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Crossley Atmospheric Gas Engine

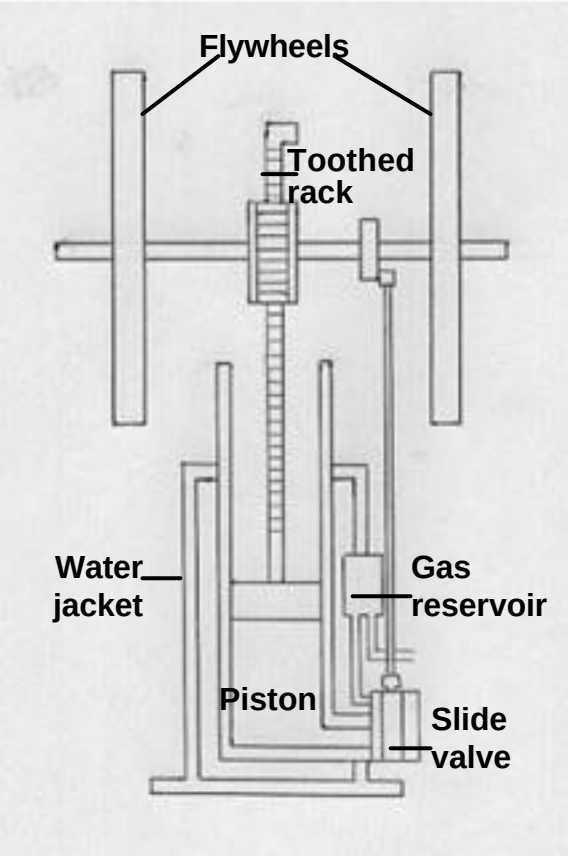
This engine was made in around 1874. It was one of about 1,500 made by Crossley Brothers of Manchester after taking out a licence in 1869 to manufacture gas engines to Otto's patent. The Museum's engine was used in a local bakery to drive a dough-mixing machine. It was presented to the Museum by Crossley Premier Engines in 1969.

In the 1860s, many engineers tried out the idea of an internal-combustion engine, where burning fuel and air inside a cylinder produced expanded. J. J. E. Lenoir, a Belgian engineer, was the first to produce a gas engine that showed that it was possible to make a working internal-combustion engine. However, since the Lenoir engine suffered from a low power output and high fuel consumption, attempts were made to produce a more efficient design.

Nikolaus Otto, a German engineer, also began experimenting with gas engines. In 1867, together with his business partner Eugen Langen, Otto produced and patented his first successful atmospheric gas engine. It was exhibited at the Paris Exhibition in the same year. Frank Crossley, who ran a small engineering business in Manchester with his brother, heard of the new invention and visited Otto in Germany. Two years later, Crossley's began producing atmospheric gas engines to Otto's patent.

These gas engines were the answer to industry's need for small simple and economic power units for small factories and workshops. There were many applications for such useful engines, although they were noisy, had a violent action and their power was limited. Within 10 years this engine was made out of date by Otto's four-stroke cycle gas engine, a working replica of which is on display nearby.

The working cycle begins when a rising piston draws a mixture of gas and air into the cylinder, which is inside the vertical support column. When the piston has risen about eight inches, the gas and air mixture is ignited by a small pilot flame burning outside. The explosion forces the piston (which is connected to a toothed rack) upwards. However, on its ascent it does not turn the flywheels, but freewheels on a ratchet mechanism. The piston is given enough momentum from the explosion to carry it up the cylinder, creating a partial vacuum underneath.



The working stroke occurs when the piston and toothed rack descend, assisted by atmospheric pressure and their own weight, turning the main shaft and flywheels as they fall. The slide valve mechanism controls the induction, exhaust and timing of the ignition of the air and gas mixture. It can be seen at the base of the column. It is operated by a long connecting rod, which links it up to a crank on the main shaft. To control the speed of the engine a small centrifugal governor at the top of the column behind the ratchet mechanism disengages the ratchet when the speed is too great, so that the toothed rack falls without turning the flywheels. To prevent overheating of the cylinder from the heat produced during ignition, it is surrounded by a water jacket through which cold water circulates.

Technical Data	
Engine type	Vertical single-acting atmospheric gas engine
Manufacturer	Crossley Brothers, Manchester
Date of manufacture	1874
Fuel type	Town gas
Rating	1 horsepower
Speed	80 rpm
Valve type	Slide valve
Ignition type	Flame carried over by a slide valve.

For more information:

Read Cummins, Lyle. *Internal Fire.* Lake Oregon,Oregon: Carnot Press, 1976.

Visit The Science Museum, London

Crossley Motors: www.crossley-motors.org.uk