PETER COOPER, REPUBLICAN INVENTOR

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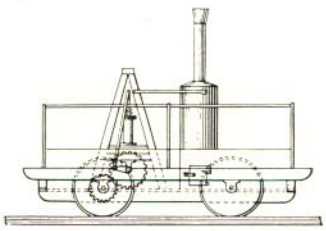
Peter Cooper loved his inventions. In his unpublished *Reminiscences* he devoted many pages to detailing their conception and operation, and like an indulgent father he had particular regard for those that had gone astray. He considered his torpedo ship, for instance, to be one of the most important works of his life. Designed in 1824 to support the Greek independence movement against British oppression, the small steam-powered ship was supposed to carry a bomb to its naval target while being directed from the shore by wires that could stretch up to ten miles! It could, moreover, return intact: "When the explosion should take place, it would bend the iron holding the torpedo, and this would reverse that action of the steam engine, and cause it to go right back to the place from which it started."



Peter Cooper's Tom Thumb was the first practical steam locomotive built on the American continent. Successful inventions like these play a minor role in Cooper's *Reminiscences* compared to such fanciful devices as the torpedo ship.

Filled with enthusiasm, Peter took the boat down to the New York Narrows, only to find that "a sail vessel crossed our track and broke our wire, and I could not find how far we might have gone on successfully." The supply ship sailed for Greece in the next week, without taking Cooper's torpedo; nevertheless he "had the satisfaction of believing that I had something to do in bringing that unfortunate threat of hostilities on the part of England to a peaceful termination."

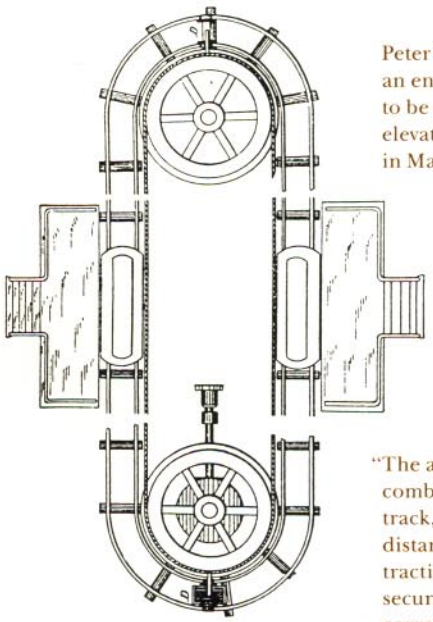
Though a failure, this torpedo experiment sheds some light on the process of invention, both in Cooper's own life and for the period. First, it illustrates that much invention in the early nineteenth century involved the simple adaptation of existing technologies. Cooper's boat was to be powered by a "rotary" steam engine which he had built two years earlier, and the design for which was to be used again to such dramatic effect in his Tom Thumb railroad engine of 1830. That engine indeed worked, but only just. Cooper referred lovingly to it as his "Teapot," jobbed together from musket barrels, a boiler, wheels, lumber and some found objects of hardware. Like his torpedo boat, one suspects that it was supposed primarily to serve as a demonstration rather than operate as a enduring machine.

De Tocqueville noted during his American travels that, in contrast to France, "scarcely anyone [devoted] himself to the essentially theoretical and abstract portion of human knowledge."

Second, one is struck by the way that Cooper almost glories in the small details of his devices, delighting in a curious blend of common sense and fertile imagination. Inventors of his generation certainly valued the "practical' over the "scientific." Never receiving any formal education in science, Cooper believed, like his hero Ben Franklin, in simply "learning-by-doing"—in his own words "always fussing and contriving" in the hope that something useful and profitable might turn up. The range of his invention is truly remarkable: from rocking baby cradles and hub-mortising machines to cable-cars and rocket propulsion. Indeed, the more tangential the effort to his work in glue and iron manufacture, the more he trumpeted his inventive genius; he did not include in his *Reminiscences* any mention of the two patents that truly brought him wealth—a design for a high-pressure steam boiler and a method for improving "the art of making Glue," signed by President Jackson in 1830.

Americans saw this practical, almost Rube Goldberg, approach as uniquely democratic, open and available to all regardless of academic accomplishment. Priority was given to physical rather than mathematical modelling. Even in the specialized fields of ship and bridge-building, it was more common to take measurements from scale models of proven designs than to develop new forms based on geometry and material science.

Celebrating the range of his application certainly was not supposed to end in mere self-praise. Cooper thought that ingenuity was not the property of particular individuals; rather it belonged to the artisan and mechanical classes from which he had come. In this he was correct. In a time before large corporations and research universities, almost all technological improvement came from the shop floor or the farm house. This did not, however, immediately confer social status upon the artisan—quite the reverse. Many educated merchants, lawyers, and doctors in New York still viewed the tradesmen with suspicion and distaste. Not only did laborers get their hands dirty but their wills, since they were constantly engaged in making a living, were not free to rise above their own self-interest to see the true nature of political virtue. Cooper's celebration of the practical and useful was part of his life-long battle with what he termed "polite" society. His social and political education, through the years of Thomas Jefferson to Andrew Jackson, made him part of the generation that raised the status of the artisan.



Peter Cooper's design for an endless cable and track to be used on New York's elevated railways, patented in May, 1879.

"The arrangement and combination of the endless track, the stations equally distant apart, the endless traction rope, and the cars secured thereto at distances corresponding to the distances of the stations, in the manner herein shown and described, so that all the cars on the circuit will simultaneously stop and start from all the stations on the circuit."

For Cooper, then, mechanical invention was not inimical to political virtue but rather essential to it. Invention fleshed out the spirit of the American Revolution. Now freed from despotic authority, the young country was required to develop its own natural resources in land and people; indeed, it was forced to do so since Britain, though the loser in military terms, still looked upon its old colonies as an enormous market upon which to dump its goods.

Ironically, one important result of raising the social status of mechanical pursuit was that the business of invention became highly personalized. Specific machines such as McCormick's reaper or Colt's revolver came to represent a whole field of technological improvement even though many other new machines, social practices, and market demands had come together to promote such change. Behind the machine lay a unique individual. Inexpensive pocket biographies paraded inventors before their readers not only as skilled geniuses but also as heroes of the republic and men of virtue. "If we have no Alexander, or Caesar or Bonaparte or Wellington, to shine on the stormy pages of our history," stated one observer in 1866, "we have such names as Franklin, Whitney, Morse and a host of others, to shed a more beneficent lustre on the story of our rise."

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In Christian Schussele's "Men of Progress," painted in 1861, Peter Cooper at last found himself in such company, presided over by the ever-watchful image of Ben Franklin on the wall. Even before the picture was composed, one might note, Cooper had directed that a portrait of Franklin be hung in The Great Hall, along with Lafayette and Washington, to serve as a constant moral and political example to the public and especially to the youthful students.

Cooper certainly hoped that the education offered by his "Union" would be cast within this democratic and very practical mold. The public would show up for lectures and demonstrations and take in new information through direct sense impressions, rather than developing systematic knowledge on which they could be examined. On the third floor a museum, including dioramas and models, would show how mechanical objects and natural creation actually worked. Space would also be set aside for various craft and trade associations so that new processes and techniques might be more widely distributed. And, most importantly, the Free Reading Room would contain all of the trade and scientific journals as well as copies of patent drawings. Cooper Union was indeed a large and imposing structure for its time, for it was required to house almost every form of popular knowledge and educational scheme in existence.

The opening of Cooper Union in 1859, according to Peter's original plan, may be seen, then, as the culmination of a first phase in America's industrial and technological revolution. Democratic and practical, the "internal improvement" of the country was supposed to flow from the republican political conditions that would liberate the common man's inventiveness. Cooper Union was to be an engine of material progress and an agency of civic virtue; in Cooper's mind these objectives were linked inseparably.

Yet Peter, having completed his mission with the founding of his Union, lived on. His life, one might say, slipped over into the period in which the whole business of "invention" was progressively drawn into the orbit of science. This change was quickly registered in the history of Cooper Union itself. Soon crammed with students admitted with little selection and who were never examined on what they learnt, the trustees, under Hewitt's direction, formalized admission requirements and set about developing a thorough-going technical education. As the Annual Report stated in 1868, the original ideas were indeed "practical, but of practically no effect on the class for which they were intended."

In the highly organized and industrialized nation that emerged from the Civil War, systematic knowledge would prove a broader avenue to success than "learning by doing." And the students, though appreciative of The Peter Cooper Medal, awarded after five years of night instruction, petitioned the Trustees in 1881 to award a regular baccalaureate degree instead. Fusing invention ever more firmly to science has led to tremendous improvements in material comfort and health—a process of which Peter Cooper would have approved. Yet what we have lost is Cooper's sense that technology also deserves to be framed by social need and political virtue.