More Time- and Labor-saving Machines

Before carpet sweepers and vacuum cleaners, people had to beat rugs by hand in order to clean them. In 1858, Hiram Herrick developed the first patented **carpet sweeper**. Melville Bissell (1843–1889) patented an improved carpet sweeper in 1876. It had a broom with a brush around a cylinder that pushed the dust into a container.

The vacuum cleaner is an air pump that works in reverse—it pulls, not pumps, air. In 1871, Ives McGaffey created the **aspirator**, a vacuum whose power came from a heavy, big, and noisy steam engine. It was good only for industries or large areas. The mechanical **vacuum cleaner** was invented in the early twentieth century and needed two people to work it. In 1907, Murray Spengler improved the very heavy British vacuum by developing a lighter vacuum using an electric fan for power. He sold his rights to William Hoover (1849–1932), who started making **electric vacuum cleaners** in 1908.

In 1946, Percy Spencer (1894–1970) was experimenting with radar using a **magnetron**. A magnetron is an electronic tube that emits short electromagnetic waves. Spencer's magnetron was built from a strong magnet and shaped in such a way that electricity passed through the magnet and created powerful radio waves. (**Microwaves** are short, high-frequency radio waves; they are the shortest of radio waves.)

During this work, Spencer found that his chocolate bar had melted in his pocket! He realized the radio waves had sent heat energy to his candy bar and melted it. This was a new way of cooking. Spencer developed the first **microwave oven**, called the Radarange (radar + range). It was as big as a closet and very heavy; it also cost $5,000, the price of an expensive car. Ten years later, microwave ovens were small enough for home use.

Microwaves reach all parts of the food, inside and out. They do not always cook evenly because food does not always absorb the microwave energy evenly. This is why you cannot toast bread (or brown or crisp other food) because toasting means only the top is cooked. With a microwave oven, the food is cooked throughout, not just on top. It bombards the food with high-frequency electromagnetic waves that cause water molecules in the food to vibrate. This raises the temperature of the food and causes it to cook.

Exercise:

1. How is a vacuum cleaner the opposite of an air pump? _____
2. Did William Hoover invent the Hoover vacuum cleaner? _____
3. What was the first food "cooked" by a microwave? _____
4. How do microwaves cook? _____
5. Why can't you toast bread in a microwave? _____