

San Diego's Parachute Manufacturers: Visionaries and Entrepreneurs

By Wallace R. Peck

More than once in San Diego's long participation in conquering the air, parachute innovation and manufacturing were major industries. Although somewhat overshadowed by the region's concentrated involvement with the development and production of both civilian and military aircraft, several parachute companies flourished for a time in San Diego. The men involved were daring pioneers in their own right—and some became business entrepreneurs with varying degrees of success.



Sketch by Leonardo da Vinci drawn ca. 1483.

The idea of floating to earth underneath a tent-like contraption was conceived possibly as early as 1483 by the Renaissance genius Leonardo da Vinci, who had drawn a sketch of a rigid pyramid-shaped device along with specifications of its dimensions, a description of the composition of its materials, and the notation that by using his design a man “can jump from any great height without injury to his body.”¹ But the contrivance was not tested until over five centuries later, in 2000. The test

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in South Africa successfully demonstrated the viability of his concept, but the long delay has given him only passing credit for the idea.² Even centuries before da Vinci, it has been reported that the Chinese were jumping off buildings and towers with umbrella-like apparatuses to mitigate their fall, and in Siam it has been said that acrobats entertained the king using similar parasols, but such feats have never been verified, nor do we know what happened to the jumpers when they hit the ground, so they are given even less recognition today.³

Development of the Parachute

The first practical parachutes began appearing in the late 1700s, when daredevils in France and England took to demonstrating their own creations, sometimes successfully, other times not so successfully. Long before the advent of



Tiny Broadwick demonstrates an early parachute, 1913.
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airplanes, parachutes were often seen floating down at local fairs, carnivals, and shows during the nineteenth and early twentieth centuries, where exhibitionists in Europe and the United States would drop from hot-air balloons to thrill the spectators below.⁴ Parachutes became so commonplace that by February 1912 a bored New York steeplejack made a parachute jump from the observation platform of the raised arm holding the torch of the Statue of Liberty, floating

safely to the grounds below, but then declining to be interviewed by the media.⁵

The U.S. armed services became fully aware of the parachute's potential for saving lives as the result of demonstrations over North Island near San Diego. The first of these took place on February 23, 1914, when Charles Broadwick exited from a biplane flown by Glenn L. Martin, the future designer and manufacturer, at an altitude of 1,500 feet, with a cord attached to the fuselage of the plane. The cord released the restraining straps of the innovative backpack Broadwick was wearing, allowing the chute to open after about six seconds, gently depositing him on the ground before the awed spectators. While descending beneath his personally designed "aerial life preserver," he coolly lit and smoked a cigarette to demonstrate his nonchalance.⁶

The next demonstration for the Army on North Island took place the following year, on March 8, 1915, when Charles Broadwick's foster daughter, Georgia "Tiny" Broadwick, whose last name she had adopted, showed the assembled military onlookers what was possible. Tiny was experienced, having started parachuting from hot-air balloons in 1908, at the age of fifteen, and she had made hundreds of jumps before thousands of spectators at county fairs, circuses and other public events while barnstorming throughout the country with her father, including performances before over 5,000 San Diegans at Wonderland in Ocean Beach.⁷ Her first jump from an "aeroplane" occurred over Los Angeles a year earlier on June 21, 1913, when she became the first woman to perform such a feat, a man having done so just one year before.⁸ "Jump" is not entirely accurate, as she usually sat on either a board or a sling that hung from the right wing or side, and using a lever released the restraint allowing her to fall clear of the plane, relying on a cord or rope attached to the aircraft to pull open her chute. Similar feats over Los Angeles the following year generated considerable publicity.⁹

Watching the North Island demonstration from the ground was Brigadier General George P. Scriven, the chief signal officer of the Army Signal Corps to which the fledging Army air units were attached.¹⁰ On one such jump Tiny's biographer said she had to cut her entangled attachment to the fuselage and pull by hand the cord's connection to the parachute on her back, thereby unexpectedly creating the first manually operated ripcord, if this really happened. There is no mention of this harrowing experience in the newspaper reports of the day, so it may have taken place at another time. In any event, the general was most impressed and recommended the purchase of a number of chutes. Only two were bought, however, and the concept's possibilities were ignored for many years.¹¹ The following week Tiny repeated her demonstration at North Island before a group of congressmen and their wives, but it did little to expedite the general use of parachutes.¹²



Wonderland Park Entrance in Ocean Beach, ca. 1911-1912 ©SDHC 15540.

With the advent of World War I in Europe in 1914, parachutes were so well developed that they were supplied to vulnerable observation balloonists, who would use them to escape from fiery gas-filled balloons that had been attacked and set ablaze by enemy aircraft. Usually, the parachute canopy was stowed in a bag or canister attached to the balloon basket or the parachute hung loosely below the basket, and the observer would wear a harness that could quickly be connected to lines leading to the chute. Jumping from the basket, the lines and chute would be pulled free and, hopefully, the observer would drift to earth free of the conflagration raging above. Hundreds of balloonists were saved by such devices.¹³

Common sense should have dictated that the occupants of combat aircraft--the pilots, gunners, and observers--would be equipped with a similar means of escape. But common sense was long in developing. It seemed that little thought was given to the safety of the aircraft crews by those in command on the ground. Their concern appeared more for preserving the flimsy airplanes, as it was feared that pilots in battle would prematurely abandon their planes to save their own lives, thereby leaving a perfectly good government machine to plunge to its destruction. The catastrophic result of this warped policy was the unnecessary loss of many pilots who plummeted to their deaths unable to leave their disabled planes, although some would accelerate their fate by jumping from their burning cockpits to avoid being cremated alive.¹⁴

For years, this blind policy persisted on both sides of the conflict, with the French, British, German, and American pilots having no means of escaping. Only in the latter part of the war did Germany start equipping its pilots with parachutes, much to the surprise of their opponents. Many lives were saved, but not on the Allied side.¹⁵ General William "Billy" Mitchell, the commander of all U.S. air combat units in Europe, readily appreciated the need for such a safety device, and insisted that the matter be investigated and that parachutes be supplied.¹⁶

The result was the formation by the Army Air Service of an experimental group, called the U.S. Army Air Service Parachute Board, at McCook Field near Dayton, Ohio, to come up with a safe and workable parachute for use in planes. Unfortunately, it was too late to help the fliers at the front as the war ended in November 1918, before the group could get started. Under the command of Major Edward L. Hoffman, an engineer, the team members, all civilians, consisted of its leader James Floyd Smith, his assistant Guy M. Ball, Leslie L. Irvin, James M. Russell, and two others. Hoffman, Smith, and Russell were to have close contacts with San Diego.

Floyd Smith, who usually dropped his first given name "James," already had a long history with aircraft, parachutes and parachuting. He started as

a circus trapeze artist, then with his wife Hilder financed and built his own airplane. Smith taught himself to fly, becoming a test pilot for the designer and manufacturer Glenn L. Martin, establishing altitude records over San Diego in 1915, and two years later making the first simulated aircraft carrier landing on North Island.¹⁷ Both Smith and his wife made parachute jumps in 1914 utilizing Charles Broadwick's backpack with an opening cord tethered to the aircraft.¹⁸ Smith later designed a manually operated parachute, one that the user could carry on his or her back and deploy with a ripcord in hand instead of a static line attached to the plane. With great foresight, he applied for a patent on June 27, 1918, which was granted in 1920.¹⁹

The McCook Field group tested seventeen different types of parachutes from around the world, finally settling on Floyd Smith's design with some modifications. After using dummies for eleven trials, the first human test occurred on April 28, 1919, when Major Hoffman reluctantly authorized twenty-three-year-old Leslie L. Irvin to leap from a DeHavilland DH 9 piloted by Floyd Smith, the disappointed inventor who was hoping to be the first. The great unknown, at the time, was whether a human being would be able to pull the ripcord, or whether he would lose consciousness or become too disoriented. "Everyone knew...that a falling man lost his senses or was suffocated as he hurtled through space."²⁰ Irwin was an experienced parachutist, nicknamed "Sky-High Irvin" or sometimes "Ski-Hi Irvin," and had worked as a stuntman and assistant casting director at the Universal Film Company. But all his prior jumps had been with a static line attached to an airplane or balloon to open the parachute. This would be the first time the jumper would be in control. He leaped from a plane flying at 1,500 feet altitude at a speed of about eighty miles per hour. The test was considered a great success. The ripcord and backpack worked perfectly, opening in less than two seconds after the ripcord was pulled, but Irvin broke his ankle on hitting the ground. While recuperating, he called his associate George Waite, a manufacturer of silk in Buffalo, New York, and in less than two months, they incorporated the Irving Air Chute Company (a "g" having been mistakenly added to Irvin's name) and were ready for business.²¹ The scramble to reap profits was on.

In the meantime, further modifications, experimentation, and testing took place, with jumps by Floyd Smith, then James Russell with his first ever jump, followed by others. The result was the "Type A" backpack parachute model, which with various alterations became the standard for the U.S. Armed Forces. Based upon that design, others were configured to be worn as seat and chest types. The War Department immediately ordered 300 from the Irving Air Chute Company, which was the low bidder. Floyd Smith was unable to prepare a bid in time to meet the bidding deadline, he said.²²



McClintock Storage Warehouse Company, 1925. Home of the Russell Parachute Company. ©SDHC #2004.

The same year that Irvin incorporated the Irving Air Chute Company, Floyd Smith formed the Floyd Smith Aerial Equipment Co., which immediately brought suit for patent infringement against Irvin's company. Smith won a pyrrhic victory. The judge ruled that although Smith's patent was valid, and Irvin's company was an infringer, damages would be minimal as substantially all of the sales by Irvin were pursuant to a U.S. Government contract, which insulated him from damages for those sales. Another suit directly against the United States would be necessary to recover any money.²³ Such a suit was prepared but not filed, with the federal government paying Smith \$3,500 for his manufacturing rights. The patent then was assigned by Smith's company to Irvin's company.²⁴ These events led to the Irving Air Chute Company becoming the principal supplier of parachutes to the military for years to come. Leslie Irvin is often given credit for the invention, but it was really Floyd Smith's idea and design that prevailed, although he reaped few monetary rewards.²⁵

The selected parachute, often called an "Irvin," the name it was labeled by the manufacturer, was a tremendous success. The first military operational use took place in October 1922 when Lt. (later Brigadier General) Harold R. Harris used it

to save his life when his plane started to disintegrate during mock combat.²⁶ In March 1924, an order was issued requiring all military pilots to fly with parachutes attached to their bodies.²⁷ This was ten years after Tiny Broadwick's successful demonstrations above North Island, and over five years since the end of World War I, a long and deadly delay. But finally it was proven worthwhile. An informal "Caterpillar Club" was created in 1922. The sole requirement for membership was an emergency use of a parachute. By 1939, the club had over 4,000 members; by the 1950s, it had over 80,000, a true testament of the life-saving qualities of the parachute.²⁸

Russell Parachute Company

In June 1924, James "Jimmy" Russell left the McCook Field organization in Dayton and headed to San Diego with the goal of forming his own parachute manufacturing company. Financial assistance was apparently forthcoming from H.R. McClintock, a well-known and well-respected local businessman who, having made his fortune in the outdoor advertising business, was now planning to build a warehouse on Kettner Boulevard at the intersection of B Street near the Santa Fe Station.²⁹ The Russell Parachute Company was incorporated in December 1925 to manufacture "aerial life preservers" with McClintock as president, and Russell as vice president. The six-story, 67,000 square-foot McClintock Storage Warehouse building, at 1202 Kettner Boulevard, was completed in June of that same year and, after being used as an exhibition site, part of it became the home of the Russell factory at the end of that year.³⁰ An article in *The San Diego Union* reported the company's start-up and stated: "Naval aviation officials here announced yesterday



Russell Parachute Company workers, ca. 1929. ©SDHC PA #202.

that they will do everything possible to make San Diego's newest commercial industry a success."³¹ There were high expectations for the enterprise.

Jimmy Russell was brimming with innovative ideas. In 1926, he designed and patented a "valve" type parachute that featured openings in overlapping parts of the parachute's panels to make for easier deployment, but it was never put into production.³² That same year, he came up with a new device that attached to the ripcord for releasing the parachute faster.³³ He also patented his new aviator's leather helmet.³⁴ He even designed and successfully tested a very large parachute to bring an entire plane safely down to earth.³⁵ And he pushed his idea of supplying parachutes to all passengers on airliners, a dream that never caught on.³⁶ But his biggest contribution was his design and patent of what became known as the Russell "Lobe" Parachute. Having participated in the investigation of the death of a parachutist at McCook Field, Russell was seeking ways of reducing the severity of a chute's opening force and the oscillation while descending. He came up with a parachute that minimized these problems. It had a slightly different appearance, with an almost flat top canopy and an inwardly curved skirt, and no small pilot chute was required to assist in opening the main chute.³⁷ This product became the centerpiece of the company.³⁸ It utilized a pack designed by Major E.L. Hoffman and was produced in a variety of sizes and in forms that could be worn on a person's back, seat, or chest, made from white or pongee silk or even cotton cloth.³⁹

The Lobe led to expansion of the Russell Parachute Company, physically growing from occupying 800 square feet to 10,000 square feet of the McClintock building. Sales boomed. Nationwide, about sixty dealers were appointed; an eastern sales office was established; a new plant was opened in England, the British Russell Parachute Co., Ltd., to comply with the requirements of British



Russell parachute, 1929. ©SDHC #PA 202.

law; and construction of a new facility was contemplated east of the Mississippi, although it was never built. Numerous demonstrations and extensive advertising ensued, with the slogan "For Safe Descent."⁴⁰ When Charles Lindbergh came to San Diego in 1927, five months after his famous solo flight to Paris, he was presented with a Lobe parachute.⁴¹ When Lindbergh Field was dedicated the following year on August 16, 1928, three Navy enlisted men jumped with Lobes in full view of the thousands in the crowd below.⁴² Pretty young ladies wearing, but not using, Russell



Charles Lindbergh relied on a parachute not once, but four times, in the three years before his famous flight to Paris. Pictured with his wife, Anne Morrow Lindbergh, 1929. Shorpy. ©SDHC #17645.

chutes were featured in publicity photographs.⁴³ That same year, Russell met in Washington, D.C. with Rear Admiral William A. Moffett, head of the Bureau of Aeronautics, to try to interest the Navy, while McClintock toured Europe with a company jumper to demonstrate the Lobe to prospective buyers there.⁴⁴

The price to dealers was between \$250 and \$350 each, depending on the size and the materials used, with the cotton version being less expensive than the silk and thereby more attractive to private pilots. A number of airlines and flight schools adopted the Lobe, and such sales mushroomed, but contracts with the military were not forthcoming. After government testing in the United States and in Britain, it was concluded that it did not offer substantial advantages over the standard parachute being produced in great quantities by the Irving Air Chute Company. This stark disappointment, undoubtedly aggravated by the onset of the Great Depression, was a major blow to the company. Even though it received government contracts for the manufacture of anti-aircraft target sleeves and other items, the survival of the company was tenuous.

The coup de grâce was a devastating court ruling. Seeing the inroads being made by the Lobe in the civilian market, notice was given to the Russell Parachute Company on December 28, 1928, of alleged patent violations, and about five months later on June 1, 1929, the Irving Air Chute Company and the Floyd Smith Aerial Equipment Company jointly filed a patent infringement suit against the Russell

Parachute Company for violation of Smith's original patent. The trial between the companies of the three former McCook Field colleagues took place the following year in Wilmington, Delaware, the state of incorporation of Russell's company. More than fifteen witnesses appeared, including Irvin, Ball, and Russell from McCook Field days, supplemented by Floyd Smith's testimony from a prior case. George Waite, the silk dealer who was president of Irvin's company, testified that the company had no competitors for military contracts, having sold over 7,000 chutes to date, with another 1,000 on order. Civilian sales had reached 1,502, and sales to foreign governments from its British factory were between 3,500 to 4,000 units. But, he said, sales had fallen since 1929 due to competition from Russell and another company.⁴⁵

One of the principal issues in the case was the existing "state of the art" prior to Smith's 1918 application for his patent, a common defense in patent disputes to demonstrate that there was no real innovation and, therefore, no valid patent. The defense tried to show that "free parachutes," that is, parachutes that could be carried and operated manually, were publicly known and used earlier. The history of airplane parachutes was reviewed. Other patents, newspaper articles, and testimony were presented. Tiny Broadwick, then married and known as Tiny Brown and a resident of San Diego, testified as to her use of the Broadwick backpack over North Island and elsewhere. She asserted that she had used a manually operated ripcord several times, including her demonstrations at North Island, but her memory of her jumps over fifteen years earlier was somewhat confused, and the judge could give little weight to her testimony. Nevertheless, after hearing all the evidence, he ruled in favor of the Russell Parachute Company, dismissing the case, declaring that even if the Broadwick backpacks were not actually used independently from a plane, they were "capable of being readily converted into the 'free jump' type."⁴⁶ It was a great victory for Russell. Unfortunately, there was an appeal.

The Court of Appeal saw things differently. It reviewed the immediate and outstanding success of the Smith packs since the time of their testing and approval at McCook Field, emphasizing that during the ensuing eleven years, "the government bought over seven thousand, twenty five; foreign governments have bought or ordered eight-thousand five hundred; the sales generally have been twenty thousand, and, until the defendants entered in competition, the plaintiff company had the exclusive trade," with 250 lives being saved by Smith parachutes. Substituting business success for innovation, the court concluded, "We have reached the firm conviction that the Smith patents and the Smith pack made a signal contribution to aeronautics, and the defendant has wrongfully trespassed on Smith's rights."⁴⁷ This was the death knell of the Russell Parachute Company. The appellate court's decision was rendered on February 3, 1931. Russell's company

was still listed in the 1932 San Diego *City Directory*, but was absent from the 1933 directory, having dissolved or at least wound down. It may have continued for another year or two to fulfill other contracts, but its heart and soul were gone, as were its profits.

Hoffman & Russell

Major Edward L. Hoffman, the military head of the Parachute Board at McCook Field, was recognized for his leadership when he was awarded in 1926 the prestigious Collier Trophy "for development of a practical parachute," the trophy being awarded annually "for the greatest achievement in aeronautics or astronautics in America...during the preceding year."⁴⁸ While still in the Army, he was inventive in his own right, designing a parachute that was more maneuverable and could be glided in different directions. His version was in the shape of a triangle, with two rounded corners and one cut-off corner to allow air to be exhausted resulting in controlled horizontal movement of the chute. He patented this idea, and upon leaving the Army he, too, formed a manufacturing enterprise, the Triangle Parachute Company, with operations centered in Cincinnati, Ohio. He obtained in 1930 several other patents, but was careful to provide that the government could use all of them free of charge, since he was on active military duty when the inventions were designed.⁴⁹ The U.S. Army Air Corps bought some of his parachutes, but despite Hoffman's hopes to replace the standard parachute, the Air Corps phased out usage of the Triangle in the late 1930s, primarily due to the cost of manufacture and the difficulty in packing, and the company was forced to close.⁵⁰

After his discharge as a lieutenant colonel from the service in 1937, Hoffman made his way to San Diego County, settling in El Cajon. He and Jimmy Russell resumed their relationship and started to work together, joining by 1938 into a partnership or association called Hoffman & Russell with facilities located at 808 Fourteenth Street in San Diego. Across the hall was a ladies garment factory with available sewing machines, enabling them to continue their long-standing mutual interest in parachutes.⁵¹ They focused on designing parachutes primarily to save entire airplanes, and ground-tested at Lindbergh Field a chute sixty feet in diameter purportedly capable of supporting 24,000 pounds. They had plans for even larger behemoths measuring up to 225 feet across, ten times the diameter of personnel parachutes, and were actively seeking material suppliers to implement their idea, but nothing came of the venture.⁵² They were ahead of their times, as comparable parachutes are used today to drop heavy loads and to recover space capsules and other orbiting heavy objects to return them safely to earth.

Hoffman & Russell worked on other innovations, and in 1941 they jointly applied for a patent for a new design to reduce a parachute's oscillation and rate of descent, especially for large loads. Apparently unable to personally profit from their ideas, they assigned the patent to the Standard Parachute Corporation, where Russell was then working.⁵³

Standard Parachute Corporation

The approaching war brought substantial parachute manufacturing back to San Diego. In May 1940, President Franklin D. Roosevelt, in an address to Congress, called for the production of 50,000 new warplanes and, in September 1940, Congress created the Selective Service System requiring the registration of all males between the ages of 21 and 36 for a possible draft into the armed forces.⁵⁴ War for the United States was on the horizon, and thousands of parachutes would be required. In reaction and anticipation, Jimmy Russell, John Speaks, and others formed the Standard Parachute Corporation and opened for business in December.⁵⁵ They were joined by Col. C.E. Fauntleroy who became president of the company.

Col. C.E. (for Cedric Errol) Fauntleroy would warrant a separate article about his colorful life. Born in Mississippi in 1891, he joined the Lafayette Flying Corps before the United States entered World War I. The members of the corps were part



Standard Parachute Corp., 1940. ©SDHC #9967-1.



Standard Parachute Corp. workers, 1940. ©SDHC #9967-9.

of the Aviation Section of the French army, and consisted of American volunteers that ultimately totaled about 269 pilots, with many of them losing their lives while training, flying, and fighting in the unreliable planes of the day.⁵⁶ With the U.S. entry into the conflict, the pilots were transferred to the Army Air Service where they continued as Army pilots. Fauntleroy was assigned to the famous 94th Hat-in-the-Ring Pursuit Squadron, attaining the rank of major. In 1920, following the war Fauntleroy formed and became commander of a flying unit supporting newly independent Poland in its war with revolutionary Russia. The unit, consisting of twelve to fourteen American pilots, was named the Kościuszko Squadron, in honor of Tadeusz Kościuszko, a Polish patriot who served in the Continental Army of George Washington during the American Revolutionary War.⁵⁷ Fauntleroy was promoted to colonel and was awarded several medals for valor. In early 1921 he briefly returned to the U.S. to recruit pilots.⁵⁸ That war ended the following month with the signing of a treaty that fixed a new border between Poland and Bolshevik Russia, and the mission of the American volunteers terminated in May 1921.

The new parachute company in San Diego was launched in December 1940 and soon moved into 371 Eighth Avenue, the three-story building that was formerly the first factory of Rohr Aircraft Corporation.⁵⁹ Initially, the World War I veteran

pilot John Speaks, another member of the Polish squadron, was designated as the president, but soon his former commander Col. Fauntleroy assumed that position and served in that role for the next two years. The experienced Russell was named vice-president and production manager of the new enterprise.

The business was a great wartime success, starting with thirty employees, ultimately employing hundreds in San Diego, mostly women, while producing over 150,000 parachutes solely for the military.⁶⁰ To meet growing demand, a subsidiary manufacturing plant was established in Manti, Utah (population about 2,500), with its first employees being brought to San Diego for training to then return and train others.⁶¹ The parachutes produced for the Armed Forces were designated as coming from "Stanpar," and several advertisements emphasized that name.⁶² Sadly, unlucky Jimmy Russell did not live to participate in the rewards, having died of a heart attack on September 13, 1941 at the age of 43.⁶³ Unquestionably, he was a true pioneer.⁶⁴ The company closed in September 1945 with the cessation of hostilities, having fulfilled its role admirably.

Pacific Parachute Company

Officers at the Standard Parachute Corporation must have been surprised when Howard "Skippy" Smith asked for a job, not in a menial position, but one of real involvement in the enterprise. Surprised, because Skippy was African-American for whom such non-menial openings at that time were almost nonexistent. But he had unique credentials—he was an accomplished parachutist.

Arriving in Los Angeles from the Deep South in the late 1930s, he became infatuated with parachuting and, with his close friend Mack Gravelle, purchased parachutes and enrolled in a school for novices. Having learned the rudiments, they joined a group of barnstormers, calling themselves "Skip and Skippy." A publicity brochure described their performance as "Courageous delayed chute openings, free falls, breakaway jumps and spot landings are some of the feats which won great acclaim for the two Negro boys." Tragically, the team of Skip and Skippy came to a sudden finale in 1939 when Skip Gravelle was killed when his parachute failed to open. Skippy Smith continued on.

Soon after Standard Parachute Corporation started in business, Skippy was knocking on its door. Despite some misgivings by other employees, he was hired as a drop tester and a packer working in the field with other men. He later became the company's first Black supervisor, being promoted to be assistant inspector, overseeing the production of the hundreds of predominately white women that were employed in the factory manufacturing parachutes. While working there, he also was still involved in the "Hollywood Air Show" which later became

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SKIPPY SMITH
formerly
Hollywood Airshow

Skippy Smith poses with his parachute for Parachute Circus Show, 1941. ©SDHC #94:19228.



Left to right: Skippy Smith with Mayor Harley Knox and boxer Joe Louis, July 1943. Sefton family collection.

known as the "Parachute Circus," presenting, with a number of other performers, jumping demonstrations over the vacant land between Linda Vista and Camp Elliott in the vicinity of what is now Miramar Marine Air Station.

Having augmented his aerial skills with ground-level production knowledge, and recognizing the huge wartime demand for parachutes of all sizes, Smith proposed to Col. Fauntleroy, the president of Standard Parachute, that he become a subcontractor for the manufacture of small chutes. Impressed with his abilities and perseverance, Fauntleroy agreed. But Skippy Smith had no funds to finance his dream. So immediately he went to Los Angeles to see if an acquaintance, African-American actor Eddie "Rochester" Anderson (known to almost everyone as Jack Benny's radio foil), would be interested. He was, and he invested \$3,000 in the enterprise, which was named the Pacific Parachute Company. For his new venture, Smith rented all three floors of the building at 627 Eighth Avenue near Market Street, a couple of blocks north of the Standard Parachute facility, and the 28-year-old was in business.⁶⁵ A week after opening, two formal dedications of the undertaking took place on March 26, 1942, one ceremony being in the afternoon at the plant, attended by white paratroopers, Negro guardsmen, religious and civic leaders, and another was held that evening at the Memorial Junior High School Auditorium in Logan Heights with a similar turnout. Speaking at both events were Col. Fauntleroy, Skippy Smith, and Eddie "Rochester" Anderson, who was met at the Santa Fe station with great fanfare and then led by a police escort to the plant. The business was dedicated to Skippy's close friend and jumping partner, the late Skip Gravelle.

Personnel at the Pacific Parachute Company consisted mainly of women

operating sewing machines, cutting silk and cloth, and performing related tasks. As one of the first, if not the first, African-American war material manufacturer in the nation, Smith was urged by others in the minority community to hire only blacks, but Smith refused, stating in effect that he would not be a party to perpetuating prejudice and discrimination. The result was a diverse workforce of African-Americans, Mexicans, Brazilians, Filipinos, West Indians, and Caucasians, a truly integrated group in an era when such desegregation was rare. His venture has been described as "one of the most ambitious entrepreneurial endeavors by an African-American in San Diego up to that time."⁶⁶ In 1943 he was awarded the National Negro Business League's Spaulding Award for achievement in business at a ceremony held in Baltimore.⁶⁷ That same year "Rochester" was honored with a trophy from the San Diego Merchants and Manufacturing Association for achievements in manufacturing and for the promotion of racial understanding.⁶⁸

Full-sized personnel parachutes were not produced at Pacific Parachute. Instead, manufacturing was concentrated on small parachutes, usually about eighteen to thirty-six inches in diameter, intended for service as pilot chutes to expedite deployment of larger chutes, and others for use with bombs and flares.⁶⁹ An estimated 50,000 such parachutes were produced during its first year of business. By the second year, however, production contracts slowed as the end of the war was on the horizon, and Pacific Parachute Company closed its doors in 1944 and moved its operations to Los Angeles, terminating its unique contribution to San Diego, racial relations, and the war effort.⁷⁰

Smith Parachute Company and Prevost F. Smith Parachute Co.

As with most of the participants in the original McCook Field group, Floyd Smith, its civilian leader and the inventor of the manually operated parachute, maintained a life-long passion for improving that life-saving device, repeatedly patenting new ideas while working with a variety of companies, both nationwide and in San Diego. He has been described as "Mr. Parachute," and as "the father of the parachute industry," having "designed more parachutes, for more companies, than any other human being."⁷¹



Floyd Smith street sign. Photo by the author.

Floyd started by forming the Floyd Smith Aerial Equipment Company initially to manufacture parachutes in Chicago. It soon

became the vehicle for bringing lawsuits to protect his patents, as previously described. Although he assigned his first ripcord patent to the Irving Air Chute Company after one such litigation, he seldom was absent from the burgeoning new industry. In the mid and late-1920s, he was involved with the newly formed Switlik Parachute Company in Trenton, New Jersey, where he developed new ideas and tested parachutes. He created a better ripcord and he patented a superior packing method which were relied upon to make that company become one of the largest parachute manufacturers in the nation, promoting the "Floyd Smith Safety Pack."⁷² Perhaps his most creative invention was an ejection seat for airline passengers, with the passengers being ejected in their seats through the bottom of the fuselage on activation of the mechanism by the pilot and then, supposedly, gently floating to earth in attached parachutes. He not-so-modestly described the "Floyd Smith Safety Seat" as "the greatest of all life-saving devices." The novel idea was successfully tested in 1929 but for some reason it never caught on.⁷³ For a time, he also renewed his association with Jimmy Russell and became involved with San Diego's Russell Parachute Company, probably in an advisory capacity.

Joining with the Cheney Silk Mills in Manchester, CT, Floyd Smith was one of the founders of the Pioneer Parachute Company in 1938, where he became vice president and chief engineer. Smith was later described as having "made more contributions to parachute engineering and design than any other man in history."⁷⁴ He continued to obtain new patents for improved packing methods, pilot chutes, and stiffeners for more comfortable packs, plus a novel tower for low-cost testing.⁷⁵ Pioneer produced thousands of chutes during World War II and continues in existence today.⁷⁶

Prevost Smith, his son, joined Pioneer as an engineer in 1942, working on a variety of innovative projects. In 1947, after the end of the war, Floyd Smith and his son left Pioneer and went into business for themselves, founding the Smith Parachute Company. They located their operations at Gillespie Field in San Diego County. Gillespie Field had been established by the U.S. Government in World War II as a training base for Marine paratroopers, a new concept for that arm of the military. Some 3,000 marines were graduated after training at that field from 1942 to 1943, with over 20,000 jumps being made without a fatality, but the idea of parachuting marines was abandoned as being impractical. No marines ever jumped in combat, and the trained chutists were relegated to ground units. The property was turned over to the County of San Diego in 1947. Besides establishing a general aviation airport, the county sought industrial development, and the Smiths were one of the early tenants.⁷⁷

Floyd Smith died in San Diego in 1956, after which the name of his company was changed to the Prevost F. Smith Parachute Company. It continued under the

direction of his son.⁷⁸ Nearly five years later in 1961, the Board of Supervisors, in his honor, renamed a street on the south side of Gillespie Field as "Floyd Smith Drive," where his name joined other local aviation pioneers with similar honors at that airport.⁷⁹

Prevost Smith was a visionary, too, with a bachelor's degree in aeronautical engineering. He followed in his father's footsteps and, some would say, went far beyond. While at Pioneer Parachute Company, he designed a new canopy, subsequently concentrating on large canopies, deceleration chutes for planes, and the use of clusters of parachutes.⁸⁰ He was lauded at the time of his death by admiring associates as "the world's foremost parachute designer." He is credited with creating the first parachute testing whirl tower, which was later installed and used for years by the Joint Parachute Testing Center at the Naval Air Facility in El Centro.⁸¹ Among his other achievements, Prevost Smith determined a method for using fine calico material, instead of silk, for the manufacture of parachutes; he also designed and manufactured chutes in a multitude of sizes for astronauts, drone aircraft, and for dropping military weapons and equipment, while fulfilling contracts with NASA, the Navy, the Air Force, Teledyne Ryan, and many other large defense contractors. He passed away in 1991, ending, at least until the present, San Diego's important but varied history with parachute manufacturing.⁸²

Conclusion

Since the demonstration over North Island by Charles Broadwick in 1914, parachute development over the ensuing hundred years has continued unabated, with more innovations and new patents galore. Originally, the billowing umbrellas were variously described by their creators as "life packs," "aviatory life buoys," "aeroplane life belts," "life vests," "aerial life preservers," "Guardian Angels," "air chutes," and even "lifeboats of the air" for those intended to save an entire airplane. Today they are often referred to as "decelerators" and they come in a vast myriad of shapes and sizes, fulfilling a great variety of purposes, from their original goal of rescuing imperiled aviators to deploying paratroopers, delivering heavy military equipment and cargo, supplying emergency relief to ravaged areas, stopping high-speed jets during landings, recovering drone aircraft and spacecraft, and even facilitating the sports of skydiving and paragliding. Well over fifty companies in the United States have been involved over time in their development and manufacture, and there have been many others worldwide. San Diegans have been an integral part of that story—Floyd Smith, Jimmy Russell, H. R. McClintock, E. L. Hoffman, C. E. Fauntleroy, Skippy Smith, Prevost Smith—all visionaries and truly entitled to be honored and remembered as modern "pioneers."

NOTES

1. Estimates of the date of the original sketch vary from 1483 to 1500.
2. Domenico Laurenza, *Leonardo on Flight* (Baltimore: The John Hopkins University Press, 2004), 58-59; BBC News, "Da Vinci's parachute flies," June 27, 2000, <http://news.bbc.co.uk/2/hi/science/nature/808246.stm> (accessed November 13, 2013); for a YouTube film of the event see: <http://www.youtube.com/watch?v=XQmiT1R53Cw> (accessed November 13, 2013).
3. See Natural & Human History Timeline, "Parachute Designed and Invented," http://www.historylines.net/history/15th_cent/parachutes.html (accessed December 11, 2013); J.V. Mumma, *Parachutes* (San Diego: The Campbell Company, 1930), 9; Herbert S. Zim, *Parachutes*, (New York: Harcourt, Brace and Company, 1942), 6.
4. For early history, see Dan Poynter, *The Parachute Manual: A Treatise on Aerodynamic Decelerators* 3d ed. (Santa Barbara: Para Publishers, 1984), 157-60.
5. "Parachute Leap Off Statue of Liberty," *The New York Times*, February 3, 1912. For details, see the magazine *Parachutist*, "Leap Year 1912," February 2012, online at: <http://parachutistonline.com/category/tags/february-2012> (accessed February 2, 2014). The jumper turned out to be Rodman Law, who later made leaps from the 37-story Bankers Trust Building and the Williamsburg Bridge in New York, and subsequently worked at Wilbur Wright Field in Dayton, Ohio, on parachute development. Peter Hearn, *Sky High Irvin*, (London: Robert Hale Limited, 1983), 67.
6. "Daring Jumper Floats Like Feather from Air Ship to Solid Ground," *San Diego Union*, February 24, 1914, 11; "Proves Utility of Aeroplane Life Belt," *San Diego Evening Tribune*, February 23, 1914, 10; "Dives from Aeroplane High in Air; Lands Safe," *San Diego Sun*, February 23, 1914, 5.
7. "Queen of Clouds Will Make Drop," *San Diego Union*, July 26, 1914, 3; "Air Queen Drops Four Thousand Feet to Wharf," *San Diego Union*, July 27, 1914, 3.
8. Capt. Albert Berry is generally thought to have been the first man to successfully jump from a plane in March 1912, the parachute being stored in a metal cylinder attached to the underside of the plane's fuselage or the skid of a three-wheeled pusher biplane. Mumma, *Parachutes*, 14. See also *Parachutist*, "Leap Year 1912."
9. "Girl Drops a Thousand Feet Out of the Sky; Alights Unhurt," *The Los Angeles Times*, January 10, 1914.
10. "Scriven Sees Unique Test; Demonstration of Life Preserver Given at North Island For Aviation Chief," *San Diego Evening Tribune*, March 8, 1915, 8; "Girl Leaps From Aeroplane; Tests Life Preserver," *San Diego Sun*, March 9, 1915, 3; "1400-Foot Drop From Aeroplane Taken by Girl," *San Diego Union*, March 9, 1915, 5.
11. "Parachute Seen As Aviation Aid," *San Diego Union*, April 16, 1915, 5. See also Elizabeth Whitley Roberson, *Tiny Broadwick: The First Lady of Parachuting*, (Gretna: Pelican Publishing Company, 2001), 65-67; Eretta Sudsbury, *Jackrabbits to Jets*, (San Diego: Neyenesch Printers, Inc. 1967), 28-29; Mary L. Scott, *Air Capital of the West*, 2d ed. (Virginia Beach: The Donning Company Publishers, 2005), 24; Katrina Pescador and Alan Renga, San Diego Air and Space Museum, *Aviation in San Diego*, (Arcadia Publishing, 2007), 50. Tiny continued to enthrall San Diegans by jumping from an airplane on July 4 and 5, 1915, at the Panama-California Exposition in Balboa Park. Attendance for the 3 days of the Independence Day festivities exceeded 61,000. She returned in September for more jumps before exposition crowds. See Richard W. Amero, *Balboa Park and the 1915 Exposition*, (Charleston, SC: The History Press, 2013), 89-90, 97.
12. For a description of her leap, see last paragraph of "Inventor Will Overturn Airship To Prove That Parachute Is Efficient," *San Diego Union*, March 16, 1915, 2.
13. Mumma, *Parachutes*, 15. One estimate gave the number of saved balloonists as high as 800 to 900. David Gold, "Early Development of the Manually Operated Personnel Parachute, 1900-1919," AIAA Paper No. 68-964 (New York: American Institute of Aeronautics and Astronautics, 1968), 6. My thanks to the staff at the Wright State University Library in Dayton, Ohio, which

maintains the Dave Gold Parachute Collection; they willingly supplied me with copies of many of his writings.

14. John Lucas, *The Big Umbrella* (New York, London: Drake Publishers, Inc., 1973), 72.
15. Capt. Edward V. Rickenbacker, *Fighting the Flying Circus* (New York: Frederick A. Stokes Company, 1919), 228, 317; Mumma, *Parachutes*, 17.
16. Gold, "Early Development of the Manually Operated Personnel Parachute, 1900-1919," 10; Hearn, *Sky High Irvin*, 64, 66.
17. See interview of Hilder Smith: "Woman Recalls Homemade Plane," *San Diego Union*, June 10, 1962, A18; Waldo Waterman, "The Early Birds of Aviation Newsletter," December 18, 1962, reproduced at <http://earlyaviators.com> (accessed December 2, 2013).
18. Floyd Smith, "The Floyd Smith Aerial Life Pack," *Aviation* (February 15, 1920).
19. Patent No. 1,340,423, application July 27, 1918, issued May 18, 1920.
20. Gold, "Early Development of the Manually Operated Personnel Parachute, 1900-1919," 12; Zim, *Parachutes*, 29-30.
21. Hearn, *Sky High Irvin*, ch. 5; Gold, "Early Development of the Manually Operated Personnel Parachute, 1900-1919," 11-13, identifying his moniker as "Ski-Hi"; a 1925 photo of his plane also describes him as "Ski-Hi Irvin." Hearn, *Sky High Irvin*, 65. The clerical error resulting in the addition of the "g" to Irvin was not corrected until 1970 when the company became part of Irvin Industries Incorporated. Today it is called Irvin Aerospace, and is part of Airborne Systems. See <http://www.answers.com/topic/airborne-systems-group> (accessed November 14, 2013).
22. Mumma, *Parachutes*, 17-19; Lucas, *The Big Umbrella*, 73-78.
23. *Floyd Smith Aerial Equipment Co. v. Irving Air Chute Co.*, 276 Fed. 834 (WDNY, 1921).
24. Hearn, *Sky High Irvin*, 93.
25. There were others, especially Solomon Lee Van Meter, Jr., who had patents and lawsuits to support his claim to have developed the concept earlier with his Patent No. 1,192,479, issued July 25, 1916. See *Van Meter v. Irving Air Chute Co.*, 27 F.2d 170 (WDNY, 1928); *Van Meter v. United States*, 47 F.2d 192 (2d Cir., 1931). He prevailed in both cases. See also Aviation Museum of Kentucky Hall of Fame, <http://www.aviationky.org/halloffame.asp> (accessed December 3, 2013).
26. Zim, *Parachutes*, 38-39; Mumma, *Parachutes*, 18; Lucas, *The Big Umbrella*, 80.
27. Mumma, *Parachutes*, 20.
28. Charles Lindbergh relied on a parachute four times before his flight to Paris. His first was during his student training, the second during a test flight, and the third and fourth while flying the U.S. Mail, all in a period of two-and-one-half years. Lucas, *The Big Umbrella*, 88-90. Irwin, with some 300 or more jumps, never qualified for membership, as none was for emergency purposes.
29. For an earlier biography of McClintock, see, *City of San Diego and San Diego County* (Chicago and New York: The American Historical Society, 1922), II:385-86.
30. The McClintock Storage Warehouse, at 1202 Kettner Blvd., later became familiar to San Diegans for many decades as the Bekins Storage building, with its large sign on its roof, after it was sold to Bekins at the end of 1930. It housed the popular Rainwater's Restaurant from 1985 to 2009 among other businesses, and has recently been refurbished. In 1980 it was added to the National Register of Historic Places. See U.S. Department of Interior, "National Register of Historic Places Inventory—Nomination Form," attached to City of San Diego Historic Site Register (1980), as a designated San Diego Historic Landmark. See http://en.wikipedia.org/wiki/National_Register_of_Historic_Places_listings_in_San_Diego_County,_California, and http://en.wikipedia.org/wiki/List_of_San_Diego_Historic_Landmarks (both accessed December 2, 2013).

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31. "Parachute Co. Locates Here," *San Diego Union*, December 2, 1925, 26.
32. Lucas, *The Big Umbrella*, 84-85.
33. H.R. McClintock is named as the inventor in the patent application, dated January 5, 1926, and he is described as having assigned his rights to the Russell Parachute Company. It is unclear whether Russell himself collaborated on the project, but it must be assumed he was the guiding force and probable designer. The final patent (No. 1,712,307) was issued May 7, 1929.
34. Patent No. 1,775,409; application June 22, 1928; issued September 9, 1930, and assigned to the Russell Parachute Company.
35. "Parachute for Plane Lands Craft Safely," *The New York Times*, September 3, 1930; "Plane 'Chute,'" *Time* (magazine), September 15, 1930.
36. Richard Crawford, "Pioneer parachute maker dropped in at right time," *San Diego Union-Tribune*, April 19, 2008, 3, reproduced by the author on his San Diego Yesterday website with the title, "The Pioneer of Parachutes," at <http://www.sandiegoyesterday.com/wp-content/uploads/2011/02/Parachutes.pdf> (accessed December 9, 2013).
37. Poynter, *The Parachute Manual*, 224-26.
38. Patent No. 1,621,766; application February 17, 1926; granted June 7, 1927.
39. Poynter, *The Parachute Manual*, 225.
40. See ads in *Western Flying* (magazine), June 1929, 95; *Aero Digest* (magazine), March 1930, 157.
41. Gerald A. Sheperd, "When the Lone Eagle Returned to San Diego," *The Journal of San Diego History*, 40, nos. 1-2 (Winter 1994), 30.
42. Scott, *Air Capital of the West*, 81.
43. *Ibid.*, 68.
44. "An Interesting New Parachute: The Russell 'Lobe' Type," *Flight* (British magazine), May 17, 1928, 369-70, 373, <http://www.flightglobal.com/pdfarchive/view/1928/1928%20-%200406.html> (accessed December 22, 2013).
45. Testimony of George Waite, Transcript of the Record, 72-73, in *Irving Air Chute Co., v. Russell Parachute Co.*, 47 F.2d 139 (3d Cir. 1931).
46. *Irving Air Chute Co., v. Russell Parachute Co.*, 41 F.2d 387 (D.Del. 1930), 389.
47. *Irving Air Chute Co., v. Russell Parachute Co.*, 47 F.2d 139 (3d Cir. 1931), 132, 134.
48. See National Aeronautics Association, Collier Trophy 1920-1929 Winners, at <http://naa.aero/html/awards/index.cfm?cmsid=62> (accessed February 3, 2014).
49. Patent Nos. 1,757,247, 1,774,513, 1,780,190, all issued in 1930. He was granted additional patents in 1932 and 1933, one for a parachute harness (No. 1,909,176) another to make it easier for crew members to quickly attach a parachute to a harness (No. 2,051,044), another to improve ripcord assembly (No. 2,042,066), and in 1936 for a parachute to lower an airliner's cabin safely to the ground with its passengers inside (No. 2,050,324).
50. David Gold, "A Look at the Hoffman Triangle Parachute—First Successful Glidable Parachute," paper presented at the 1980 SAFE Symposium, San Diego, CA; Poynter, *The Parachute Manual*, 235, 252.
51. Interview with Robert L. Fronius, San Diego Historical Society Oral History Program, June 29, 1991, 23. Fronius was the operator of the San Diego Parachute Company, which repaired, packed and sold parachutes, but did not manufacture them.
52. "New Parachute Tested at S.D. Airport," *San Diego Union*, August 12, 1938; "Parachute To Lower Planes?—It's Here," *San Diego Sun*, August 14, 1938, 24.
53. Patent No. 2,282,407, issued May 12, 1942.

54. For the text of President Roosevelt's address to Congress, see <http://www.presidency.ucsb.edu/ws/?pid=15954> (accessed November 16, 2013); the Selective Service System was a creature of the Selective Training and Service Act of 1940 signed September 16, 1940 (Chap. 720, 54 Stat. 885).
55. "Parachute Manufacturing Plant Opens Here; Only Five in Nation," *San Diego Union*, December 8, 1940, 3A.
56. Dennis Gordon, *The Lafayette Flying Corps* (Atglen, PA: Schiffer Publishing Ltd., 2000).
57. This led to paraphrasing the World War I declaration, sometimes misattributed to General Pershing, of "Lafayette We Are Here," with "Kościuszko We Are Here." Janusz Cisek, *Kościuszko We Are Here: American Pilots of the Kościuszko Squadron in Defense of Poland, 1919-1921* (Jefferson, NC: McFarland & Company, Inc., 2002), 200-01.
58. "Flier Upholds Stand Taken by Poles," *The Daily Princetonian*, February 4, 1921, 1.
59. Scott, *Air Capital of the West*, 111. The building is still there, beyond left field of Petco Park and adjacent to the Park at the Park. It now houses a restaurant and several other businesses, but its address has changed to 815 J Street due to the closing of Eighth Avenue for easy access to the park. It is called The Schieffer and Sons Building, named after the original owners.
60. Crawford, "Pioneer parachute maker dropped in at right time," 3.
61. Amanda Sue Midgley Borneman, "Proud to Send Parachutes Off": 'Central Utah's Rosies During World War II,'" thesis submitted to Brigham Young University (2006); Margaret LuRae Munch Greenwood, "My Work in the Manti Parachute Plant," at http://www.orem.org/PDF/Vet/Greenwood_Margaret-LuRae.pdf (accessed November 22, 2013).
62. "Round Trip Ticket," *Flying* (March 1944), 107; "Mission to Jump and Occupy," *Flying* (May 1944), 18.
63. "S.D. Parachute Company Head Dies in Nevada," *San Diego Union*, September 15, 1941, 4; "James M. Russell, Parachute Expert, Pioneer in the Field, Headed Coast Company," *The New York Times*, September 15, 1941.
64. Crawford, "Pioneer parachute maker dropped in at right time;" Crawford, "The Pioneer of Parachutes."
65. The building was described as representing "one of the highlights of African American entrepreneurship in San Diego and California." Mooney & Associates, "Centre City Development Corporation Downtown African-American Heritage Study," December 2004, V-27; see, also, pp. II-27-II-28, V-27-V-31 for a history of Smith and his company. <http://www.sandiego.gov/planning/programs/historical/pdf/surveydocs/africanamericanheritagestudy.pdf> (accessed January 24, 2014). The building still stands and, as recently as 2013, housed an art show. It now appears to be vacant.
66. Gail Madyun, "'In the Midst of Things,' Rebecca Craft and the Woman's Civic League," *The Journal of San Diego History* 34, no. 1 (Winter 1988), 35.
67. "Parachute Co. Wins Negro Business League Award," *Los Angeles Tribune*, August 23, 1943, 1.
68. Elizabeth McLeod, "Rochester Goes to War: Eddie Anderson and the Pacific Parachute Company," http://radiospirits.com/email/eddie_anderson_090412.asp?pcode=N09NC001 (accessed November 13, 2013).
69. See Poynter, *The Parachute Manual*, 338-49, for a review of various pilot chutes.
70. For a contemporaneous history of the start-up, with photographs of Smith and his company, see Harold Keen, "Rochester, Skippy Smith and Co.," *Survey Graphics* 31 (September 1942), 379, available online at <https://archive.org/stream/surveygraphic31survrch#page/378/mode/2up/search/Rochester> (accessed December 5, 2013). See also "Pacific Parachute Company," *The San Diego Informer*, March 27, 1942, 4. For a later history of Smith, see Steve Schmidt, "'Skippy' Smith made a difference," *San Diego Union*, February 25, 1996, A1.

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71. Dan Poyntner, President of the Parachute Industry Association, "J. Floyd Smith, Parachuting Pioneer, Biography," (2009), <http://www.slideshare.net/DanPoynter/floyd-smith-parachuting-pioneer-biography> (accessed January 29, 2014).
72. For a history of the Switlik company see Poynter, *The Parachute Manual*, 231; Jon Blackwell, "1925: The chute that saved 5,000 lives," *The Trentonian*, <http://www.capitalcentury.com/1925.html/>; "Switlik, Stanley, (Dec. 4, 1890–Mar. 4, 1981) Manufacturer," at http://www.poles.org/db/s_names/Switlik_S.html (both accessed December 3, 2013).
73. Floyd Smith, *Coming Down* (Trenton, NJ: Switlik Manufacturing Co., c. 1930), 10-16; David Gold, *The Parachute in Perspective: Looking Backward to 1931, Circa A.I.A.A. Origin* (Paper presented at AIAA 7th Aerodynamic Decelerator and Balloon Technology Conference, San Diego, CA, October 21-23, 1981, 3-4).
74. Poynter, *The Parachute Manual*, 213.
75. Ibid. Waldo Waterman, "The Early Birds of Aviation Newsletter," December 18, 1962, reproduced at <http://earlyaviators.com> (accessed December 2, 2013); "Chute Inventor Honored," *San Diego Union*, December 4, 1962, 18.
76. It is now called Pioneer Aerospace and is a subsidiary of the international conglomerate Zodiac Aerospace.
77. M.L. Shettle, Jr., "Marine Corps Auxiliary Air Facility, Gillespie," The California State Military Museum, at <http://militarymuseum.org/MCAAFGillespie.html> (accessed November 23, 2013); "Plane News," The Official Newsletter of County of San Diego Airports, Summer 2009, 1.
78. "J.F. Smith, Parachute Inventor Dies," *San Diego Union*, April 20, 1956, A4. He is buried with his wife at the Portal of Folded Wings Shrine to Aviation at Valhalla Memorial Park in Los Angeles County.
79. "Airport Street Is Named After Parachute Pioneer," *San Diego Union*, February 20, 1961, 14.
80. Poynter, *The Parachute Manual*, 213.
81. The whirl tower at El Centro was 120 feet high, with a 56-foot boom, which spun a 114-foot cable to which was attached a missile-like container containing a dummy and a parachute. The dummy carried sensors and strain gauges to evaluate the parachute when released at various speeds. See, Poynter, *The Parachute Manual*, 295; *Joint Parachute Test Facility*, DOD Catalogue No. 407068, Rev. May 1963, 14, at <http://www.dtic.mil/dtic/tr/fulltext/u2/407068.pdf> (assessed December 21, 2013); *Naval Aviation News*, February 1960, 6, at <http://www.history.navy.mil/nan/backissues/1960s/1960/feb60.pdf>; and M. L. Shettle, Jr., "Naval Air Facility, El Centro" The California State Military Museum, at <http://www.militarymuseum.org/MCASElCentro.html> (both accessed December 9, 2013).
82. "Prevost F. Smith, 77, parachute innovator, designer and maker," *San Diego Union*, June 22, 1991, A28.