DAVID DICK,
A MEADVILLE INVENTOR

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The family of William Dick and its descendants have been closely interwoven with the life and development of Meadville, from the pioneering days of northwestern Pennsylvania to the present, a period of a century and a half. The founder of this prominent line arrived in French Creek Valley in 1794, with his wife and two young sons. By 1803, three more sons completed the family circle. The activities of these brothers in banking, business, commerce, politics, and mechanical progress, in the period up to the Civil War, constitute a panoramic view of the development of Meadville from a frontier town, through the stage of an agricultural community, to its eventual culmination as an industrial center of the region. The fame of one of these brothers was international.1

From the time his father first put the tools of a carpenter into his hands, until he won an award in 1851, and even to his death, David Dick's chief interest was in tools and machines, despite the fact that thirty and more years of his life were spent in conducting a mercantile business, and he reached the age of forty before he seriously turned to the advancement of science and technology by his inventions. From his experience as a carpenter and contractor, he acquired a working knowledge of tools; from his venture into steamboat navigation on the Allegheny River and the building of the first stern-wheeler on western waterways, he became familiar with engines; and from his reading and correspondence, he kept abreast of the mechanical developments of his countrymen.

His first efforts were made to improve the steam engine, but for the

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1 Read at a meeting of the Historical Society of Western Pennsylvania, May 18, 1948, and based upon the author's thesis, "The Dicks of Meadville," submitted to the graduate school of the University of Pittsburgh in partial fulfillment of the requirements for the degree of master of arts.—Ed.

2 The correspondence and papers of the Dick brothers, including over seventeen hundred letters, deeds, land contracts, and miscellaneous items, remain in the possession of the descendants of William Dick. Without access to these original documents, this study would not have been possible. The author, therefore, is indebted to Mrs. John Earle Reynolds of Meadville for the careful preservation of the material and for permission to use the collection at the University of Pittsburgh, under the direction of Dr. Russell J. Ferguson.
minor adjustments that he found practical, no patents were issued. In the 1840's, however, while a member of the Dick firm of Meadville, he began work on his first and most important invention—his anti-friction press. This press was to offer to the public a new mechanical power by which any given amount of force or power could be exchanged for any other amount of force or power that might be required, without material loss from friction.

The purpose of the inventor's exertions was to produce a machine more effective than the existing hydrostatic or hydraulic presses and at the same time to reduce the initial cost. This, David Dick succeeded in doing. The Crawford Democrat carried a rather flattering announcement of the invention, March 16, 1848. Congressman J. M. Farrelly informed the inventor that his patent application would need to be resubmitted, for instead of one invention, the anti-friction press was recognized as three distinct inventions. R. J. Curtis of Virginia described the new machine as a new mechanical power and one that needed protection for every type of machinery to which it could be applied. J. D. Robinson of Waterford called the press "one of the most valuable improvements of the present age,"3 pointing out that it could be used for pressing cotton, tobacco, and sugar cane, and that the manufacturers of the North could use it for punching and cutting iron. Other applications of the principle were to appear as the years passed.

Two separate patents were granted in Washington, October 10 and October 17, 1848.4 While waiting for this final action, Dick enlisted the aid of a Meadville mechanic, Joseph E. Holmes. Together they set up a machinist's shop to build presses. By fall, they were filling orders for machines of great variation, but the most common were punching, printing, and cheese presses.

The anti-friction press, as it was manufactured for sale, was remarkable for its simplicity. Two upright standards supported a central axle, which was allowed to move slightly upward in its bearings. The axle, rotated by means of two cogwheels and a hand crank, moved in turn the two eccentric or cam wheels, whose axles rested upon sectors with curved surfaces. As the crank was turned, the cams revolved, pushing the upper two sectors upward against a plate or platform which

3 Farrelly to Dick, July 6, 1848; Curtis to Dick, March 6, 1848; Robinson to Dick, April 29, 1848.

rested upon the supports. Anything placed on this platform could then be pressed against a rebutting back with great pressure. In the words of the Scientific American:

The greatest principle of this invention is the saving and centralizing of the power, by directing the power which is applied through a line of contact points. The most perfect machine is that which transmits the power applied, in any ratio, multiplied into time, or what is better in machinery, "space," with the least loss by friction. In all machinery constructed to gain power, by losing time, to use common terms, the loss by friction is very great, such as block and tackle, and other machinery, screw, etc., where the power is transmitted over a great extent of surface. In machinery for lifting or pressing, 100 lbs. passing through two feet space, will lift 200 lbs. through one foot of space, and so on in the same ratio, barring the friction, which is the great evil of all complicated machinery. This great drawback (friction) on power is removed in Mr. Dick's press, so far as positive mechanical demonstration can test—and there is no surer way—its value.  

Dick made no claim of inventing the eccentric wheel, nor of first using the eccentric sector and roller for the purpose of pressing, but rather he claimed as an invention his combination of two eccentric sectors having their bearings upon edges with a roller placed between them, whose axis had free play for the purpose of eliminating friction in producing mechanical power.  

By February, 1849, the orders were "showering in" to such an extent that he decided to rent a shop in New York City. He was particularly elated by the sale of six presses to a client from Paraguay. The imaginative inventor envisioned the whole of South America as a new field of conquest. Word of the new press spread to Pittsburgh and New Orleans and requests came for agencies in these cities. In July, a shop was rented on the corner of Washington and Jane Streets in New York. W. J. Buck, a member of a firm with whom the Dick brothers had transacted business, contributed financially to the equipment of the establishment.

Dick concentrated on the working out of new uses for his mechanical power, rather than upon the sale and production of presses. In December he constructed a special heavy-duty press for a trial at the

5 Scientific American, March 30, 1850.
7 David Dick to Lydia Dick, February 24, 1849; Curtis to Dick, March 6, 1848; Robinson to Dick, April 29, 1848; W. R. Ridder to Dick, September 7, 1848; Quakenbush and Gilchrist to Dick, November 14, 1848.
Brooklyn Navy Yard. This machine, christened the "Sampson," was adapted to pull piles out of the ground. Embedded in the soil for fifty feet of their seventy-foot lengths, these piles measured fifteen inches square and had been installed seven years. In addition, the piles were spiked together below the surface of the ground. The engineers at the navy yard had tried every available means without success. After a few false starts, in which chains broke and tackling parted, the "Sampson" gradually drew the heavy timbers free en masse. David Dick had reason to be proud of his personal triumph.8

In April, 1850, a new type of press was made in the shop. W. C. Buck, foreman, sold a linseed oil press to a firm in Tennessee for six hundred dollars. With a three-horsepower engine, the press could exert a pressure of four hundred tons and do the same work as a hydraulic press with a saving of one-third in time and cost. J. C. Booth of the United States Mint ordered two types of shears—hand-powered and power-driven—to cut the edges from metal ingots. John C. Huey of New Orleans requested a cotton press.9 Business improved generally through 1850 and the enterprise seemed assured of success.

One obstacle to real achievement, however, was the need for strong iron. The metal in use was either too brittle or too soft, especially for the metal punches in demand. Dick's search for better iron led to the incorporation of the Spathic Ore Company of New York. Tests in 1850 and 1851 from Mine Hill revealed that superior iron could be smelted from the spathic ore there. A further advantage was the lesser amount of coal required in the process. Two barrels of this ore created a sensation in England, yet the company failed for lack of financial backing. A solution of Dick's problem was to be delayed until the general adoption of the Bessemer process for making steel about two decades later.10

Eventually the New York shop was transferred to the Matteawan Company of New York, for financial difficulties and mismanagement threatened bankruptcy. Dick's attention was attracted to larger fields of conquest, those of Europe. The first notice of the anti-friction press

8 David Dick to John and James R. Dick, December 20, 1849.
9 Buck to Dick, April 5, 1850; Booth to J. E. Holmes, June 14, 1850; Huey to Dick, October 31, 1850.
10 J. M. Scribner to Dick, March 2, 1849; James Dick to David Dick, November 8, 1850; Jeremiah Jenkins to David Dick, January 14, 1851; W. J. Buck to Dick, January 22, 1851; David Dick to Lydia Dick, March 12, 1851.
abroad appeared in the London newspapers when the Matteawan Company conducted a demonstration of an embossing press specially built for the Methodist Book Concern, publishers of religious literature in New York. The firm required a press that would exert a pressure of one thousand tons, and its representatives were wholly satisfied when the Dick machine developed a pressure of 1234 tons during the trials.\textsuperscript{11} The \textit{Scientific American}, always ready to praise the anti-friction principle, described this press as the largest ever seen. It was five and one-half feet between the platens and twenty-four by thirty feet between 10ds. The mechanical movement of the machine extended twenty-two inches, producing power in the ratio of 860 to one through the first two inches of motion, and gradually increasing up to 6,890 to one through the last two inches. The tremendous pressure was furnished in a matter of fifteen minutes with the application of two horsepower, exceeding the most sanguine hopes of the inventor.\textsuperscript{12} The \textit{New York Express} went even further than the scientific periodical in its praise: “Dick’s Anti-Friction press is one of the noblest and most perfect arrangements of power ever disclosed. The applicability to the various purposes in the arts where immense force is required, together with its compactness, renders it most invaluable in the construction of all kinds of printing, embossing, and other presses.”\textsuperscript{12}

The successful demonstration for the Methodist Book Concern brought the attention of the London press, but it remained for an exhibition in that city to attract the attention of the world.

Word had been received in America that an exhibition of the works of industry of all nations was to be held in London in 1851. The invitation had been sent to the United States Congress, and that body had designated the National Institute for the Promotion of Science as the agency to undertake the task of preparing the contributions from the various states.\textsuperscript{14} The institute named an executive committee, headed by President Fillmore, to contact the state governments. The response was rather apathetic, for only eight states had exhibits in London when the fair opened. In fact, the American section was almost empty for several months. Congress failed to appropriate money to

\textsuperscript{11} David Dick to James R. Dick, July 8, 1851.
\textsuperscript{12} \textit{Scientific American}, April 3, 1851.
\textsuperscript{13} Charles T. Rodgers, \textit{American Superiority at the World's Fair}, 28 (Philadelphia, 1852).
\textsuperscript{14} J. C. Kennedy to Dick, October 23, 1850.
underwrite the expenses involved, although it did commission the "St. Lawrence" to carry exhibits free of charge to London. Two private citizens, E. K. Collins of New York and Colonel C. F. Train of Boston, augmented this service of ferrying the articles across the Atlantic without charge.

A huge building of glass, wood, and iron, covering approximately nineteen acres, was constructed in record time in Hyde Park, London, and christened the Crystal Palace. The nations of the world sent those results of human industry capable of being preserved without injury for the duration of the exhibition—raw materials and produce, machinery, manufactures, and fine arts.15

David Dick negotiated a loan to finance the exhibition of his machines by his experienced demonstrator, Joseph E. Holmes.16 Reports from London were very encouraging by the fall of 1851. The London press had been hostile during the summer until trials were held to test the machinery on exhibit. But with the triumph of the McCormick reaper, and the recognized superiority of the American machinery in general, favorable publicity appeared. When this change occurred, Holmes made progress in his attempts to dispose of the English rights to the Dick patents. From London he sent the welcome news that the presses had been awarded a great medal, the highest honor bestowed by the judges of the exhibition, and that arrangements were being concluded whereby his patron would realize a large profit.17 To make certain that the sale would be satisfactory, Dick sailed for Liverpool on the "Canada" in September.

Charles T. Rodgers of Louisiana, who attended the trials of machinery and implements in 1851, made the sweeping claim that European axes, shovels, hoes, pitchforks, scythes and other farming implements were all inferior to the American.18 More surprising, perhaps, was the award of the judges to the exhibits of the Adirondac Steel and Iron Company, because they were superior in every respect to the best English cast steel. Colonel Samuel Colt created a sensation with his firearms—his revolvers boasted rotating cylinders, rather than revolving barrels. The British were so pleased with them that Parliament de-

16 Dick to A. G. Thompson and George Griswold, December 10, 1850; Dick to J. E. Holmes, December 27, 1850.
17 J. R. Black to Dick, September 11, 1851.
18 Rodgers, American Superiority, 14, 47, 58.
clared the Colt firearms free of duty. Competition in agricultural produce was almost an American monopoly, for the staples of the South were preeminent. These worthy products of America's industry shared honors with the Dick anti-friction press.

Dick basked in an aura of success in London for the period of time necessary to complete the sale of the English patent rights. So much time was consumed in the transaction that he wrote to his wife that "selling a patent here is like negotiating the Treaty of Ghent." In the meantime, he toured London, comparing what he saw with remembered sights at home. One significant comment is worthy of mention. He was convinced that America could outstrip the British in manufacturing.\(^{19}\)

In October, the English rights were sold to a New Yorker in London for $28,000.00 in notes, payable periodically in the next two years.\(^{20}\) With this rather dubious conclusion, the Crawford County inventor sailed for New York and home, happy in the honors his machines had won, but very little improved financially, for the New Yorker failed to meet his payments.

Other honors had been bestowed upon David Dick, and more were to follow. He had received silver medals from the Metropolitan Mechanics Institute and the American Institute at New York in 1848, and a gold medal from the American Institute in 1849. At the Exhibition of the Industry of All Nations held at another Crystal Palace in New York in 1853, he was awarded a bronze medal for his boiler plate shears and punches, and his silver, cheese, tobacco, copying and embossing presses.\(^{21}\) Finally, in 1857, the Metropolitan Mechanics Institute bestowed another medal.

But the inventor valued the triumph of his machines in physical tests more than the honors of ribbons and medals. In December, 1857, he learned that his mechanical power was to be used in a great experiment. The engineers at the Navy Yard in Washington were convinced that four or five of the Dick machines, with eight to ten men, could move their largest vessel a distance of 480 feet in four hours. A leviathan of a ship had been built and christened the "Great Eastern," and David Dick, with his assistants, Taylor and Holmes, was assigned the

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19 David Dick to Lydia Dick, September 9, October 30, 1851.
20 Dick to C. L. Rowand, December 18, 1857.
21 John E. Reynolds, In French Creek Valley, 260 (Meadville, Pa., 1938); J. E. Holmes to Dick, March 5, 1853.
task of launching it at Philadelphia in January. Great was the appro-
bation when the machines withstood the terrific strain without mishap. This splendid achievement gave the inventor more pleasure than did any other single honor.²²

In spite of the many honors, financial remuneration still remained elusive. The Matteawan Company of New York went bankrupt, and a second company, the Hadley Falls Company of Holyoke, Massachusetts, in 1852 concluded a contract to manufacture Dick's presses. For five years, profits were fairly steady. Then the Hadley Falls Company failed. Dejected over the sudden turn his affairs had taken, Dick de-
parted for Meadville, leaving his business in New York in other hands.

There were several reasons why his patents did not bring wealth to David Dick. The successful general storekeeper of Meadville could not cope with the manufacturing problems in the city, for his interests were chiefly those of the student and the inventor. Those entrusted to exploit his machines were rather unreliable. And the very nature of his invention, a mechanical power applicable to a host of uses, was such that a great investment, which was not available, was necessary for the realization of profit. Yet the principle of his inventions was adopted by manufacturing concerns, without benefit to the inventor, for his patents were virtually impossible to protect.

The last decade of David Dick's life was spent in Meadville, experimenting with his machines. His efforts were rewarded by the issuance of four patents in Washington, between 1860 and 1870, in addition to the extension of his earlier patents. He devised a rock and ore crushing machine, operated by a combination of moving jaws, eccentric rollers, and cone-shaped sectors, and similar in principle to the larger presses. After three years of effort, on October 28, 1862, he received a patent for apparatus designed to use mineral oils as a fuel. By the spring of 1864, oil was accepted as a fuel for steam vessels. Even the engineers of the Philadelphia Navy Yard, who were usually reluc-
tant to adopt innovations, listened intently as the Crawford County inventor explained his process. Naval engineers recommended that manufacturers adopt the new fuel.²³

David Dick made a considerable contribution to the science and

²² Dick to C. L. Rowand, December 18, 1857; A. R. Henry to Dick, January 8, 1858.
²³ Report of the Commissioner of Patents for 1864, 1:810, for 1862, 1:625; W. J. Buck to Dick, April 28, 1864; Charles G. Foster to Dick, January 24, 1866.
technology of his age. His anti-friction press was widely used in the United States and in some countries of Europe. He was instrumental in the acceptance of oil as a fuel, and his atmospheric engine was at least a contributing factor in the development of one of the world's most important inventions—the internal combustion engine of the automobile and the airplane. From his inventions, he did not garner great wealth, for, like many inventors, he expended the great bulk of his gains on new inventions and scientific experiments. The pursuit of wealth was not an object with him, except as it contributed to his scientific investigations.

The Daily Tribune-Republican described him in these words at his death, March 22, 1870:

"Meadville has produced no more honorable and upright man than David Dick. He was noted for his integrity, industry, enterprise, purity of character, and thorough unselfishness, and he will be mourned, not only in our own community, but by scientific men both in this country and Europe.  

24 Daily Tribune-Republican, March 24, 1870.