread out more uniformly throughout the day and the peak load will not go so high.

(d) The study has shown that the peak load on this farm line always comes in the evening at chore time. This will probably be true of any farm line but especially of one in a dairying community. The seven milking machines operating on this line have considerable to do with this load.

(e) Electric ranges will make this condition worse because the range will also be in use at chore time and cause the peak load to go still higher.

(f) It has been found that electric lights in the barns and buildings save a great deal of time in doing chores, but no attempt has been made to get accurate figures on it. In order to get this data, the time would have to be kept on a farm before the electric lights were put in. The test would have to be started before the electric line was installed. It is planned to do this in Minnesota's test.

Cost Figures Now Known

There are several ways of figuring the cost of the electric service on this farm line. The total cost would include the fixed charge ($8 per month), the interest and depreciation on the cost of the stub line, the interest and depreciation on the wiring and fixtures in the buildings, and the interest and depreciation on the electric motors and appliances, plus the energy rate of five cents and three cents per K.W. Hr. The depreciation on wiring and motors would be small. A patron on the line, who has the service already and pays his fixed charge, figures that the fixed charge and the first 30 K.W. Hrs. each month at five cents just about covers the lighting service and the cost of running smaller motors and appliances about the house. In figuring whether it would pay to use such appliances as the electric refrigerator or the larger motors for power, the cost would be figured at three cents per K.W. Hr. because they would have used more than the 30 K. W. Hrs. anyway. In any event, the interest and depreciation on the stub line and wiring must not be left out of the actual cost. The reader may figure the cost of the following in his own way. The consumption figures are given not as test results or as accurate averages but just as specific examples to give the reader a general idea of the amount of energy used in certain farm operations.

Example 1.—A one-half horsepower electric motor pumped water on one farm for a year. The well, a shallow one, was approximately 20 feet deep. The total energy used by this pump was 108 K.W. Hrs. The amount of stock on the farm when the stock survey was made was 20 head of cows, 8 head of horses, and 50 head of hogs.

Example 2.—In one home, electric motors pumped hard and soft water for the water pressure system. The lift was not high in either case. Both motors were one-third horsepower. The motor

FIG. 10.—A SMALL ELECTRIC COOKER

This little cooker is constructed so as to save every bit of heat possible that is generated by the heating unit in the bottom of it. It works on the principle of the fireless cooker and promises to show some good results from the standpoint of economy. The test on it has barely started.

pumping hard water for the bathroom, kitchen, and house used 77 K.W. Hrs. of energy for the year. The motor pumping soft water for the lavatories and house used 33 K.W. Hrs. of energy for the year. The family was about average size.

Example 3.—A washing machine driven by a one-fourth horsepower motor employed throughout the year in an average size family used 24 K.W. Hrs. of energy.

Example 4.—A utility motor drove a line shaft for a year having the following machines run from the line shaft: washing machine,

FIG. 11.—THE CHRISTMAS TREE ELECTRICALLY LIGHTED
Santa Claus must now become accustomed to electrically lighted Christmas trees on the Renner test line.

cream separator, churn, meat grinder and grind stone. The total energy used for the year by this one horsepower motor was 149 K.W. Hrs.

Example 5.—A milking machine was run by a two horsepower motor on one of the farms during the year. It was a large dairy farm and the average number of cows milked during the year was approximately 30 head. The motor used 565 K.W. Hrs. of energy for the year. The type of milking machine used was a light running type. Another milking machine of a different type used on the line

was driven by a three horsepower motor. It used nearly twice as much energy for the year and milked an average of three less cows.

Example 6.—An electric refrigerator, slightly larger than the average family ice box, which was run from July 14 to October 14, used 289 K.W. Hrs. of electric energy. The average per month during this time would be between 96 and 97 K.W. Hrs.

Example 7.—A cream separator skimmed the milk from 8 cows for 6 months and used 10 K.W. Hrs. of energy. These were grade

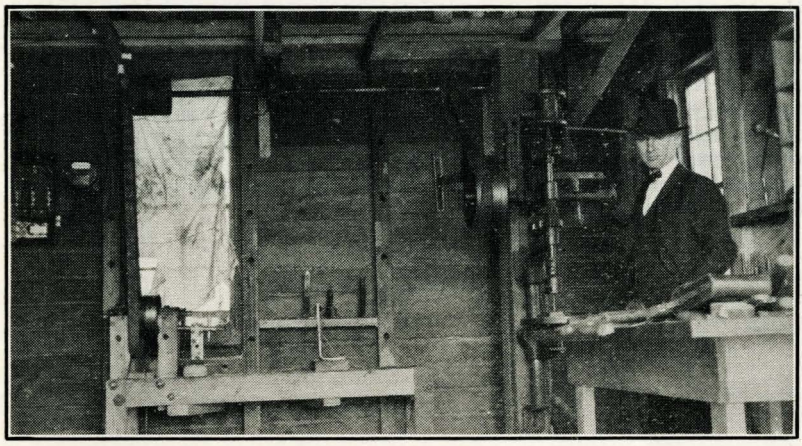

FIG. 12.—DEAN H. CROTHERS VISITING AN ELECTRIC FARM SHOP

This photograph shows Prof. Crothers, who is head of the Engineerng Division at South Dakota State College, on an inspection tour of the Renner Test Line. Prof. Crothers is consulting advisor on the "Relation of Electricity to Agriculture Project" and has taken a keen interest in the problem of applying electricity to farm equipment.

cows giving, on the average, a total of 17 gallons of milk at each milking.

Example 8.—An electric range for cooking used 244 K.W. Hrs. for the month of July and about the same for August. Average figures on this range are not yet available.

NOTE: Heating units of any kind, such as grills, toasters, heaters, irons, take a comparatively large amount of energy. An average electric iron, for example, uses as much energy as 14 house lights of 40 watts each or about enough to run a one-half horsepower motor on full load.

Energy Used and Cost

Table I gives the average amount of energy used at each farm per month last year. In January, the first month the line was in use, the average amount of energy used was 41.12 K.W. Hrs. per farm. The next month it was 50 K.W. Hrs. It then dropped to 45 and stayed almost the same until August, when it began to climb, reaching 117.5 in December. This was largely because of the added number of motors and appliances. Notice the column of data headed

"average bill per customer." This means the actual average monthly light bill paid to the power company by the patrons on the line. It includes the fixed charge and the energy charge. It includes the total cost of the electric service except the interest and depreciation on the stub line, wiring, and equipment. The average light bill paid the first month was $9.89 of which $8 was for the fixed charge and $1.89 for the energy charge. With the increase in the consumption of electricity, the bills got larger throughout the year; but notice that in December, when an average of 117.5 K.W. Hrs. were used, the average electric bill was only $12.24, although almost three times as much electricity was used as in January, the first month. The column headed "total line load" shows the increase in the connected load during the year. During the first six months, the connected load increased from nothing to 23,990 watts light load, 20,700 watts motor load, and 8,940 watts appliance load. During the last half of the year, the light load remained the same. The motor load increased from 20,700 to 39,262, while the appliance load increased from 8,940 to 22,190 watts.

TABLE I.—FIGURES ON TEST LINE FOR YEAR 1924

Month	Fixed Charge Total	Total Consumption	Average per Customer 17 Farms	Total Bill	Average Bill per Customer	Peak Load	Total Line Load (Watts)	Average Line Load
1924		K.W.H.	K.W.H.					
January	$7.90	748	41.12	$158.22	$ 9.89	5		
February	8.27	800	50.	165.37	10.335	8.3		
March	7.85	779	45.8	166.04	9.767	6.1		
April	7.93	820	48.24	168.99	9.94	6		
May	8.06	810	47.7	169.82	9.99	6.5		
June	8.35	752	44.2	172.34	10.14	8.0	Light .....23,990 Motor .....20,700 Appliance 8,940	Light .....1,493 Motor .....1,290 Appliance 559
July	8.04	754	44.35	166.82	9.813	8.8		
August	7.98	1162	68.352	170.13	10.007	11.1		
September	7.98	1355	79.7	185.89	10.93	12		
October	7.98	1457	85.7	189.09	11.12	12		
November (after tour)	7.93	1911	112.4	199.34	11.73	15.5		
December	7.93	1997	117.47	201.54	12.24	15.1	Light .....23,990 Motor .....39,626 Appliance 22,190	Light .....1,493 Motor .....2,403 Appliance 1,338.7

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