Denis Papin | Encyclopedia.com

(*b*. Blois, France, 22 August 1647; *d*. London [?], England, *ca*. 1712) *technology*.

Papin was the son of Denys Papin and Magdaleine Pineau. He studied medicine at the University of Angers, from which he received the M. D. in 1669. He was apparently early intent upon a scientific career, since shortly after graduation he went to Paris, where he began working as an assistant to Christiaan Huygens. Papin was a skillful mechanic; he constructed an air pump, with which he performed a number of experiments under Huygens' direction. These were eventually published (1674), and included some attempts at preserving food in a vacuum that testify to Papin's utilitarian bent of mind.

In 1675 Papin went to London. He took with him letters of introduction to Henry Oldenburg, but it was with Robert Boyle that he soon established himself. In *A Continuation of New Experiments*, published by Boyle in 1680, Papin described both the investigations that he had made with Boyle (chiefly on the air pump) and those that he had conducted himself. In Boyle's scientific household Papin also invented his "Steam digester," a pressure cooker for which he invented a safety valve that was to be technologically important in the development of steam power. He demonstrated the digester to the Royal Society, under the auspices of Robert Hooke, in May 1679. In the latter part of the same year, he was employed by Hooke to write letters for the society, at two shillings each. He was not elected a fellow until late in 1680.

Papin was again in Paris with Huygens at some time in 1680; in 1681 he went to Venice, where he was director of experiments at Ambrose Sarotti's academy. He remained there for three years; among his duties was the performance of diverse experiments for the entertainment of the members, who periodically gathered in Sarotti's library. Papin returned to London in 1684 to serve as temporary curator of experiments to the Royal Society, at a salary of £30 a year. He sought the more lucrative post of secretary, but Halley was elected in his stead. His own work at this time consisted primarily of experiments in hydraulics and pneumatics, a number of which were published in the Royal Society's *Philosophical Transactions*.

In 1687 Papin went to Germany and joined a number of his fellow Huguenots at the University of Marburg, where he had been appointed professor of mathematics. He married and acquired a large family, which further strained his always inadequate finances. At this time Papin's interests in air pumps and steam pressure merged to provide an innovative solution to the widespread need for raising water. He considered first a piston ballistic pump using gunpowder, the idea for which he had earlier discussed with Huygens but claimed as his own (in a letter of 6 March 1704 to Leibniz). Papin met the problem of a 20 percent residue of elastic air remaining in the chamber after combustion by substituting steam for the gunpowder. In 1690 he published an account of a single cylinder engine in which water was both boiled and condensed in a tube beneath a piston. Atmospheric pressure forced the piston down again. While not immediately practical in actual operation, the piston arrangement had the advantage, Papin noted, of requiring steam at pressure low enough to be accommodated by vessels artisans of the time could make. Thomas Newcomen independently achieved great success following this line.

Papin remained in correspondence with Huygens during these years, and at one point, having tired of his heavy teaching load and low salary, appealed to him for help in finding a new position. Huygens could offer him nothing in The Hague, however, and Papin in 1695 was given a place in the court of the landgrave of Hesse, in Kassel. Here he devised a number of pumps and other practical inventions that intermittently interested his patron. He was made counsellor to the landgrave, and received recognition for his work in raising water from the Fulde. In 1705 Leibniz sent him a diagram of T. Savery's high-pressure steam pump. Papin designed a modification to this engine, published *in Ars nova ad aquam ignis adminiculo efficacissime elevandam* (1707), which though workable was not to prove as fruitful as the original piston model.

In 1707 Papin returned to England, but his old friends were gone, and he received no permanent appointment from the Royal Society. He drifted into obscurity and died, probably about 1712, but certainly at some date before 1714.

BIBLIOGRAPHY

Papin's more important writings include: *Nouvelles expériences du vuide* (Paris, 1674), repr. in Huygens, *Oeuvres complètes*, XIX (The Hague, 1937), 231; *A New Digester or Engine for Softening Bones…* (London, 1681;) *A Continuation of the New Digester of Bones, Together With Some Improvements and New Uses of the Air Pump* (London, 1687); "Nova methodus ad vires motrices *validissimas levi pretio comparandas," in Acta Eruditorum (1690), and Ars nova ad aquam ignis adminiculo efficacissime elvandam* (Kassel, 1707). A complete bibliography of Papin's writings, together with a biography, was published by Ernst Gerland, *Leibnizens und Huygens' Briefwechsel mit Papin, nebst der Biographie Papins* (Berlin, 1881), which

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For evaluation of Papin's place in the development of steam power see R. Thurston, *A History of the Growth of the Steam Engine* (New York, 1878); R. L. Galloway, *The Steam Engine and Its Inventors* (London, 1881); and H. W. Dickenson, *A Short History of Steam Power (Cambridge, 1938).*

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