

The Amateur In Aviation: George A. Spratt And The American Aeronautical Community

A SMALL, informal group of Americans in the late nineteenth century dedicated themselves to resolving the vexatious question of manned heavier-than-air flight. Within this circle of theorists and experimenters were such renowned scientists and engineers as Samuel P. Langley of the Smithsonian Institution and Octave Chanute, a retired engineer living in Chicago. On the periphery of this aeronautical community, as it has sometimes been referred to, were a number of amateurs, most of whom exhibited considerable zeal but little fundamental understanding of the technical complexities of aerodynamic theory and practice.¹ One of the most prominent of these enthusiasts, and one who made a small but material contribution to the development of heavier-than-air flight, was George A. Spratt of Coatesville, Pennsylvania.

By the 1890's, when George Spratt started his work in aeronautics, important progress had been made in Europe and the United States toward eventual resolution of the problem of heavier-than-air-flight. As early as 1810, Sir George Cayley had made basic inquiries into the principles of aerodynamics and flight control. In later years, he built and tested fixed-wing gliders. Across the Channel in France, Jean-Marie Le Bris constructed and flew for a short distance a full-sized glider in 1857, while Felix Du Temple the same year successfully tested small powered models. In the 1860's, Francis Herbert Wenham, a

¹ The most thorough study of the aeronautical community in America is Tom Day Crouch, "To Ride The Fractious Horse The American Aeronautical Community and the Problem of Heavier-Than-Air Flight, 1875-1905" (Ph D diss., Ohio State University, 1976) See, especially, 2-5

British marine engineer, devised cambered wings of remarkably modern configuration and in 1871 built the world's first wind tunnel. Another marine engineer, Alphonse Pénard, built a rubber-band-powered monoplane with inherent stability that flew more than 130 feet at a public demonstration in Paris in 1871. The first real airfoil emerged in 1884 when Horatio F. Phillips patented a design for a double-surfaced wing. Serious attempts were made by Clément Ader to fly a powered machine in 1890, but more significant and influential were the publications and gliding experiments of the German, Otto Lilienthal, beginning in 1891.

On this side of the Atlantic, a number of pioneers contributed to the advance of heavier-than-air flight in the years after 1875. One of the first was John J. Montgomery, a Californian who assembled his first successful glider around 1883. Bird flight fascinated a young Chicagoan, Israel Lancaster, and in the mid-1880's he designed small gliders that made unusually long flights. A paper delivered by Lancaster at a meeting of the American Association for the Advancement of Science at Buffalo in 1886 inspired Samuel Pierpont Langley, director of the Allegheny Observatory and one of the nation's leading scientists, to conduct a series of aerodynamic experiments in Pittsburgh that he hoped would conclusively prove the feasibility of mechanical flight. Of greater moment, however, was the influence of Octave Chanute. Chanute, a French-born civil engineer living in Chicago, collected a vast amount of information on aeronautics which he published beginning in 1891 as a series of articles in the *Railroad and Engineering Journal*. He applied his engineering knowledge to the design and construction of full-sized gliders, and by the middle of the decade was acknowledged as the key figure in the American aeronautical fraternity. Chanute transmitted information from one experimenter to another and provided financial assistance to those whose work seemed most promising. Among such individuals was George A. Spratt.²

George Alexander Spratt was born in New Jersey on February 1, 1870, the son of George Reed Spratt, a physician with a graduate degree

² An excellent overview of the development of heavier-than-air flight is Charles Harvard Gibbs-Smith, *Aviation An Historical Survey from Its Origins to the End of World War II* (London: Her Majesty's Stationery Office, 1970), esp 21-93. A more popular study is C H Gibbs-Smith, *Flight Through the Ages A Complete Illustrated Chronology* (New York: Thomas Y Crowell Company, Inc., 1974), esp 58-89.

from the University of Pennsylvania. The elder Spratt moved with his family to Coatesville, in Chester County, around 1880 and settled into a comfortable medical practice. Seeking to emulate his father, the younger Spratt set out in pursuit of a medical career. He may have attended Bucknell University prior to matriculating at a medical school in Philadelphia, possibly Jefferson Medical College, but it is uncertain if he ever earned a medical degree despite many contemporary references to him as "Doctor." Heart disease brought on by a childhood case of rheumatic fever caused Spratt to abandon medicine and forced his banishment to the family farm four miles northeast of Coatesville. At first glance, life on a farm would seem more strenuous than a career in medicine, but a country doctor in the pre-automobile era led a surprisingly rigorous existence. Having to give up a lifelong ambition created a deep void, which the young man countered with the conviction that "there seemed to be a voice within that quietly bid me hope that there was a mission for me to fulfil. . . ."³ That "mission" came in 1896 when Spratt marshalled the scientific training he had received in medical school and turned his inquisitive disposition to the study of aeronautics; and did so with extraordinary devotion and intensity.

Spratt's immediate inspiration was observation of an airborne box kite, which so captivated him that he followed up with detailed studies of bird and insect flight and the aerodynamic principles of sailing. The more he learned about heavier-than-air flight the greater was the depth of his curiosity and enthusiasm. At one point early in his investigation, he wrote, "Flying has been the dream of my life. I never scared a bird up or saw it cross a valley, but what I longed to go with it and envied it." He also firmly believed in the eventual practicality of flight, asserting, "it will come out on top of all methods of transportation in time."⁴

Spratt recognized, however, that his work needed the support and guidance of someone with more experience than he with the complicated

³ Much of Spratt's early life is obscure. Probably the most reliable account insofar as background information is concerned is "The Spratt Family of Pennsylvania," in Spratt file, box 6, Pearl Young Collection, Denver Public Library, Denver, Colorado. See also, George G. Spratt to author, Mar. 18, 1981, and George A. Spratt to Wilbur Wright, Apr. 23, 1903, The Papers of Wilbur and Orville Wright, General Correspondence, Spratt file, 1903, box 50, Library of Congress Manuscript Division (hereafter cited as Wright Papers, Gen. Corresp., LCMD)

⁴ Spratt to W. Wright, Apr. 23, 1903, Wright Papers, Gen. Corresp., Spratt file, 1903, box 50, LCMD, Spratt to Octave Chanute, Aug. 26, 1899, *ibid.*, box 27, LCMD

scientific and technical aspects of heavier-than-air flight. This led him to contact Octave Chanute. Spratt first wrote to Chanute about his interest in aeronautics in April 1899. In the letter he outlined his ideas about a testing apparatus for computing aerodynamic lift on curved surfaces. Chanute found Spratt's preliminary efforts "very interesting" but doubted his mechanism would work because of excessive friction among its moving parts. He did, however, offer helpful suggestions about improvements to Spratt's device and encouraged him to continue his work.⁵ It was the beginning of an association that would last until Chanute's death in 1910.

In the summer of 1899, Spratt broadened his experiments from empirical observations of curved lifting surfaces to actual flights with a small model glider. Fitted with interchangeable paper wings of different cross sections and a stabilizing tail surface or "governor," the glider was only moderately successful; it covered a mere 140 feet on its longest flight before crashing to earth and requiring considerable repair. The results of the glider tests and the fact that many of his ideas and experiments had been anticipated by others in the United States and abroad were discouraging to Spratt, and he expressed his dismay to Chanute in the fall of 1899. Chanute, characteristically, praised Spratt for the progress he had made in such a short time and encouraged him to carry on with his work on flying models and lifting surfaces.⁶

Spratt's early efforts struck Chanute as being sufficiently worthy to warrant an offer in October 1900 to finance the construction of a full-scale glider incorporating data from Spratt's preliminary studies. Chanute wrote, "When you have satisfied yourself as to the best shape to give the surfaces, I think it would be well to build a full sized gliding machine, and I am willing to review your plans and to defray the cost of the materials." A firm believer in man-carrying gliders as the most fruitful avenue of aerial research, Chanute offered practical advice to Spratt: "I think however that it would be dangerous to be lifted by the wind as a kite until you have practiced on a hill side so as to know where

⁵ Chanute to Spratt, May 9, 1899, *The Papers of Octave Chanute*, Octave Chanute Letter Book, Container 24, microfilm reel no. 16, Library of Congress Manuscript Division (hereafter cited as *Chanute Papers*, LCMD)

⁶ Spratt to Chanute, Oct. 8, 1899, *Wright Papers*, Gen. Corresp., LCMD, Chanute to Spratt, Oct. 6, 1899, *Octave Chanute Letter Book*, *Chanute Papers*, Container 25, microfilm reel no. 17, LCMD.

the centre of gravity. . . should be placed, and the motions necessary [to control the glider].”⁷

Spratt agreed in principle with Chanute about the efficacy of a full-sized machine, and yet he doubted he had the experience or ability to construct a glider and feared he might “bungle” the job if he tried. Furthermore, he lacked an area on the farm suitable for tests. An alternative, Chanute suggested, was to have Spratt build a glider according to Chanute’s own design, using recent ideas he had about automatic equilibrium. Unfortunately, pressing business kept Chanute from completing plans for the machine, and it was never built.⁸ Chanute’s concept of automatic equilibrium, though, may have been the seed for Spratt’s long commitment to an airplane with wings so designed and constructed as to be absolutely stable.

Chanute was the catalyst for widening Spratt’s connections with the group of engineers and scientists experimenting with heavier-than-air flight at the turn of the century. Since May 1900, Chanute had been corresponding with Wilbur and Orville Wright and had come to recognize in the brothers the characteristics and abilities that would eventually make powered flight a reality. In June 1901, Chanute introduced Spratt to the Wrights, suggesting that the amateur would be a useful addition to the brothers’ camp at Kill Devil Hill, near Kitty Hawk, North Carolina, where they planned to conduct glider flights that summer. Uppermost in Chanute’s mind were Spratt’s medical skills, almost certain to be needed in the event of an accident or injury at the isolated Outer Banks. Farm work in Coatesville delayed Spratt’s arrival in the Wrights’ camp until July 25.⁹

For three weeks at Kitty Hawk, Spratt assisted the brothers with their gliding experiments. After a number of flights, Spratt became especially concerned about the dangerous lack of stability exhibited by the glider. He attributed this to the deep camber of the machine’s wings. Without independent experimentation, the Wrights had

⁷ Chanute to Spratt, Oct 5, 29, Nov 25, 1900, Octave Chanute Letter Book, Chanute Papers, Container 25, microfilm reel no 18, LCMD

⁸ Spratt to Chanute, Oct 1, 1900, Wright Papers, Gen Corresp, box 27, LCMD, Chanute to Spratt, Oct 29, Nov 25, 1900, Octave Chanute Letter Book, Chanute Papers, Container 25, microfilm reel no 18, LCMD

⁹ Marvin W. McFarland, ed., *The Papers of Wilbur and Orville Wright*, 2 vols (New York: McGraw-Hill Book Company, Inc., 1953), I, 58, 65, Spratt to W. Wright, July 20, 1901, Wright Papers, Gen Corresp, Spratt file, 1901-1902, box 50, LCMD

accepted Otto Lilienthal's calculations which showed the optimum curvature of a wing to be about 1-in-12 (or, an inch in depth for every twelve inches in width). From Spratt's preliminary investigations, he suspected that a wing so sharply curved would demonstrate sudden movements rearward of its center of pressure as it took on more shallow angles of attack. Wilbur Wright maintained that the parabolic cross section of the glider's wings and the sophisticated control mechanism used would preclude any major problems but he could not deny that the machine behaved poorly in the air. Conversations with the Wrights and with Edward C. Huffaker, another amateur experimenter present at Kitty Hawk, convinced Spratt that the Wrights had not achieved the most safe and efficient airfoil design. The brothers finally reduced the curvature of the wings and immediately the glider's performance improved. Spratt was particularly impressed with Wilbur's skill in handling the machine in the air. Altogether, the Wrights enjoyed Spratt personally and considered him to have been an agreeable and knowledgeable companion at the lonely Outer Banks.¹⁰

On his way back to Coatesville, Spratt determined to carry out experiments on centers of pressure and lift utilizing theories he had discussed with the Wrights in North Carolina. He had already mapped out his procedures to Chanute earlier in the year, and they met Chanute's approval, but he had not had time to implement them before leaving for Kitty Hawk. Once at the farm, Spratt assembled a fairly sophisticated instrument consisting of two swinging arms, one above the other, extending horizontally from a three-foot vertical pipe. Between the arms Spratt attached flat planes and curved surfaces at various angles of incidence. The entire device could rotate freely in any direction to face the wind. Lift and pressure figures from the surfaces registered on a circular table graduated into degrees and fixed to the lower swinging arm. The mechanism allowed Spratt to compute simultaneously the centers of pressure and their movement at different inclinations and to calculate the amount of lift at various wind speeds and directions.¹¹

¹⁰ McFarland, ed., *Papers of Wilbur and Orville Wright*, I, 108-11; Spratt to Chanute, Aug. 16, 1901, Wright Papers, Gen. Corresp., box 27, LCMD.

¹¹ Chanute to Spratt, July 4, 1901, Octave Chanute Letter Book, Chanute Papers, Container 25, microfilm reel no. 18, LCMD; Spratt to Wrights, Nov. 17, 1901, Wright Papers, Gen. Corresp., Spratt file, 1901-1902, box 50, LCMD;

Frustrating problems confronted Spratt during his aerodynamic experiments. The testing apparatus, he soon discovered, was not entirely satisfactory in operation. It depended on natural air currents, which were often variable and unreliable; Spratt did not, like the Wrights, perfect a wind tunnel, which was especially odd because the brothers had earlier discussed with him their tests and had detailed for Spratt the tunnel they employed in Dayton. At times, Spratt did use a pedal-actuated fan in his barn but found it to be awkward and its results were inferior to those from tests out of doors. Some of Spratt's findings, furthermore, did not ring true. Wilbur Wright questioned Spratt's empirical results for lift on planes set at shallow angles and his calculated data showing that two small surfaces exhibited greater lift than a single one of the same total area. Moreover, despite much work with wood veneers and after repeated attempts to use the sheet steel recommended by the Wrights and pressed wood pulp suggested by Chanute, Spratt never discovered a satisfactory material from which to shape his curved surfaces. Notwithstanding this, the results of the experiments with the testing apparatus demonstrated enough worth to elicit a comment from Wilbur Wright about Spratt's mechanism: "It is ingenious in construction and so far as I can see it is correct in its method of operation." Chanute considered Spratt's work promising enough to continue his financial support. He even made an unsuccessful overture to Samuel P. Langley recommending a small appropriation from the Smithsonian to underwrite Spratt's experiments.¹²

In 1902, Spratt became more closely involved with the Wright brothers and their aeronautical experiments. Wilbur Wright wrote to Chanute in June 1902 that Spratt, if he so desired, would be a "very welcome addition" to their camp at Kitty Hawk. Spratt said he would soon "have more time than ever for aeronautical work" and enthusiastically agreed to make the trip. On the afternoon of October 1, Spratt arrived at the Outer Banks. He remained in camp nearly a month, during which he lent a hand with the Wrights' new glider, kept a detailed notebook on the gliding experiments for Chanute, and

McFarland, ed., *Papers of Wilbur and Orville Wright*, I, 181

¹² W. Wright to Spratt, Oct. 19, 1901, Spratt to Wrights, Nov. 17, 1901, Jan. 21, 1902, Wright Papers, Gen. Corresp., Spratt file, 1901-1902, box 50, LCMD, McFarland, ed., *Papers of Wilbur and Orville Wright*, I, 201, 216, 225, Chanute to Spratt, Jan. 8, 1902, Octave Chanute Letter Book, Chanute Papers, Container 25, microfilm reel no. 19, LCMD

discussed at length with the brothers future gliding flights and aerodynamic theories. Holding a particular interest for Spratt were the relative merits of airfoils that were parabolic in cross section versus those that were circular.¹³

Upon Spratt's return to Coatesville in late October, he renewed his tests of pressure centers on curved surfaces. Unfortunately, his experiments revealed little that was not already known about the action of moving air on curved surfaces, and he lapsed into abstruse speculation about how much time it took for deflected air currents to pass over a wing. Spratt also wrongly concluded that the amount of air deflected by a wing was more significant than surface area in determining potential lift. Wilbur Wright soon corrected him and thereby earned Spratt's gratitude for putting him back on the right track. "I am sorry," Spratt replied to Wright, "to have made such a mistake but [I] am glad your shoulders are so used to warding off argumentative blows. . . ."¹⁴

By the spring of 1903, Spratt was confident that he had made a momentous discovery, a circular-section airfoil that he claimed had a natural tendency toward equilibrium regardless of shifts in the center of pressure. He bragged to the Wrights that he had "solved the mystery of the lift of curved surfaces and proven it experimentally. . . ." He said that with his instruments he could calculate lift and drag on all types of airfoils set at any angle of incidence. Furthermore, Spratt proclaimed that he could "guarantee" that he would soon be able to delineate a "law of absolute stability" for aircraft.¹⁵

The versimilitude of Spratt's aerodynamic theories, however, remained open to question. In April, he prepared a manuscript article summarizing his tests and conclusions and sent a copy of it to Wilbur Wright for his comments. Wright read the paper but found much of it ambiguous and difficult to understand. He recommended a fuller enunciation of Spratt's "laws" and a complete description of the procedures used to arrive at his conclusions. In later correspondence in 1903, Wilbur Wright offered concrete suggestions to Spratt about how he

¹³ McFarland, ed., *Papers of Wilbur and Orville Wright*, 1: 238, 241, 267-68, 274-76.

¹⁴ Spratt to Wrights, Nov. 7, 1902, Spratt file, 1901-1902; Spratt to Wrights, Feb. 19, Apr. 15, 1903, W. Wright to Spratt, Mar. 28, 1903, Wright Papers, Gen. Corresp., Spratt file, 1903, box 50, LCMD.

¹⁵ Spratt to W. Wright, Apr. 15, 1903, Wright Papers, Gen. Corresp., Spratt file, 1903, box 50, LCMD.

could sharpen the focus of his data on circular wing sections. Spratt nevertheless sent his manuscript to the Franklin Institute, which rejected it—probably for the same reasons detailed by Wright in his letters.¹⁶

Aerodynamic experiments occupied most of Spratt's spare time in the summer of 1903, and he came to rely even more on the advice and support of the Wrights. Spratt reported regularly to the brothers on his work, which seemed at times to be progressing slowly, if at all. He complained about ill health and seemed to drift back and forth between bouts of mental depression and outbursts of energy and enthusiasm. Wilbur Wright advised Spratt to construct a full-scale glider in order to try out his theories. In his barn, Spratt began putting together the machine, but due to radical changes in its configuration (at one point requiring Spratt to start all over again) and difficulties in finding proper materials, he was able to complete only the wing spars before autumn.¹⁷

Spratt journeyed south to the Wrights' camp at Kitty Hawk a third time in October 1903. This time his stay lasted four weeks. He aided the brothers with gliding tests and with initial work on their powered machine, all the while growing increasingly skeptical of their approach to the problem of flight and becoming more convinced that automatic equilibrium was crucial to a safe airplane. At one point he even predicted disaster for the Wrights. Spratt left camp more than a month before Orville's triumphal December 17 flight. He learned of it and the longer ones made by the brothers that day from a newspaper clipping sent to him while visiting relatives in Connecticut. On December 20, he wrote to the Wrights: "Let me congratulate you, and I do so with all my heart."¹⁸

Following the Wrights' success, Spratt went back to his studies of aerodynamics. Most of his experiments focused on perfecting a glider incorporating his theories of absolute stability and utilizing his circular wing section. The results of Spratt's endeavors were often

¹⁶ Spratt to W. Wright, Apr. 23, 1903; W. Wright to Spratt, Apr. 27, May 6, 15, 24, 1903, Spratt to O. Wright, June 12, 1903, *ibid.* The Franklin Institute has no correspondence with Spratt regarding his proposed article.

¹⁷ Spratt to W. Wright, Apr. 15, 1903, W. Wright to Spratt, Apr. 27, 1903, Spratt to Wrights, July 12, 1903, *ibid.*; McFarland, ed., *Papers of Wilbur and Orville Wright*, I, 305-7.

¹⁸ Chanute to Spratt, Dec. 19, 1903, Octave Chanute Letter Book, Chanute Papers, Container 26, microfilm reel no. 20, LCMD; Spratt to Wrights, Nov. 18, Dec. 20, 1903, Wright Papers, Gen. Corresp., Spratt file, 1903, box 50, LCMD.

discouraging, but he received the steady advice and encouragement of Chanute in terms of both his theories and the practical application of them in a man-carrying glider. Chanute was especially cautious to warn Spratt that keeping the center of gravity at the exact center of pressure generated by a circularly-arched wing was theoretically attractive but was unworkable in practice because the pressure center inevitably shifted and caused loss of lift.¹⁹

Spratt nonetheless persisted with experiments to prove his hypothesis. At last, he informed Chanute in August 1905 that he had successfully tested his theory and had found the solution to the equilibrium problem. Chanute acknowledged that if Spratt were correct he had made a breakthrough of significant proportions, yet he, like Wilbur Wright two years earlier, found much of Spratt's description of the theory incomprehensible due to inaccurate and unscientific terminology. Undaunted, Spratt in the summer of 1906 turned his energies to building a glider based on his findings and followed Chanute's suggestion that he patent his invention. Unfortunately, the patent office rejected the application. Spratt labored on the glider for several more months, only to abandon it as impractical early in 1907.²⁰

Spratt did not, however, entirely give up his efforts to construct a flying machine based on his principles. He renewed his work in the summer of 1907 and reported on his progress to Chanute, who provided financial support and practical advice. At Chanute's suggestion, for instance, Spratt improved on the glider's previously flimsy construction. The machine was ready for tests in the spring of 1908. Initially Spratt "flew" the glider down two wires stretched from the peak of a barn roof, but this method did not yield satisfactory results. Chanute visited Spratt in the summer and recommended lightening the glider and attempting free flights from a nearby hill. He stressed that "you need absolute freedom in the air. . . ." Spratt demurred. He reasoned that free flights were still too dangerous and commenced a series of tests with the glider towed behind a car. These, too, were somewhat less than successful, in part because the glider was "thrown together," according to Spratt, in order to test his ideas on stability and

¹⁹ Chanute to Spratt, Apr. 22, May 30, July 9, 1904, Chanute Letter Book, Chanute Papers, Container 26, microfilm reel no. 21, *ibid.*

²⁰ Chanute to Spratt, Aug. 5, 1905, Jan. 7, 1906, *ibid.*; Chanute to Spratt, Aug. 14, 1906, Container 27, microfilm reel no. 22, *ibid.*

equilibrium.²¹

In his quest for absolute stability, Spratt removed himself from the mainstream of aeronautical progress in the United States. Furthermore, his theories ran directly contrary to one of the cardinal principles of the Wrights, whose success can be attributed in great measure to their abandonment of automatic equilibrium in favor of constant attention to control by the aviator.

As time went by, Spratt's ties with the Wrights deteriorated. The brothers' reluctance to develop their invention further and their bitter patent dispute with Glenn Curtiss and others were disillusioning to Spratt. On their part, the Wrights resented Spratt's insistence that his early theories and his experimental apparatus of 1901-1902 had ensured the brothers' success. Wilbur Wright attempted to clarify his and his brother's indebtedness to Spratt in a letter of October 16, 1909. Wright acknowledged the value of Spratt's ideas on the simultaneous measurement of lift and drag, although he pointed out that he and his brother had implemented Spratt's concepts "in a machine of different design than yours." Wright's promise that "we shall certainly give you proper credit" did nothing to assuage Spratt's deep feelings of betrayal, and up to his death in 1934, he and others insisted that the Wrights would never have flown had they not become acquainted with Spratt and his work.²²

After 1908, Spratt went ahead with his research in aeronautics. He designed and tested a crude reaction motor in 1909 that in some ways anticipated later rocket and jet propulsion. Yet his real interest remained absolute stability, and he pursued his dream with unusual determination and singleness of purpose. In 1920, fourteen years after

²¹ Chanute to Spratt, Aug 20, 1907, Octave Chanute Letter Book, Chanute Papers, Container 27, microfilm reel no 22, LCMD, Chanute to Spratt, June 17, 1908, microfilm reel no 23, *ibid*, Spratt to Wrights, June 28, 1908, Wright Papers, Gen Corresp, Spratt file, 1906—, box 50, LCMD, "The Spratt Towing Flight Experiments," *Aeronautics* 3 (Dec 1908) pp 38, 40

²² George G Spratt to author, Mar 18, 1981, McFarland, ed, *Papers of Wilbur and Orville Wright*, I, 554 n 3

There has been some controversy over the exact nature of Spratt's contributions to the Wright brothers' work. For assertions that Spratt made possible the Wrights' success, see *Lancaster Sunday News*, Feb 6, 1927, *Philadelphia Inquirer*, Sept 16, 1934, *Coatesville Record*, Sept 29, 1934, Wayne Morris, "Dr Spratt and his Work" (unpub paper, Chester County Historical Society, West Chester, Pa, Oct 19, 1943), pp 7-8. The Wrights' position is clearly stated in O Wright to Charles S Foltz (undated), Wright Papers, Gen Corresp, box 27, LCMD

his initial application, he received a patent for his wing of circular cross section. He also built several airplanes using the wing, one of which he tested at Pine Valley, New Jersey, in 1924. Not until shortly before his death, however, did a full-sized airplane fly in Coatesville that used all Spratt's theories about stability and control.²³

George A. Spratt was a product of the upsurge in enthusiasm for heavier-than-air flight in the late nineteenth century. While the lore of flight, or for that matter, any high-technology enterprise, is replete with tales of lone backyard inventors or woodshed mechanics who accomplish major scientific or engineering breakthroughs, in actual fact, untrained and inexperienced amateurs have made virtually no significant contributions. Spratt was, to a certain extent, an exception. He quickly contacted the most knowledgeable individuals within the aeronautical community and exhibited a fundamental understanding of empirical procedures. If his work was flawed, or if his ideas and testing apparatus were only minor contributions to the eventual conquest of the air, Spratt still deserves lasting credit for his dedication to the vision of heavier-than-air flight.

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²³ Chanute to Spratt, Aug. 28, 1909, Octave Chanute Letter Book, Chanute Papers, Container 27, microfilm reel no. 24, LCMD; *Aviation* 17(Nov. 3, 1924): p. 1228; *Philadelphia Inquirer*, Sept. 16, 1934. His son, George G. Spratt, lives (as of 1981) in Wallingford and has built a number of airplanes with the Spratt wing.