Background - Domestic Technology - part 2

Stoves

Fireless Cooking

The first technological approach to these conditions was the "Fireless Cooker" which sought to utilize as little electricity as possible by adopting a heavily insulated enclosed cooking cavity. In addition, the heating element in this cooker was not required to operate at particularly high temperatures. Manufacturers of fireless cookers emphasized the fact that their devices consumed very little electricity. The "Copeman Automatic Cooker" likely represented the leading edge of fireless cooker technology, circa 1912.

"The special feature of the Copeman oven is its automatic control. . . when the clock closes the switch, the current is applied just long enough to bring the food to a proper temperature . . . then the current automatically shuts off, but the dinner continues to cook without expense, the stored up heat in the oven and the heating element being sufficient for the purpose."

(Lancaster, Maude. Electric Cooking Heating and Cleaning: A Manual of Electricity in the Service of the Home, D. Van Nostrand Company: New York, 1914)

Electric Range

The second technological approach culminated in the electric range. Many ranges were created by combining existing electric cooking devices. These ranges, exemplified by the Simplex model, were exhibited and used at a ceremony for the first meal cooked by electricity, in Berlin (Kitchener), Ontario. They consisted of several electrically heated disc stoves and a broiler mounted on top of an electrically heated oven. Rather than appearing as a co-ordinated unit, the device consisted of a disjointed but familiar compilation of small electric appliances. To a homeowner familiar with cooking on a conventional coal or wood range, however, some of these early electric units must have appeared quite innovative.

Because there was no need for a firebox, the early electric ranges could be built of a much lighter construction. It was possible to place the oven at any location in the cabinet, and to install either an open or closed storage shelf under the oven where the firebox/ash-box would have been. The heavy nickel-plated cast iron feet, firebox and fittings of the earlier coal/wood range were replaced by black enamelled sheet metal and angle iron construction.

From the perspective of food preparation, there was a major difference between electric ranges and fireless cookers. The oven in an electric range was designed to be a relatively dry environment. With the exception of the earliest electric ranges, almost all had some sort of moisture vent pipe leading out the back of the oven. This made it possible to brown roasts and to develop crisp crusts on baked goods. In order to facilitate this cooking/broiling action, most electric ranges were also equipped with an element attached to the roof of the oven.

Electric ranges differed most from their fireless cooking contemporaries in the amount of insulation around the oven compartment. Although there was insulation between the wall of the oven and the shell of the cabinet, it was more for the prevention of heat transfer to the cabinet exterior than for the retention of heat by the oven. Both cooking appliances were usually equipped with a thermometer in the oven door. Until truly automatic temperature control became available, it was essential to monitor the thermometer in order to turn the electricity "on" and "off" to maintain the desired cooking temperature.

Automatic oven control, which used a bimetallic switch for turning off the circuit and reconnecting it when the temperature fell below a preset level, was another feature added to electric ranges in the 1920s. A clock timing device for setting the oven to come on at a particular time also came as an option in the mid-1920s.

Refrigerators

In the period after 1920, refrigerating units began the move from large industrial food lockers and ice making plants to the homes of North America. Prior to that time, ice boxes, introduced in the mid-nineteenth century, were used to keep foodstuffs cool in most Canadian urban homes.

The Ice Box

An ice box consisted of a heavily insulated wooden or metal rectangular box into which a block of ice was placed. The exterior was traditionally made of wood. To prevent the walls from rotting as a result of high humidity levels, the interior walls were made of zinc coated tin or enamelled sheet metal.

After 1900, many ice box manufacturers began to introduce units which had enamelled metal both on the outside and inside surfaces. This material was touted for the simplicity of keeping it clean. By the 1890s, much of the ice used in domestic ice boxes in large urban centres was manufactured rather than naturally derived.

Mechanical Refrigeration

The first generation of household mechanical refrigerators appeared on the North American market shortly after 1915. In mechanical refrigeration, a liquid or gaseous refrigerant replaces the block of ice. The refrigerant is either heated or pressurized to the point of vaporisation, the vapour passes into the cabinet of the unit, absorbs heat, flows out, condenses/releases trapped heat and is recycled.

Mechanical refrigeration relies on two techniques to process the refrigerant --absorption or compression.

Absorption requires the use of a heat source such as a gas or kerosene flame to vaporise the refrigerant.

Compression requires the refrigerant to be pressurized/vaporised by mechanical means. In the domestic sphere, the motive power for the compressor is the fractional horsepower motor.

These two techniques relied on fundamentally different technologies associated with competing fuel sources: absorption with natural or coal gas, and compression with electricity. The gas refrigerator was technologically the most simple as it had no moving parts except for the thermostat that ignited the flame.

Gas or Electric?

The circumstances of how these two technologies competed for dominance is an example of the power of marketing and industrial strategy. The big American manufacturing industry looked at the two technologies, observed that compressor technology required an electric motor and, because it had close ties with the electric utility industry, chose to concentrate its efforts and dollars on the development of that technology.

In the US, companies the size of General Electric and General Motors were involved in the development of refrigerating technology and as a result had the funding for research and development which the absorption/gas technology did not have. By 1927, these firms had accumulated a great deal of experience in designing marketing campaigns; all of these forces and techniques were brought to bear in promoting the compression refrigerator.

Problems Introducing Refrigeration to the Home

One of the most important factors preventing the transfer of refrigeration technology to the home was its scale. Domestic refrigeration awaited the reduction of the size of components before it could be established.

Another stumbling block was the selection of an appropriate refrigerant. A variety of refrigerants including carbon dioxide, ammonia, sulphur dioxide, and methyl chloride were used. By the mid-1930s most refrigerants were either sulphur dioxide or methyl chloride until the introduction of chlorofluorohydrocarbon, or Freon which was non-flammable, non-toxic and non-explosive and had a remarkable ability to absorb and dissipate heat. It took decades before this gas was recognized as a major factor in the depletion of the ozone layer.

The most common problem of refrigerators of the mid-1920s was refrigerant leaks around the compressor piston gland. The majority of early machines relied on an evaporator or "brine tank" to assist in the absorption of heat from the contents of the refrigerator cabinet. The "tank" was in reality a large sealed honeycomb, configured around two to four slot-like openings in which ice cube trays could be placed.

Until the mid-1920s, most of these domestic refrigerating machines were designed to retrofit existing domestic ice boxes. Due to its size, the compressor assembly was placed either alongside the ice box, in the basement or on a covered porch. Two lines connected it to the heat extraction mechanism which was placed where there had previously been a block of ice. Even when the consumer purchased a complete unit, the refrigerating mechanism was often manufactured by a different firm than the cabinet.

In 1925, General Electric introduced its first "monitor-top" refrigerator in which the refrigeration unit was mounted on the top of the cabinet. This was the first refrigerator in which the refrigerating mechanism and cabinet had been integrated. The integration greatly altered the appearance of the

appliance, and because the motor/compressor unit was hermetically sealed, the number of refrigerant leaks was substantially reduced.

Before 1930, marketing of refrigerators focussed on their modernity and their ability to ensure that foods were kept cold. They were very expensive (a 1926 Kelvinator ranged from $340 - $610) and consumed a lot of electricity. Because it was in constant use, it generated a monthly bill second only to the electric range.

By the mid-1940s it was possible to purchase a refrigerator with a separate freezer compartment. One problem which affected customer satisfaction was the extraction of moisture from the air inside the refrigerator and dehydration of perishable goods. In an effort to reduce this problem, the refrigerators were compartmentalized.

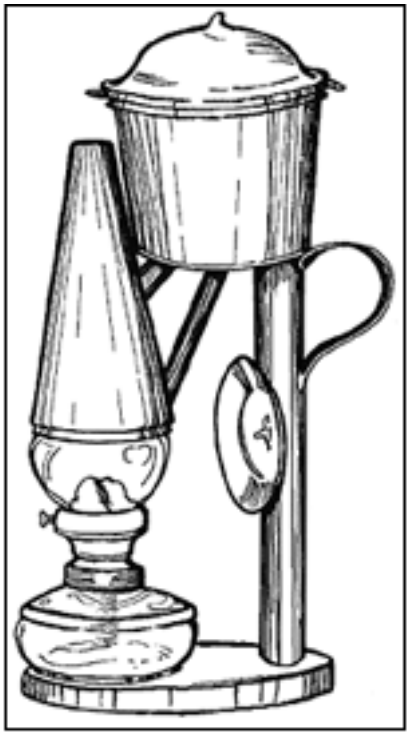
One design feature introduced by both General Electric and IHC (International Harvester Co.) refrigerators was a foot operated door latch. It disappeared by the mid-1950s.

Gadgets

In general, gadgets were expensive and, until the advent of mass production and a national distribution system, were beyond the reach of the average family.

Gear mechanisms were incorporated into a variety of small gadgets which promised to reduce labour and increase efficiency. These machines looked much different than their tool precursors. This was because they were organized to allow repetitive rotary motion to perform the task (egg beater, apple parer, potato peeler).

Many other gadgets were invented without gears and some were developed to perform unimportant tasks (pickle spear, shrimp cleaner, milk bottle opener). Other gadgets were combinations of two tools (stove-lamp, foot warmer) and even children's toy gadgets (toy egg beater, toy meat grinder) were developed to reinforce the idea that children could do kitchen tasks just like the adults.



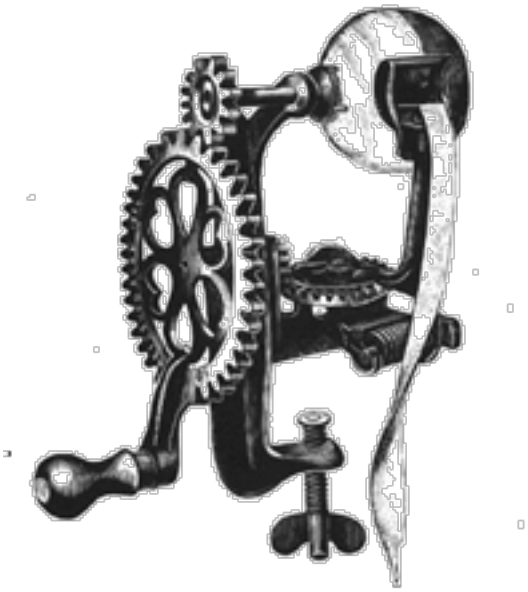
Kerosene lamp with boiler, Circa 1868

The word "gadget" was coined in 1886 to mean any small handy item for the kitchen. The story goes that it was derived from the mispronunciation of the French name of Monsieur Gaget who sold miniature Statue of Liberty souvenirs to Americans living in Paris.

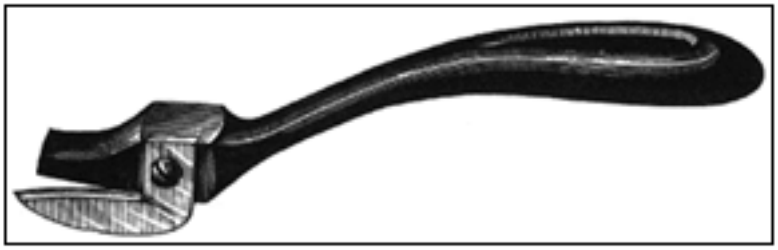
Examples of Interesting Gadgets

Apple parer ca 1890 -Dried apples were an important part of Canadian winter diets. Every fall, the average Canadian family pared and cut up to 200 bushels of apples. Paring could be done by hand with a sharp knife although this method was slow and semi-mechanical parers came into use as early as 1803. The cutting blade was attached to a threaded shaft or a set of gears, which caused the tool to travel across the surface of the apple as it was rotated by a hand crank. These utensils were later elaborated

with the addition of a coring attachment and an arm to push off the pared apple.



Can opener - The first practical can opener was developed 50 years after the birth of the metal can in England in 1810. British soldiers in 1812 tore open cans with bayonets, pocket knives and rifle fire. These early cans were large, thick-walled, made of iron and were sometimes heavier than the foods they held. Only when thinner cans of steel came into use in the late 1850's was it possible to create a can opener, patented in 1858. The can opener we use today, with a cutting wheel that travels around the rim, was invented in 1870. The only change from the original patent was the introduction of a serrated rotation wheel.



Egg beater - The egg beater was one of two technological innovations which was purchased in sufficient numbers to make a substantial impact on American cooking (the other was the cast-iron stove). In the Sears' 1897 catalogue a "Dover" egg beater sold for 9¢.