

lieutenant, Morton McMichael, the former Philadelphia mayor and America's leading Whig publisher, who was chairman of the Fairmont Park Commission.

The Philadelphia Interests displayed their industrial wonders. Baldwin constructed several exceptionally beautiful lo-

comotives, just for the Centennial. And the Careyites' 29-year-old protégé, Thomas Alva Edison, put on a display of his automatic printing and multiplex telegraph devices.

Only days before the July 4th opening of the Centennial, Edison had completed his move into his new Menlo Park,

Franz Reuleaux's 1876 'Letters from Philadelphia'

Franz Reuleaux, the head of the German machine builders' delegation to the U.S. Centennial celebration in Philadelphia, wrote a series of reports on the exposition, in the form of open letters. They were printed serially in the European press, with great public impact and resulting in international controversy.

The letters beautifully illustrate the moral and philosophical character of the republican nationalists, Carey and his allies, who, despising chauvinism, fought to bring modern technology to the world.

Reuleaux, a professor of the science of development of machines at the Berlin Technical Institute (Berliner-Gewerbe-Akademie), served as the institute's president from 1876 for about 30 years. His teaching, writing, and political leadership were of very great influence in late-nineteenth-century German industry.

During his three months in Philadelphia for the Centennial, Reuleaux studied the methods of the city's great industries, the most important of which were the "Philadelphia Interest" firms led by Henry Carey's political partners. It is certainly the Carey circle to which Reuleaux refers, when he suggests, in the first letter, that a "master's hand" was behind the Philadelphia exposition.

The following are translated excerpts from Reuleaux's "Letters from Philadelphia" ("Briefe aus Philadelphia"), published in 1877 by Vieweg and Sons. Reuleaux and his writings were brought to *EIR*'s attention through the research of Lothar Komp.

From the First Letter, June 2, 1876:

These numerous separate exhibitions, many of which are of vast dimensions, produce, together with the great exhibition halls, an impression much like the movements of a mighty fugue, in that every voice intones anew the main movement, each, however, with its own character, entwining and interweaving itself with the other figures, until, finally, the entire tremendous industry-orchestra, roaring and thundering, comes together to bring the theme

to the conclusion.

Never before has this overall impression been so perfectly achieved. In any case, the effect betrays a master's hand at the conductor's baton. . . .

Today I wish only to elaborate, in broad outline, on the reproaches that have been hurled against us. The quintessential charge is the motto: German industries' fundamental principle is "cheap and bad."

Unfortunately, for the most part, this really is the fundamental principle of our industry, at least insofar as its first half is recklessly applied, and therefore, as the consequence, its second part follows. Even though competent, upright industrialists who condemn this principle have endeavored to work against it in our country, even though many whose hearts are fond of our industry have spoken out against it, it nonetheless has the upper hand, and thus manifests itself all too clearly in our exhibition.

Second reproach: In the industrial and fine arts, the only motif Germany knows is the partisan-patriotic, which does not belong in the world arena, and which no other nation has brought; Germany no longer has feeling for unbiased beauty which is beautiful on its own merits.

Indeed, once this is said to us, we are overcome by a feeling of shame when we wander through the exhibition, and in our section we observe the Teutons, Prussians, Kaisers, crown-princes, "Red Princes," Bismarcks, Moltkes, and Roones, made of porcelain, biscuit, bronze, zinc, iron and clay, painted, embroidered, knitted, printed, lithographed and woven, which come marching out, battalion-like, from every nook and cranny to greet us.

From the Ninth Letter, Aug. 25, 1876:

First of all to be emphasized, is . . . that in the recent decades, American industry has worked its way up to, for the most part, admirable heights. For this she can thank not only the skillfulness of her intelligent workforce, of which we Germans form a considerable portion, but also, without a doubt, the protective tariff.

The protective tariff has called forth, reared, and brought to a state of high perfection industries which did not exist here before, and it continues to have this same effect today. In Germany, one should not be astonished by this; because, in previous times, we ourselves used the protective tariff for entirely the same purposes and with the greatest success.

New Jersey "invention factory," under the sponsorship of Philadelphia Interests partner Gen. William J. Palmer. Palmer's executive secretary, Edward H. Johnson, had become Edison's business manager. University of Pennsylvania Prof. George Barker, head of research at the Franklin Institute,

was now Edison's science adviser.

Twenty months later (in March 1878), Barker would arrange for Carey, Carey lieutenant Morton McMichael, and George Boker, who had just completed his work as U.S. ambassador to Russia, to conduct a private telephonic ex-

Furthermore, the majority of American industry has sought its strength in the quality of its products. By this means it has succeeded, little by little, in pushing back a long line of foreign imports. The essential means to accomplish this are, firstly, the machine which spares bodily exertion and, secondly, human intelligence in the form of the skillfulness of the workers, by granting them high wages. Both factors together provide a product which, at relatively cheap prices, is of good, and for the most part of very excellent quality.

From the Tenth Letter, written aboard ship returning to Europe, early September 1876:

In the last few days of my transoceanic sojourn, more and more attacks [on the "Letters from Philadelphia"] from Europe have reached me which, in their violence, lack nothing. . . .

For me they are a proof that the enemies have written themselves into quite a rage. The English press could not resist adding slightly to the translation, to increase their instinctively awakened triumphalism, by telling their English readers that I called German products "cheap and nasty."

From an unpublished research paper by Lothar Komp:

In the introduction to his book *Konstruktör (The Designer)*, which for many decades was among the most important textbooks for aspiring machine-builders, Reuleaux attacked those who hold the view "that all polytechnical teaching must be subservient to the ruling principle of 'cui buono?', that all teaching methods must have a concrete relationship to specialized and 'bread and butter' studies [*Brotstudium*]."

Reuleaux, on the other hand, inspired his students with Schiller's inaugural address at the University of Jena, entitled "What Is and to Which End Do We Study Universal History?"

In his ceremonial speech celebrating the 50th anniversary of the Berliner-Gewerbe-Akademie in November 1871, Reuleaux refers to the achievements of universal minds like Leonardo da Vinci and Gottfried Wilhelm Leibniz and emphasizes: "Therefore, that education which achieves the utmost is inconceivable unless universal education is made possible. Therefore it is wrong, to expect

the utmost from specialized education, as penetrating as it may be."

. . . The accusations in his book *Kinematik*, published in 1875, are harsh:

"Today some want the machine engineer to believe that he should see his science merely as an expedient, which he is to learn and to practice only as it is immediately useful for his field. He is told that it should be his means of living, not, as the previous schools intended, an enlargement of his range of vision, an elevation of his viewpoint, a strengthening of the penetrating force of his intellect.

. . . The previous path, which made the German technical universities great and exemplary, was that which equipped the pupil with true scientific knowledge and lent to his technology itself that contemplative nature (*Innerlichkeit*) which brightens the range of vision and enables it to discover the possibility of forging ahead into new realms."

. . . The students of . . . Reuleaux accomplished what Reuleaux had demanded in his *Letters from Philadelphia*. Germany broke from strict adherence to the free-trade doctrine, and experienced a considerable increase in the living standards of its workers, per household. It was the graduates of the technical universities who achieved the breakthrough of shifting Germany over to "production according to the American system" [of standardized machined parts].

The components of machines and other goods were now, through the consistent application of machine tools, to be so precisely manufactured that they were to become interchangeable. Although this form of production is, at first, more expensive, because of the high cost of the machine tools, and of the highly paid specialized workforce, it made possible a drastic increase in the productivity of German industry. It is to be noted, that, without the principle of interchangeability, every single part of a machine, down to the last screw, must be "tailor-made." Around 1860 in Germany, it was still the case that, because of the lack of precision in the production process and the lack of standardization, for every nut, there was one and only one specially made bolt.

Universal interchangeability, on the other hand, demanded extraordinary precision in the production of individual parts; indeed, far more precision than was necessary for the functioning of one individual machine. This objective was only to be achieved with the most up-to-date machine tools.