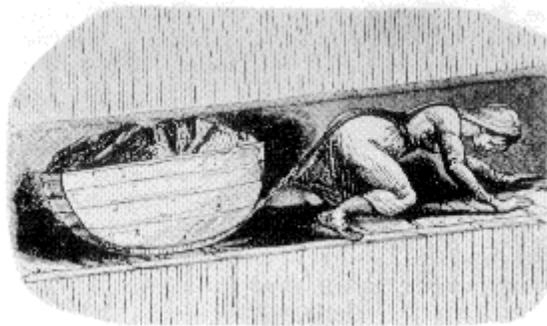


Quantum Mechanics_motive power



A young "drawer" pulling a coal tub up a mine shaft, whose "effect" constitutes the "elevation of a weight to a certain height" (Sadi Carnot).

In thermodynamics, **motive power** is a natural agent, such as water or steam, wind or electricity, used to impart motion to machinery such as an engine. Motive power may also be a locomotive or a motor, which provides motive power to a system. *Motive power* may be thought of as a synonym for either "work", i.e. force times distance, or "power".

History

In 1679, physicist Denis Papin conceived the idea of using steam to power a piston and cylinder engine, by watching a steam release valve of a bone-digester rhythmically move up and down. In 1698, based on Papin's designs, mechanical designer Thomas Savery built the first engine. The first scientific treatise on the energetics of engines was the 1824 book: *Reflections on the Motive Power of Fire* written by French physicist Sadi Carnot.

As an example, the Newcomen engine of 1711 was able to replace a team of 500 horses that had "powered" a wheel to pump water out of a mine, i.e. to "move" buckets of water vertically out of a mine. Hence, we have the precursory model to the term *motive power*. Based on this model, in 1832, Carnot defined work as "weight lifted through a height", being the very same definition used to this day.

1824 definition

Carnot states, in the footnotes to his famous 1824 publication, "We use here the expression *motive power* to express the useful effect that a motor is capable of

producing. This effect can always be likened to the elevation of a weight to a certain height. It has, as we know, as a measure, the product of the weight multiplied by the height to which it is raised.”

In this manner, Carnot is actually referring to "motive power" in the same manner we currently define "work". If we were to include a unit of time in Carnot's definition, we would then have the modern-day definition for power:

$$P = \frac{W}{t} = \frac{(mg)h}{t}$$

Thus Carnot's definition of *motive power* is not consistent with the modern physics definition of "power", nor the modern usage of the term.

1834 definition

In 1834, the French mining engineer Émile Clapeyron refers to Carnot's motive power as "mechanical action". As an example, during the expansion stroke of a piston engine he states that: "the gas will have developed a quantity of mechanical action during its expansion given by the integral of the product of the pressure times the differential of the volume." Clapeyron then goes on to use graphical methods to show how this "mechanical action", i.e. work in modern terms, could be calculated.

Source: <http://waterkalinemachine.com/quantum-mechanics/?wiki-mapping=Mechanical%20power>