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THE ECONOMIC VALUE
OF
ELECTRICITY IN THE KITCHEN.

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THE ECONOMIC VALUE OF ELECTRICITY IN THE KITCHEN.

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Fire Place,

Sheet Iron Stoves.

Modern Methods.

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Gas Stove,

Electrical Stove.

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THE ECONOMIC VALUE OF ELECTRICITY IN THE KITCHEN.

The first method of cooking consisted of lighting a fire of dry sticks or leaves in a grove, a cave or other natural shelter and in the hot ashes were buried the seeds or flesh used as food. This consisted of a sort of broiling which when successfully done was very satisfactory. Where tents or wigwams were erected the fire would be lighted in the middle of the floor with perhaps a hole in the roof for smoke to escape.

The early fire places were without chimneys and the flues extended only a few feet up in the thickness of the wall. They were then turned out through the wall to the back of the fireplace, the opening into the air being small oblong holes. There is no evidence of chimneys until the twelfth century and brick was not used for their construction until the fifteenth. The fireplaces of the New England Colonies are especially interesting. The inflammable chimney of logs and clay built by the first settlers soon gave place in all houses to vast chimneys of stone built with projecting inner ledges on which rested a bar about six or seven feet from the floor called a lug-pole or back-bar; this was made of green wood and thus charred slowly. Later the back bars were made of iron. On them were hung iron hooks or chains with hooks of various lengths called trammels, hakes, pot hangers, etc. On these hooks pots and kettles

could be hung at varying heights over the fire. The pots and kettles used were of great size, some holding as much as fifteen gallons, and weighing forty pounds.

Skillets, broilers and kettles were equipped with legs in the earlier days which enabled them to be raised above the coals and ashes of the open fire place. If the bed of coals were too deep for the skillet or pot legs, then the utensil must be hung down from above by the ever ready trammel.

A frequent accompaniment of the kitchen fire place was the Dutch Oven. These succeeded the jacks; they were a box like arrangement upon one side. Like other utensils of the day they often stood on legs.

The bake kettle often called the Dutch Oven was preferred for baking bread. It was a strong kettle standing on stout stumpy legs and when in use was placed among the hot coals and closely covered with a strong metal convex cover on which coals were closely packed.

The Pennsylvania Germans were the first to use stoves in the United States. Among the first was one of sheet metal, box shaped, of which three sides were within the house, and the fourth with the door, on the outside. With this arrangement it was necessary to feed the fire from the outside. In 1743, Benjamin Franklin invented the fire place in which both coal and wood could be used. From these first stoves many variations were employed. First, the saddle bag, then the Buck, and lastly the ranges of to-day.

Since 1885 an important development has been in the use of gasoline as a fuel. A practice that began in the West and extended Eastward. At first stoves were made to burn the gasoline direct, but in the newer forms called process stoves, the gasoline is first

changed into gas. Where cheap fuel gas is available it is used quite extensively, but in many cases it is too expensive.

The object of the Thesis was to test for the comparative cost of coal, gasoline and electricity in the home, and for practical use in the kitchen and to determine the economical use of electricity.

Three tests were suggested; ironing, baking bread, and preparing a meal on the three different stoves, coal, gasoline and on electricity.

Ironing Test.

In this test we limited ourselves to one hour on each, counting in the time it took to heat the irons. On the coal range, it took twenty five minutes to heat the three irons sufficient to iron with. We were only able to iron two skirts, two night-gowns in the time that remained. Sixteen pounds of coal were used in this test, which at four dollars and fifty cents a ton would cost three cents and six mills.

On the gasoline two burners were used and three irons. In ten minutes the irons were ready to use. Three shirt waists and one skirt were ironed, two thirds of one quart of gasoline was used in the test, which at eighteen cents a gallon would cost three cents.

The electrical iron was attached to the college current with a conducting wire. The iron is the shape of usual flat iron hollowed out for the reception of the resistance coil in which the heat is developed. The iron has a long drop cord so that the iron could be carried at considerable distance from the plug. Current used in it was measured directly by an ammeter and found to be two and five tenths amperes, the drop taken by a volt meter directly over the two terminals showed a drop of two hundred and twenty volts. After current was turned on the iron was ready to iron with in five minutes. A shirt waist suit, one shirt waist, one skirt were ironed. Since the current was used for one hour, the total energy consumed was fifty five hundredths of a Kilowatt hour which at fifteen cents a Kilowatt hour would be eight cents and two mills.

Thus the relative cost as shown in each test was,

Coal, three cents and six mills

Gasoline, three cents.

Electricity, eight cents and two mills.

Ironing Test.

Time	No. of articles	Amount used	Cost	Cost
	ironed			
Coal 1 hr.	2 night gowns 2 skirts	16 pounds	4.50 per ton	\$.036
Gasoline 1 hr.	3 shirt waists 1 skirt	2/3 quart	.18 per gal.	\$.03
Electricity 1 hr.	1 shirt waist suit 1 shirt waist 1 skirt	cur. 2.5 amp. volts, 220 watts, .550 K.W.hrs, .550	.15 per KW hr.	\$.082

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Baking Bread Test.

On the coal range the fire was started one hour and forty five minutes before the oven was at right temperature to bake the bread. The two loaves of bread were baked in forty minutes, and eighteen pounds of coal were used in this test, which at four dollars and fifty cents a ton would cost four cents. On the gasoline stove the oven was used over two burners. After starting fire, the oven was ready in ten minutes. The time required to bake the two loaves was fifty minutes and amount of gasoline used in the test was one pint, which at eighteen cents a gallon would cost two cents and five mills.

In the electrical oven there are three resistance coils connected in the series, so by connecting we may have the following results: full current, eight and eight tenths amperes, medium current five and two tenths amperes, lowest current two and five tenths amperes. When using the oven the full current is turned on from thirty minutes to one hour before using it. In this test the full current was turned on thirty five minutes before the bread was put in. After the bread was in thirty five minutes the oven became too hot, so all the heat except the lowest current was turned off. The bread was taken out after staying in the oven twenty more minutes. Three loaves were baked. The oven heat is very hard to regulate correctly, as the different currents affect this to a great extent and after once heated very hard to cool off unless the door is left open, this, of course, can not be done in baking bread.

The total energy consumed was two and forty four hundredths of

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a Kilowatt hour, which at fifteen cents a Kilowatt hour would be thirty six cents and seven mills. Thus the relative cost, as shown in each test was,

Coal, four cents,

Gasoline, two cents and five mills,

Electricity, thirty six cents and seven mills.

Baking Bread Test.

	Time	No. of loaves baked.	Amount used	Cost	Cost
Coal	1 hr.	2	18 lbs	4.50 per ton	\$.04
Gasoline	1 hr.	2	1 pint	.18 per gal.	\$.025
Electricity		3	Full	.15 per KW hrs.	
	11/12 full cur.		8.8 amp cur. 220 volts 1936 watts 1.774 KW hrs.		\$.2661
	7/12 med. cur.		Med. 5.2 amp. cur. 220 volts 1144 watts 667 KW hrs. total 2.441 KW hrs.	.15 per KW hrs.	<u>.1010</u> <u>.3671</u>

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Meal Test.

The following dinner was prepared on each stove.

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|-----------------------|---------------------|
| Lettuce Soup | Croutons |
| Roast Beef | Gravey |
| Potatoes | Escalloped Macaroni |
| Baking Powder Biscuit | Coffee. |
| Strawberry Shortcake. | |

In planning this meal we hoped to put to test the time it would take to prepare the meal, to use the oven in each case as much as possible, to find cost, and see if the meal was easiest prepared by electricity.

The oven was used for the following things on each stove: to roast the meat and potatoes, escallope the macaroni after being partially cooked on top of the stove, toasting croutons, baking the short cake and biscuits, the amount of dish water needed was heated on stoves.

The fire in coal range was started at three o'clock, the roast not put in for half an hour after fire was started. Dinner was ready to serve at five thirty. Amount of coal used in test was thirty two pounds, which at four dollars and fifty cents a ton would cost six cents. On the gasoline stove of three burners, the oven taking two of them. The fire under oven started at three thirty was ready for meat in ten minutes. In planning this meal, we had to plan every detail of meal in order to use the one burner to the

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best advantage. The macaroni had to be started on it, soup to be made, coffee, gravy, and the dish water needed to be cooked on this one burner. Dinner was served at six o'clock. Amount of gasoline used in this test was three pints at eighteen cents a gallon would cost seven cents and five mills.

In preparing meal with electricity, two plates were used besides the oven, the plates each using current two and nine tenths amperes. First plate was used from three fifty until five thirty, using same current all the time. Second plate was used from three fifty five until five thirty with same current all the time. The oven had full heat turned on from five minutes after three until twenty after four before meat was put in. The oven became too hot so all current was turned off and door opened ten minutes. Current off from four thirty until five ten, then medium current turned on until power went off at five thirty. Dinner served at six. The plates and oven hold the heat for almost an hour after the current is turned off. We heated all dish water needed by placing pans of water on both plates and one on top of oven, and one inside of oven after the current went off. In this test the total energy consumed was five and four hundred and eighty six thousands ^{ths} Kilowatt hours, which at fifteen cents a Kilowatt hour would be eighty two cents and two mills.

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The gasoline test proved to be the easiest one prepared as no attention was required to watch burners. On the range, firebox had to be refilled often, and on the electrical stoves constant attention is necessary to watch the different currents for heat and if economy is practiced.

Thus the relative cost as shown in preparing the dinner was,

Coal, six cents,

Gasoline, seven cents and five mills,

Electricity, eighty two cents and two mills.

Meal Test.

	Amount used			Cost	Cost in test.
Coal	32 lbs.			4.50 per ton	\$.06
Gasoline	3 pints			.18 per gal.	.075
Electricity	Cur.	Volts	Time KW Hrs.		
Oven			7	per K W hr.	
Full	8.8	220	1- hr. 3.065	.15	.459
			12		
Med.	5.2	220	7/12 .667	.15	.100
Plate 1	2.9	220	1 2/3 1.063	.15	.1594
" 2	2.9	220	1 1/12 .691	.15	.1040
			<u>5.486</u>		<u>.8224</u>

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In summing up the tests, first in the ironing test, it was found that less work was done with the coal than by any other method. The most work being done by electricity, the heat being constant no* time was wasted, thus, in the end being the cheapest.

In baking, the gasoline was the quickest method, the electrical oven being hard to regulate and to keep at an even temperature. The degree of heat was much easier controlled by gasoline and for baking purposes it proved to be the best.

The electrical tests were the most expensive made but we have to take into account the high rate charged in Manhattan, fifteen cents per Kilowatt hour, while in other cities it is much less, the lowest city rate being about five cents per Kilowatt hour. Thus the cost would be one third as much as that at Mahhattan, but would still be expensive. In order to be as cheap as gasoline and coal the rate would have to be one and a half cent per Kilowatt hour. In winter time provided the house was heated with steam or hot air the gasoline could be used as cheap as coal, but where kitchen must be heated the coal would prove the cheapest.

If in the future, different forms of apparatus would be devised as undoubtedly will be, it will simplify every thing and make cooking with electricity within reach of all. It would be difficult to say whether the increasing demands for fancy dishes has brought about improved apparatus for cooking or that the new devices for cooking has brought about fancy dishes, but the new and various forms and methods by which heat developed by electricity can be used may be of great aid to all kinds of cooking in the future.

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