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SAM CODY'S FLYING CATHEDRALS

English pride suffered a severe jolt in May of 1908 when the honor of building and flying the first plane in Great Britain fell to an American.

The man responsible for this humiliation was Colonel Samuel F. Cody, ex-Indian fighter, buffalo hunter, crack shot, cow puncher and Wild West Show producer, and namesake of the famous "Buffalo Bill" Cody. On the morning of May fifth he had piloted his clumsy flying machine (which the skeptics had tabbed too heavy to fly) across the balloon field at Farnborough in a butterfly-like flutter at an altitude conservatively estimated at six inches.

If Cody was nervous that morning, he certainly hadn't shown a trace of it as he sat in the pilot's seat attached to the trailing edge of the lower wing. He fiddled with the switch and gasoline pump control while his machinist, Peters, prepared to start the 50 horsepower Antoinette. This handsome piece of machinery rested on its beds in front of the pilot's seat, its flywheel projecting over the leading edge. Its rear end was connected by roller chains to two huge propellers whose tips spun but inches from Cody's knees. The wings stretched 25 feet on either side of him, and behind and in front hung the elevators and rudders, precariously attached to long bamboo outriggers.

Peters approached the engine by crawling under and between the outriggers. He grasped the bicycle-like flywheel, and turned the engine over a half dozen times allowing the injection system to pump gas into the cylinders. The two geared-down propellers revolved slowly in opposite directions as the engine rotated.

He then gave it a mighty swing. The little V-8 fired on one and then two cylinders before settling down to a steady beat, blue smoke pouring from the eight upward-pointed exhaust stacks as the oil in the cylinders burned off. The big paddle props turned jerkily as the engine warmed, their drive chains clanking as they tensed and slackened from the uneven pulsation. When it had settled down, Cody gave the signal for a push from his helpers, turned the gas full on, and the big flight was under way.

Some of the doubting Thomases on the field that morning believed Cody had failed to fly, just as they had predicted. But they quickly admitted their error when shown an unmistakable gap in the wheel tracks in the heavy dew.

Cody had flown all of 50 feet, and just to prove it had been no freak, he made four more hops the same day, stretching the distance to 150 feet and the altitude to 10.

Up to that point in his adventurous life, Cody's entire aeronautical experience had been limited to a few startling flights in man-made kites. He had done a smattering of gliding, and made a hop or two in a dirigible, but he knew no more about powered airplanes than a new born babe.

Cody was a huge man, hard and rugged from his Wild West years. He had enormous vitality and unlimited enthusiasm for building aerial contraptions. His hands, capable of doing the most delicate sort of work on his planes, could tie knots in eight gauge steel wire--a task most men could do only with pliers. He invariably wore a dark business suit complete with vest, a high wing collar and four-in-hand tie, and on this particular occasion, a white linen duster and a floppy motorist's cap its visor pointing backward. An elegant Van Dyke beard and a waxed mustache, the points of which projected past his cheek bones, completed the picture of the dashing Victorian motorist turned aeronaut. At this point, Cody was forty-six --- old for a man to take up flying, then or now.

For the next few months following the great triumph at Farnborough, Cody experimented with the ship, suffering his full share of smashups. The public and press ridiculed him unmercifully the entire time, seemingly because they disliked the idea of an American doing England's aviation--in spite of the fact he had become a British subject. He was labeled a bluffer and an American showman, and his pathetic machine on which he spent every cent he could scrape together and so much effort, was insultingly called an agricultural implement, a mowing machine and a grasshopper.

But the fact remained that Cody had accomplished miracles. Four or five aeronautical pioneers in America and France had turned in somewhat better performances, but Cody had worked single handedly and without benefit of anyone's experience. He experimented quietly, inventing, improvising, working on a shoestring. Britain was not so far behind as some of its critics liked to think.

On the eve of the British Military Trials, 1912, Cody appeared in one of his massive biplanes over the hangars at Salisbury Plain, his six cylinder Austro-Daimler snarling contentedly. A large crowd of contestants, gathered here to compete in this, the most important test of aeronautical skill that had ever been staged, paused to watch as the big machine carrying the Colonel and a passenger thundered by at better than 70 miles per hour--the only plane at the meet to arrive on the wing.

The ship was his 1911 model, hastily yanked out of mothballs to replace a special one Cody had built for the event--and crashed two weeks before. Powered by the wrecked plane's engine, and stressed to absorb its great thrust, it had arrived to compete with the world's finest aircraft and pilots--30 all told.

At the end of the month-long contest, the War Office published the results:

(a) Prizes open to the world for aeroplanes made in any country: First prize to Cody.

(b) Prizes open to British Subjects for aeroplanes manufactured wholly in the United Kingdom except for engines: First to Cody.

With this magnificent triumph, Cody became Britain's hero of the hour, and any doubts held about the performance and ability of his planes vanished forever.

The winning plane differed little basically from its two predecessors. All were ungainly looking biplanes, characterized by excessive wing gap, fore and aft outriggers, drooped wings and a general appearance of dishevelment and confusion. They were immensely big affairs, their wings interlaced with a network of wires and struts, their span averaging 46 feet, their weight well over a ton apiece. Because of the katahedral angle (opposite to dihedral) of their wings, the planes were universally referred to as "Cathedrals".

Viewed as a whole, the typical Cody machine, such as the 1910 model here-with pictured, appeared clumsy and ugly. But a closeup inspection revealed the high degree of thought, skill and workmanship that went into making it the remarkable performer it was. Construction occupied hundreds of hours during the winter of 1909 and early spring of 1910. The loving care Cody and his assistants lavished on it reflected itself in the highly polished silver spruce struts, the plated fittings and the drum-tight fabric, painstakingly tailored by Mrs. Cody.

He overlooked no details, and in this massive contrivance they flourished. There were dozens upon dozens of specially fabricated and cast ferrules, tangs, forks, and sockets. There were special screw eyes, ball joints, turnbuckles, straps--no two alike, all designed to fit a specific place, and built to withstand the tremendous loads imposed upon them in flight. All were designed by "by guess and by God", for rule books and manuals did not exist. Wherever strut joined strut or spar, wherever rib touched beams, wherever bamboo outriggers and control rods were joined, special metal fittings were provided, each requiring individual machining. Each piece of bamboo, specially selected for straightness and soundness was wrapped between joints with linen thread, then carefully varnished for lasting protection. Guy wires, where they passed through eye bolts were threaded through short pieces of copper tube to protect them from chafing. And so it went.

The machine met its fair share of criticism by others in the aeronautical profession who saw in it the effort of a rank amateur and an unprogressive one at that. Certainly the design appeared more and more antiquated as time went on, but Cody was no longer young (he had reached 51 when he won the Army Trials) and if he lagged behind some of the more advanced and daring designers of the day, it is understandable, for he was then an old man carrying on in a very young man's profession.

Laffan's Plain near London, where Cody carried on much of his early experimental work was described by one 1910 reporter as being "a cross between a deer forest and a seaside golf links, full of two foot stumps hidden in high grass, the entire place located in a valley fraught with endless wind eddies". He marvelled how the Cody machine could take the punishment of flying out of an infernal location of this nature, adding "To obtain a machine that will and does stand a series of hard knocks any one of which would smash practically any other aeroplane to pieces, Cody has relied upon his own genius for picking out the best of materials and upon superlative workmanship, and we must confess that we have never before seen such a splendid piece of construction". Obviously, to fly out of a place of this sort, Cody needed an exceptionally rugged machine.

In a way, the construction of the machine centered around its landing gear, and the landing gear centered around a pair of hickory keels that acted as the backbone of the entire structure. The gear itself, consisting of a fixed axle and a pair of spring loaded telescoping tubes attached to the two keels, was very strong and capable of absorbing normal bumps and grinds. But for the really rough ones, Cody equipped his plane with a wooden skid running fore and aft under the axle. This piece of laminated hickory functioned solely as a preventer--something for the machine to slide upon should the wheels be shoved high up against their springs. A pair of small wheels on its forward end kept it from tripping on takeoffs and landings. In the rear, the skid gently faired into a kangaroo-like tail piece which projected down and back from the keels to form the plane's tail skid. In confining the landing gear to the narrow area between keels, Cody sacrificed the wide tread so necessary for easy ground handling, forcing him to add a pair of wheels on the wingtips to protect them from dragging along the ground.

Nowhere in the design of the entire plane did Cody's originality and inventive genius show itself more strikingly than in the control mechanism. And nowhere in the world did another plane exist with anything quite like it.

A single steering wheel column, roughly five feet long, mounted directly in front of the pilot, operated all of the machine's control surfaces: (1) a single rudder aft, (2) a pair of spring-loaded balancing planes hinged between the wings at their tips and (3) a massive, divided elevator mounted far out in front on bamboo outriggers, so hinged that the halves could be moved simultaneously in standard fashion, or in opposite directions like ailerons.

The column was attached to a rocking shaft set at right angles to it at a point a foot or so from the bottom of the column by means of a heavy metal trunnion. The trunnion allowed a fore and aft motion of the column, and the rocking shaft, riding in metal bearings, permitted the column to rotate laterally.

The steering wheel turned the rudder, speed-boat fashion by means of

cables wound around a drum on the column. The column, moved sideways, operated the balancing planes through cables connected to a lever on the end of the rocking shaft, and because the rudder cables ran through sheaves on this lever as well, the lateral movement of the column also worked the rudder, thereby effectively synchronizing the two.

The forward elevators, directly joined to the base of the column by stout bamboo poles, were pushed up and down by a simple forward and backward motion of the column. Any lateral movement, however, divided the elevators, forcing them into opposite attitudes. The aileron effect resulting from this twisting of the surfaces produced instantaneous results, providing the machine with a high degree of maneuverability.

Thus were all the plane's control surfaces combined into the movements of a single lever, theoretically, at least, a simple and foolproof system. Remarkably enough Cody could give dual instruction on this machine from the back seat by simply reaching over his student's shoulders to the knob extension on the steering column.

The balancing planes resembled modern day ailerons only generally, for they moved quite independently of each other, and in one direction only--downward. They served mainly to keep the plane in level flight although aiding in turns by lifting the high wing into the bank. Being spring loaded, they automatically returned to level position when the column was centered, and in a bank the wire leading to the low side lay slack and dangling along the wing.

The French-built ENV 8 cylinder water cooled engine used by Cody on this plane developed 60 hp at 1100 rpms, and 80 hp at 1500 rpms. It weighed 287 pounds and drove an enormous propeller, 10'2" in diameter at 550 to 775 rpms through a 2:1 chain drive.

It was a particularly dangerous rig for a man to start because of the height of the propeller above the ground and the presence of the toe skid and outrigger pole immediately underfoot. The double pull inflicted by the 2:1 ratio added to the woes of the propeller swinger whose one avenue of escape from backfires and kickbacks was through a set of bracing wires and rudder cables on either side.

Starting procedure involved turning on the gas cock located under the pilot's seat, priming the cylinders with gas or ether through the petcocks in the cylinder heads (if the engine chanced to be cold) then pulling the propeller through a few times before turning on the ignition. Engines of the era were not famous for their quick starting, and it is to be supposed that this ENV required considerable coaxing before bursting into life.

Cody's instruments and controls consisted of a tachometer mounted on a strut beside him, an ignition switch on another strut, and a foot throttle. A

rear vision mirror on the opposite strut allowed him to inspect the machinery department behind him without the necessity of turning around. And far out ahead of him mounted on the toeskid as far from metal as possible, reposed a large spherical compass which is reported to have spun uncontrollably during every flight.

Directly in front of him, more or less blocking his vision, but providing him with a measure of heat on cold days hung the radiator. The water from the engine travelled far in the process of being cooled, rising seven feet directly up to an expansion tank on top of the wing, thence thru the radiator 14 feet away and back to the engine. Cody's method of piping this water through hose-connected sections of metal tube is the only example of poor workmanship in the entire machine.

Takeoffs in the Cody were fairly conventional: control column forward enough to raise the weight off the kangaroo tail but not far enough to engage the toe wheels; sit back and let it fly itself off. Once airborne, the movement of the column differed little from present day aircraft except for the amount of effort required to move it. Like other machines of the era, counterbalances, trim tabs, adjustable stabilizers, did not exist. Pilots of planes like this had to remain constantly on their toes, for to relax even a second could invite a stall or a dive. This was especially true in plane's like Cody's with a highly sensitive control surface far out ahead of the center of gravity and lift. A sudden forward motion of the column could dig these big flaps into the air hurtling the plane's unthethered occupants into space in the twinkling of an eye.

Landing the Cody was something else again, requiring far more skill than conventional planes of the day. For it was necessary and desirable to get it on its main gear first, the method used in present day tricycle gear planes, bringing it in at precisely the correct speed to ease it on to this particular point. It was wholly possible for it to hit first on its toe wheels, but these contained no shock absorbing device and might break off. And it was equally possible to land it on its kangaroo tail. But either procedure could result in a general slewing around in one direction or another. It was better to hit on the two well-sprung main wheels, thence back to the tail which would quickly drag it to a halt.

Cody had designed this plane for a hundred and twenty horsepower, but such a powerful aircraft engine did not exist in 1910 and he was forced to settle for half that amount. Although decidedly underpowered the big machine with an overall weight of 2700 pounds flew extensively that year winding it up triumphantly by winning the British Michelin Trophy for the longest flight of the year. Flying for 4 hours and 47 minutes Cody covered 186 miles at an average speed of 39 mph to beat out his nearest competitor by 9 miles.

Abandoned temporarily in 1911 while Cody built other planes, it flew

again in 1912. Out of pure curiosity to see what it might have done two years previously with all the power he had designed it for, Cody mounted the 120 horsepower Austro-Daimler in it, and promptly took off with four passengers, flying them at 70 miles per hour around the neighboring countryside. Had this power been available in 1910, he would have broken the passenger carrying record for the World.

Late that summer, one of Cody's students wrecked the old girl in a misjudged approach. Full throttle at the last second failed to pull it up in time, and it hit the ground wide open, tossing out Cody and his pupil--unhurt. Its massive construction withstood the shock, but with no one aboard to cut the switch, it plowed across the field, and seconds later smashed itself to splinters in a grove of trees nearby.

This was the beginning of the end of the Cody era, for the following year the last of the great machines met its finish. The biggest of all his planes, it had been equipped with floats for the Daily Mail Seaplane Circuit of Great Britain. On August 7, 1913 Cody shifted it back to wheels to demonstrate its superb flying characteristics to some friends. With one of them aboard he tried a mild zoom. Without warning, the ship disintegrated, and its two occupants catapulted out into space. As they hurtled earthward, Cody was easily identified by his long white linen duster which trailed out behind him like a partially opened parachute.

Cody had often remarked that when his time came he hoped the end would be quick--and in one of his own planes. And if he had secretly hoped it might be spectacular as well, his wish was granted, for the finish was more dramatic than anything he had ever done before.

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Fowler's Transcontinental Flight:

Robert G. Fowler, the pioneer airman, completed the second transcontinental airplane flight on February 8th 1913. While this flight was not as long as that made by Calbraith Rodgers, it constituted another milestone in aviation.

Fowler left San Francisco for New York, his original destination. He flew as far as Emigrant Gap, California, but because of inclement weather he had to suspend flight operations over the high Sierra mountains. Leaving San Francisco on September 11th, Fowler had reached Emigrant Gap by September 24th 1912. His plane was disassembled and shipped to Los Angeles, California, from where he departed on his second attempt to span the continent, October 21st 1912.

His flight was quite notable, having flown 1700 miles to Houston, Texas in a period of 18 days. This in itself was a record. From Houston he flew on to New Orleans, arriving there December 31, 1912. He spent New Years Day in New Orleans and then took off from that city on January 4, 1913. From there he flew to Brontley, Alabama and then on to Moncrief Park, Florida, arriving there at 4:45 P.M. February 8, 1913.

Contributed by Willis L. Nye

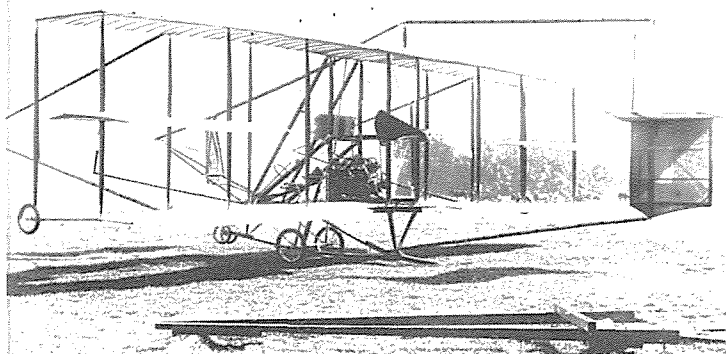
SAM CODY'S CATHEDRALS



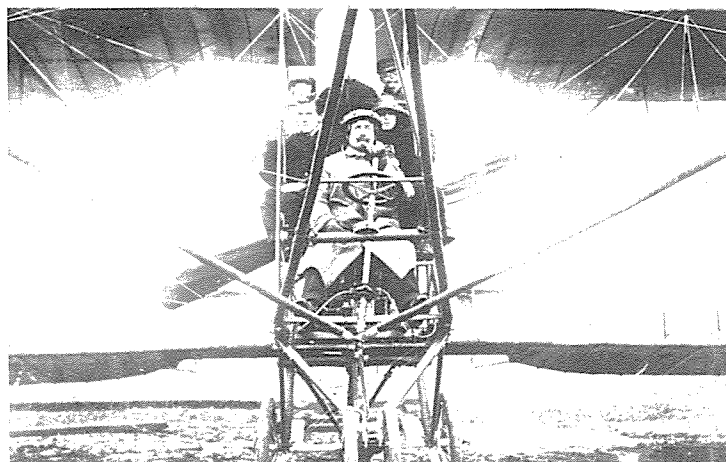
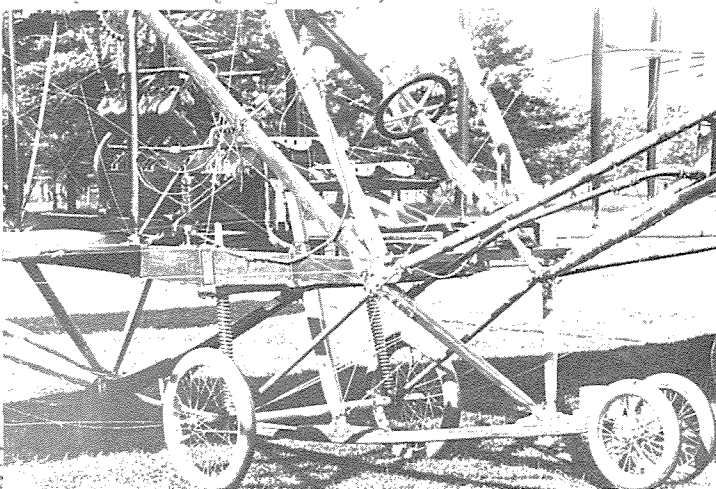
Col. Samuel Cody in an early version of the pilot's crash helmet, seated in one of his 1910 Model biplanes.



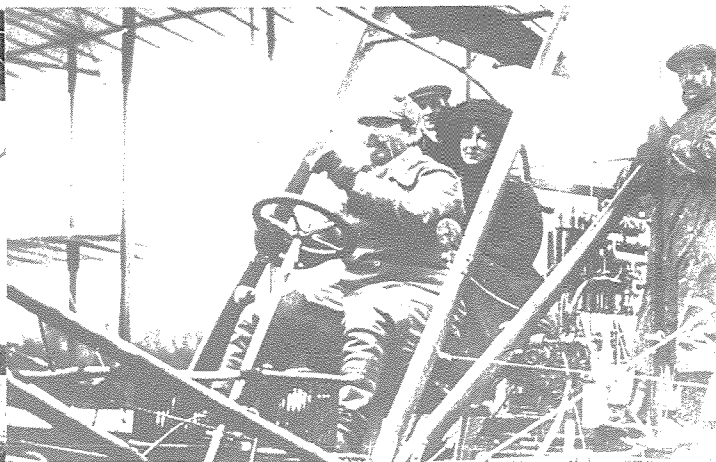
Col. Cody's 1910 British Michelin Cup winner over the Eleriot school hangars at the famous preWar flying field, Brooklands.



Cody's machines all used much bamboo, showed careful design and workmanship, especially in the metal fittings. The power plant was a 60 horsepower ENV engine which turned the propeller, through chain and sprockets, at 775 rpm.



Cody, in his 1910 Model, flew with four passengers on metal farm machine seats at 70 mph. Total live weight was 738 pounds, a notable feat for January 1912.



All photos courtesy of 'FLIGHT' Magazine
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