A photograph of a grocery store produce section. The shelves are filled with various fruits, including green and purple grapes, red and yellow apples, and strawberries. The fruits are displayed in woven baskets and plastic bags. The background is slightly blurred, focusing attention on the produce.

# Inventions That Changed The World: Refrigeration

## Discussion Questions:

- 1) How is refrigeration used today?
- 2) How did people keep food cold before refrigeration?
- 3) How did the first cooling systems work?
- 4) When was the first refrigerator invented?
- 5) How did refrigeration change the world?

# Refrigerators

Refrigerators have changed the way humans live. They have made our lives easier.

## Advantages of Refrigeration:

- Fresh food can be kept for a longer time without spoiling.
- Fresh food can be frozen for later use. Some frozen foods can be kept for months.
- We can buy food in advance instead of shopping every day for fresh food.











Refrigerators are used in the home and the supermarket for food preservation. But they have many other uses. They are used in medical research, for example.



# How did people store food safely before refrigerators?

When food was in season it was eaten fresh. Any food that could not be eaten needed to be preserved for later use. Produce such as apples could be picked and stored in a cool room, like a cellar under the ground. This would help them keep for months after they had been harvested.

Food preservation techniques allowed people to keep food longer. When produce was harvested it could be cooked and bottled or canned for later use. Some produce could be dried and some could be preserved with vinegar (pickled) or olive oil. Meat products could be smoked or salted and stored in a cool room for later use.



Bottling



Pickling



Salting

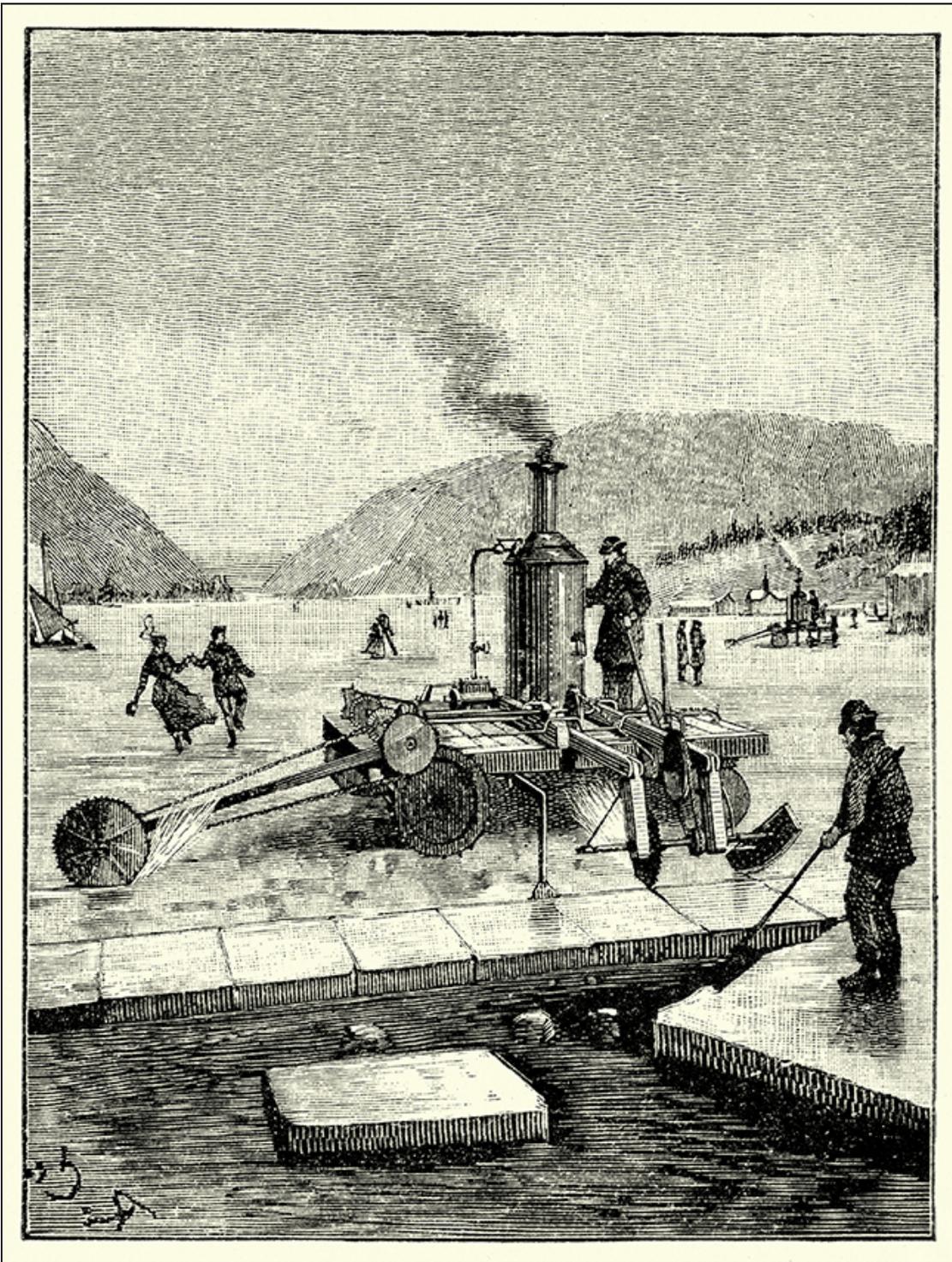


Drying

For centuries, people have known that food keeps fresher for longer when it is kept cool. Before refrigerators were invented people used ice to keep food cool.

At first, the only source of ice was found in naturally frozen waterways. During the winter this ice could be cut and stored in ice houses ready for distribution during the summer.

In the 1800s many different types of machinery were invented to make ice production easier. This picture shows a steam driven ice cutting machine that cut natural ice into regular shaped blocks.





Ice chests were cooled by ice that was delivered by the 'ice man' each day.

## Ice chests

Ice chests were often made of wood and lined with metal. Some were very fancy, to look like a piece of furniture. They had different compartments inside to hold food and drink, a special ice compartment, and a tray to catch the drips as the ice melted.

Ice was transported by horse and cart and customers were able to buy blocks of ice from the iceman each day.

The first vapor-compression refrigeration system was built in 1834. This meant that artificial ice was able to be made for the first time, using chemicals such as ammonia and sulfur dioxide.

By the mid 1850s ice companies attempted to make large quantities of artificial ice through mechanical means. However, the ice was not as clear as natural ice and was often tainted by the chemicals used in its production. It was considered inferior.

By the late 1800s pollution in some natural waterways led to the sale of polluted ice which made people sick. Artificial ice production then began to take a more important role in providing the ice needs of the population.

Many inventors contributed to the design of the modern day refrigerating system. Changes in technology made refrigerators safer and more affordable over time.

The first refrigerator made for home use was invented in 1913. Its cooling system still required dangerous chemicals such as ammonia, which could be quite dangerous and were known to cause explosions.



Refrigerators became more desirable when gases such as chlorofluorocarbons (CFCs) were introduced in the 1930s, as these were more stable and much safer.

CFCs were not used after the 1980s as it was discovered that these gases caused damage to the Earth's ozone layer.

1930s refrigerator



1950s refrigerator

Refrigerators were very expensive and remained unaffordable for many people until the 1950s and 1960s.

# Modern Refrigerators

Refrigerators come in all sorts of sizes and designs. Some have a single door, some have two doors or freezer drawers. Some even have water cooling and ice making facilities for drinks.

In the 1980s, scientists discovered that some of the gases that were used in the cooling systems of refrigerators were damaging the ozone layer. These gases were called chlorofluorocarbons (CFCs) and their use was eventually banned in many parts of the world. Modern refrigerators use alternative refrigerant gases that do not have the same damaging effects as CFCs. For example R-134a (tetrafluoroethane).

