Following his service in the Continental Army, Stevens purchased an estate at Hoboken confiscated from a New Jersey Tory, and proceeded to sell off the lands to finance his scientific experiments. Working with friends in Congress, Stevens helped to frame the act establishing the first U.S. patent laws, passed in April 1790. With some assistance from Washington's protégés Rumsey and Evans, Stevens became well-trained in steam engineering. In 1804, he launched the *Little Juliana,* one of the first ships driven by twin screw propellers. Stevens also developed the *Phoenix,* a 100-foot steamboat, which became the first ocean-going steamship in the world.

With steamboat development well under way, Stevens turned his attention to railroads. In 1824, at the age of 76, Stevens demonstrated America's first steam railroad on a half-mile circular track in his backyard, and whisked his passengers around at six miles an hour. Stevens's proposals for a vehicular tunnel under the Hudson, and an elevated railroad system for New York City, had to wait until later generations could implement them.

Stevens trained his sons as inventors, and with them developed the shaped projectile for artillery, and preliminary plans for an ironclad battleship. As early as 1815, Stevens proposed an armored U.S. Navy. With the support of West Point officers, the Stevens sons were finally awarded a government contract to build a demonstration ironclad; but British pressure on succeeding administrations eliminated all funding. Undaunted, the Stevens family continued to sell off their possessions, and poured hundreds of thousands of dollars into the ironclad steam battery they were building at their pier in Hoboken. Their efforts finally bore fruit in 1861, when the Navy realized what the unfinished ship could have done to defend Fort Sumter. Two of the Stevens family's supporters encouraged John Ericsson to build his famous *Monitor.*

The development role of the U.S. military

Within a few years of West Point's opening in 1802, Superintendent Jonathan Williams succeeded in establishing the U.S. Military Philosophical Society, for the purpose of advancing science and disseminating it throughout the nation. Williams had been in France during the Revolution, serving as American consul at Nantes, and working with Franklin's ally Caron de Beaumarchais, to funnel munitions and funds

John Stevens on the philosophical war

Late in life, the brilliant scientist and inventor John Stevens composed a treatise on metaphysics, distinguished for its Socratic method of demolishing the absurdities of British empiricism. The surviving manuscripts include these observations on Isaac Newton and René Descartes:

"To say that the primary parts of matter must consist of solid atoms, because we cannot conceive how properties can subsist without substance, is certainly taking great liberties with nature. The fact is, the hardness and what is vulgarly called the solidity of bodies in no instance depend upon atomic hardness and solidity; for in that case all bodies would of necessity be hard and solid.

"Of what are the substrata of the various powers and energies of nature we are totally ignorant, but that such powers and energies exist we plainly perceive by their operations. I further contend that if such a matter as Newton has described really did exist, it would be impossible for us to acquire any knowledge of it, from its very nature. It is now the universally received opinion that all our knowledge of things existing without us is derived from impressions made upon the senses. Now I would ask in what manner can the *internal* texture of an atom—which is hard, solid, and impenetrable—operate upon our sense. It is manifest [that] its hardness, solidity, and impenetrability can never be open to us, as it would then be no longer hard, solid, and impenetrable. . . .

"The truth is, it is now clearly ascertained that hardness or softness, solidity or fluidity, depend altogether upon temperature; that, by an increase or diminution of heat, all bodies may be made to assume a solid, fluid, aeriform or gaseous form. Until, therefore, we have a better evidence of its existence than merely the resistance of what we vulgarly call hard bodies, we shall take the liberty of dismissing this solid, massy, impenetrable being as wholly unnecessary. Perpetually hanging as a dead weight upon us, it has so embarrassed philosophers that, in their speculations respecting Matter and Spirit, it has drawn them unavoidably into the greatest absurdities."

When he turned to a consideration of *space,* Stevens reminded his reader that "Des Cartes was so enamored of a *plenum* that he declared nature abhorred a vacuum," and yet Newton "was compelled to require empty space, void of any resisting medium, in order that heavenly bodies might not be impeded in their courses." Again, discussing "metaphysicians of the Cartesian School on their own ground," he said "they tell us matter is inert; incapable alike of motion, thought, or design. Now, we find in the works of nature the most incontestable evidences of motion, thought, and design. What then are we to infer? Evidently that the Power of the Great Architect pervades the whole system! This conclusion, however skeptics may cavil, will ever be held by sound minds as incontestable."