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PERPETUAL-MOTION MACHINES AND THE CONSERVATION OF ENERGY

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**PERPETUAL-MOTION MACHINES
AND THE CONSERVATION OF ENERGY**

THE SEARCH FOR NEW FORMS **OF ENERGY**

During the twelfth and thirteenth centuries, water wheels and some windmills were the main sources **of energy**. Many inventors **of** this time, however, dreamed **of** an alternative **energy** source. They hoped to develop what were known as perpetual-motion machines.

A perpetual-motion machine is one that would continue to operate indefinitely without any external **energy** source other than the movement required to first place the machine in motion. The ultimate perpetual-motion machine would be designed in such a way that it would also be capable **of** useful work. It would be a self-contained unit that would generate **energy**.

So far, this idea has been proven to be impossible. During the nineteenth century, scientists made progress in unfolding the mysteries **of** nature. They discovered certain fundamental laws **of** nature that govern the behavior **of** matter. These laws are called the **conservation** laws.

THE **CONSERVATION** LAWS **OF** MATTER AND **ENERGY**

Scientists working in the eighteenth century began to realize that matter cannot be created or destroyed, but it can be converted from one form to another. In the nineteenth century, scientists realized that this applied to **energy** as well: that **energy** cannot be created or destroyed, but **energy**, like matter, can be converted from one form to another.

When applied to the work **of** a machine, this means that the **energy** or work produced by a machine must theoretically be equal to the amount **of** potential **energy** or work put into the machine. In other words, **energy** cannot be created.

These **conservation** laws, however, do not hold for nuclear physics.

THE FORCES **OF** FRICTION AND GRAVITY

Friction is a force **of** resistance that works against movement. It converts some **of** the kinetic **energy**, **energy of** motion, into heat. Heat, itself, will also reduce a machine's efficiency.

Gravity is another force that works against movement. It is a force **of** attraction that maintains a pull on objects. Gravity also contributes to weight.

A pendulum clock, for example, operates on the **energy of** its spring. When its spring is wound up, it is storing kinetic **energy**. As the pendulum moves back and forth, this **energy** is used up. The forces **of** friction and gravity are constantly acting against the pendulum. A source **of energy** must be supplied to overcome these forces. When the **energy of** the spring is completely used up, the pendulum comes to a stop until its **energy** source is replenished--until the spring is wound up again.

Gravity and friction also apply to perpetual-motion machines. Some external **energy** is needed to enable the machine to overcome these forces. Many early designs for perpetual-motion machines attempted to combine forces **of** water, magnetism and gravity. Some appeared to run without any outside **energy** source because they were quite efficient in their use **of energy**. But, no matter how efficiently the **energy** was used, it would eventually be used up. Every perpetual-motion machine designed came to a halt once its original **energy** supply was depleted. No machine yet known is capable **of** operating endlessly without a replenishing **energy** source.

PERPETUAL MOTION ATTEMPTS

Many designs for perpetual-motion machines were attempted. Here are some examples:

The teapot dynamo was a teapot with no lid. Its spout was curved back over itself so that the water would flow into the pot again. It was assumed that when the teapot was filled, the water would rise into the spout and pour back into the pot. This would create a perpetual movement **of** water. However, this was not the case. Once the water reached a certain level in the spout, it would no longer move through the spout. If any water were added to the pot, most **of** it would just overflow from the edges **of** the teapot itself. Only additional **energy** from an outside source, such as a suction pump, could keep the water moving.

The magnetic motion generator consists **of** a large magnet and a ramp. The magnet was used to pull an iron ball up a ramp. The ball was then supposed to drop through a hole and roll back to the beginning where the magnet would pull it up again. The difficulty with this design was that any magnet powerful enough to overcome the forces **of** friction and gravity and pull the magnet up the ramp was too powerful to let it drop down through the hole.

The weighted rotating wheel machine was designed with graduated sizes **of** weights tied to the spokes **of** a wheel, which was mounted on an axle. Initially, the machine was put into motion by placing the heaviest weight at the top **of** the wheel. This weight would cause the wheel to rotate. It was hoped that the movement would be strong enough so that the weight would make it back around to its starting position at the top **of** the wheel. Again, the forces **of** gravity and friction would eventually slow down the movement **of** the wheel as the initial **energy** supply was used up, and the wheel would stop.

Even after recognizing the **conservation** laws governing the behavior **of energy** and matter, some inventors still experiment with perpetual motion.