Analyse this

This apparatus, held in London's Science Museum, has some significant purpose — or curiosity value — in the history of physics. Can you guess what it is?

IT "WEAVES ALGEBRAIC PATTERNS JUST AS THE JACQUARD LOOM WEAVES FLOWERS AND LEAVES". ANSWER NEXT MONTH.

James Prescott Joule was the son of a wealthy brewer in Manchester, in the north of England. He received his early scientific education from another well-known Mancunian, John Dalton. Joule began to investigate the fast-developing topic of electricity generation in the 1830s, wanting to make comparisons between the efficiency of various energy sources. In the 1840s he became interested in heat, which was then seen as a wasteful by-product of useful work. By 1843 he was convinced that "wherever mechanical force is expended, an exact equivalent of heat is always expended". He began a series of experiments comparing the work done in various forms with the resulting heat produced.

Last month:
Joule's paddle wheel

science
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In 1845, Joule performed his first paddle-wheel experiment, churning the water in a calorimeter using paddles driven by falling weights. After a series of painstaking experiments using sperm oil and mercury as well as water, he reached the conclusion that a weight of 772 pounds (350 kg) falling through a distance of 1 foot (0.3 m) raises the temperature of 1 pound (0.45 kg) of water by 1 degree Fahrenheit. He called this the 'mechanical equivalent of heat'.

His results were not universally accepted because the observational effects were small. William Thomson, later Lord Kelvin, recorded that a Fellow of the Royal Society objected because "he had nothing but hundredths of a degree to prove his case

by". It was only through using very sensitive thermometers, constructed especially for this experiment, that Joule was able to reach a consistent result.

The paddle-wheel experiments became classics in the history of science. The rotating vanes pass through the gaps between a set of fixed vanes to cause maximum resistance to the water or other liquid. It is not so much the result that is remembered now, but the fact that Joule had shown that heat had a mechanical equivalent.

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