

**FORGOTTEN TODAY,
CHARLES WARD HALL AND
HIS HALL ALUMINUM FLYING
BOATS FORMED A SMALL
BUT IMPORTANT PORTION OF
AMERICAN AVIATION HISTORY**

“SEND IN THE ALL-ALUMINUM!”

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Today, the name Charles Ward Hall does not hold much significance for the average aviation enthusiast. This is particularly unfortunate since Hall had a long-lasting effect on American aircraft design. Hall's career began as a New York building contractor and he became well-known for the quality of his work. He also took note of the increasing interest in the rapidly developing world of aeronautics — going for his first flight in 1909 with famed aviatrix Ruth Law.

Also, his son, Charles Ward Hall Jr., developed an intense interest in flying and joined the Lafayette Flying Corps during the Great War. Using his engineering experience, Hall Sr. created an unusual design — a small 20-foot sailboat hull fitted with a pivoting mast and the wing from a surplus Thomas Morse S-4B Scout (still carrying its military insignia!). He sailed this creation through Long Island Sound while also thinking about much bigger projects including a flying boat that would be mainly from aluminum.

Named the “Hall Aluminum,” this was a tiny aircraft com-

pleted in 1922 that had a hull, lower wing, and tail booms fashioned of aluminum but the top 25-foot span upper wing was of wood construction with fabric covering. Power came from the little-known Wright Gale engine of 60-hp. For a first attempt, the extremely light machine actually flew well and was quickly noticed by the ultra-rich of the day on Long Island Sound with their luxury yachts.

Hall realized that while aluminum could pioneer lightweight aircraft construction, the material also had problems when it came to salt water — namely corrosion. So for his first effort, he came up with the practical but rather inelegant solution of coating the airframe with grease. After each flight, he would wash off the plane and then re-coat it when the time came to put it back into the water. Not practical for large scale operations, at least it worked and the little bird remained relatively corrosion free and flying for years.

Being a businessman, Hall knew he wanted to make his ideas pay money and established Charles Ward Hall Engineering. He then went looking for work and his first customer came in the form of the US Navy who issued a contract for the construction of an aluminum upper wing to compare with the standard wood unit fitted to the popular Curtiss HS-2L flying boat. The resulting wing had equal strength to the wooden unit, but weighed half the amount.

By 1929, the company had become the Hall Aluminum Aircraft Corporation and received two Navy contracts. The first was for the XFH-1; the second for the XPH-1. Building

aircraft required talented people and construction space so Hall worked a deal to utilize some of the space created by Consolidated Aircraft in their Buffalo, New York, facilities while also being able to hire some of the local aviation talent.

Hall was a perfectionist and that meant he went from employee to employee to watch their work and make sure it was up to his exacting standards. He was also a good businessman and knew how to negotiate favorable contracts.

The XFH-1 was an experimental fighter aircraft and Hall created a variety of flanged, closed aluminum tubing structures that would be utilized for the aircraft's primary construction. He would use however many of these tubed components needed for the aircraft and size and location were based on his stress calculations. These tube components were reinforced with bulkheads of drawn sections that were then riveted and reinforced with gussets.

The XFH-1 wing was very interesting since the multiple tube components had been cambered in a design that would, as the load increased, straighten and strengthen the wing spar. Thus, when on the ground and sitting still, the wing would droop slightly but in the air it would become completely straight under flight loads. Attached to the spars, the ribs were at an angle of 88-degrees while ailerons (upper wing only) were attached by a continuous piano hinge that reduced drag and created an effective aileron gap. The upper wing also had a six-degree sweep back while the lower wing had a four-degree sweep forward — giving an unusual appearance.

The plane was shipped to NAS Anacostia where it was tested from 25 September 1929 through 3 February 1930.

Navy engineers had gone through the aircraft before its first flight and recommended several changes that were undertaken. When the contractor pilot flew the prototype, Navy officials thought the prescribed maneuvers were all too gentle so a series of more demanding tests were ordered. During these, some of the fabric separated from some ribs while the ribs themselves bent under loads.

There was rudder flutter and this was crudely cured by simply hacking away a portion of the rudder. Then came the power dives. At 200-mph, the upper wing's rear spar buckled and partially froze the ailerons. Fortunately, the pilot was able to handle the situation and land safely. The unit was removed and returned to the factory for repairs.



US Coast Guard Hall PH-2 V-169 on patrol over the northwest coast. (Gordon S. Williams)



Hall started out with the XFH-1 fighter that was mainly more of a developmental aircraft than a true fighting machine.