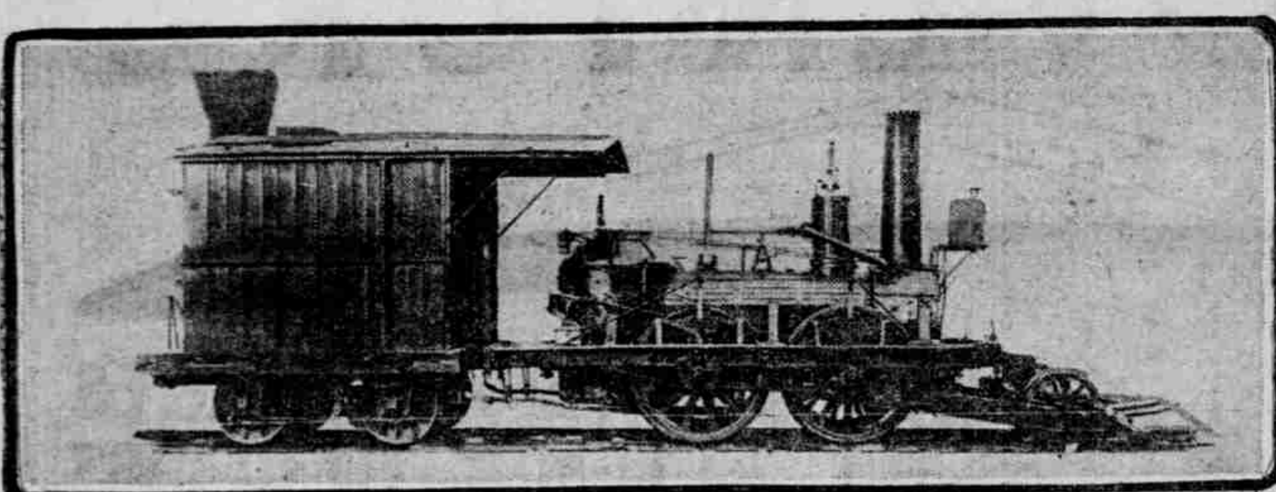
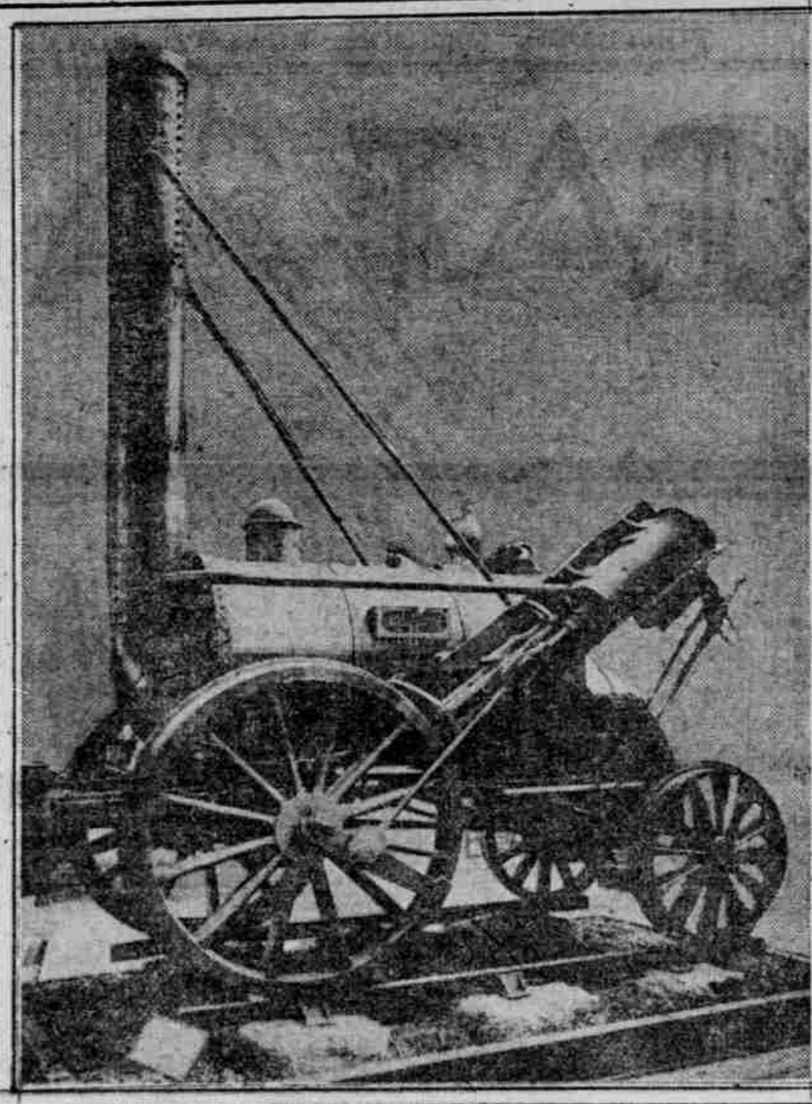
IRON HORSE IS NOW ONE HUNDRED YEARS OLD

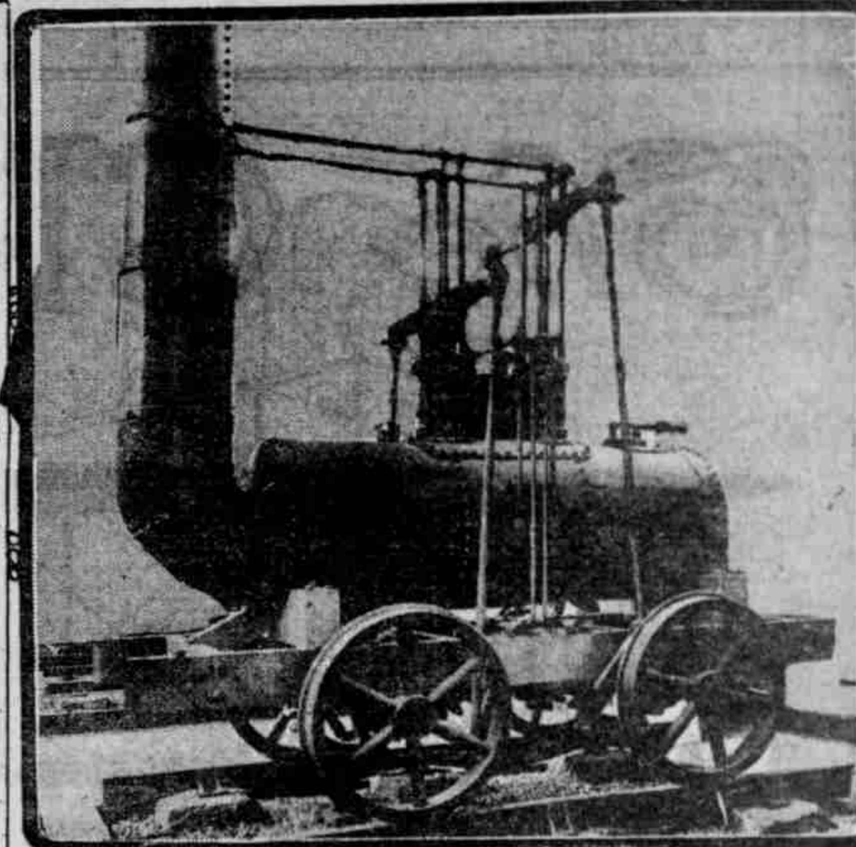
First Locomotive Built by George Stephenson Attained a Speed of Three Miles an Hour. So Noisy That Public Complained. "John Bull," His First American Locomotive, Still in Existence.



The John Bull, First Locomotive to Run in America, 1831.



Rocket, Which Made 12 Miles in 43 Minutes on First Trip.



The Blucher, First Locomotive, Which Made Trial Trip July 25th 1814.

George Stephenson, Inventor of the Locomotive.

BY JOHN ELFRETH WATKINS.

WASHINGTON, July 25.—(Special.) Today the iron horse celebrates the 100th anniversary of its birth.

George Stephenson's engine, Blucher, July 25, 1814, convinced a dubious British public that it was a practical locomotive. In the obscure little mining town of West Moor, England, this equally obscure engineer had been puzzling his brain for a year or more endeavoring to provide an economical means for hauling coal from the Killingworth collieries to the riverside.

Horses at that time were expensive. With a view to saving the cost of the keep of as many as possible, he tried to perfect one or two mechanical devices as a substitute. These did not satisfy the self-made engineer. His further efforts resulted in the invention of the steam locomotive.

This most commonplace chain of events led to the construction of one of the greatest world-revolutionizing inventions of history. The result of George Stephenson's perseverance was the epoch-making Blucher.

Locomotives, of course, had been heard of before. The idea was only quickened in the mind of Stephenson. Those, however, which had been invented would carry themselves just so far and no farther. They were merely big toys. It remained for him to demonstrate that steam could be made to propel an engine and draw a load besides.

On her maiden trip on the tracks of Killingworth colliery the Blucher drew up an incline and at a speed of three miles an hour a load of 30 tons, distributed among eight cars. Furthermore, and what was of most importance, she continued to run successfully and without hitch.

Declared a Nuisance.

But Stephenson's pathway was not strewn with laurels, as the result of his achievement. The noise of the escapement of steam from the Blucher's machinery drowned the plaudits which his associates may have wished to bestow upon him. In fact, the officers of the law gave warning to the inventor that this din was a nuisance and that steps must be taken for its abatement. It was complained that Blucher's economic advantage over horsepower was hardly appreciable, that her speed barely exceeded that of a horse's walk, and that steam power remained equal in point of cost with horse power.

Meanwhile Stephenson himself was undaunted. He began thus early to reveal his genius by his patience. He alone remained upon the pinnacle of hope while even his friends abandoned his locomotive in despair. He stoutly contended that it would eventually supersede every other tractive power. So it was with confidence and faith that he turned his attention toward the improvement of the Blucher.

He had made it his rule to keep informed on all similar appliances and devices with which other inventors were toying. As a result he was probably the best posted man on the subject of locomotives in the world. Besides, he was a fine mechanic and could personally work out his theories.

His Lordship's Patronage Given.

Another point, which is of infinite importance, he received solid financial backing from Lord Ravensworth and his partners, the owners of the Killingsworth colliery. They furnished him with the money requisite for the building of his engine and the continuance of the work.

Stephenson, therefore, had only to apply his ability to perfect the Blucher, and the road on which it was to run. The chief features of the first locomotive, which he desired to improve, related to the disposal of the exhaust from the engine and to the adhesion of the wheels to the rails. He had turned the exhaust into the smokestack. This more than redoubled the generation of steam, but at the same time made such a racket that the public redoubled its complaint of it. Likewise, the Blucher's wheels were roughened with bolt heads and other protuberances to make them take hold of the rails. But the constant friction of the wheels when thus spiked so wrenched and racked the locomotive that it was kept constantly out of repair.

In his second machine Stephenson introduced the steam blast. This helped in abating the awful noise that had kept up while Blucher was under steam. He substituted smooth wheels and demonstrated that they would run on smooth rails. In addition he made changes in the machinery so numerous that it is almost impossible to render an account of them. One thing suggested another to his mind and a remarkable composite was the result. Of the greatest importance was his application of the ball and socket joint to the connecting rods where attached to the piston and his addition of crank pins to the crank axles. By this arrangement he overcame upon uneven roads much of the difficulty caused by the rigidity of the machinery.

Like a Story Book Hero.

During all of this time George Stephenson was undergoing an evolution quite as remarkabel as that of his locomotive. His life reads like that of the story book hero, who never fails to rise from poverty and ignorance to glory and wealth. His childhood and youth had been quite inglorious enough to please the most fanciful story teller, and his rise in life was singularly spectacular, until, eventually, he was offered by the King a peerage, which he declined.

He was the son of poor but respectable parents. His father had been a fireman at the village colliery of Wylam, Northumberland, George's birthplace. Here the family had occupied a mean little cottage, which stood beside the dusty wooden tramway on which coal wagons were drawn daily by horses from the coal pit to the loading quay. It is rather a symbolic picture—that of this young boy born directly in the environment which he afterward so miraculously transformed.

At the age of 8 he kept the cows of a neighboring widow. The bent of his mind appeared even then to have exhibited itself, for it is recorded of him that his favorite amusement was erecting clay engines. He found the clay in the nearby bogs and from the hemlock which grew about he shaped his makebelieve steam pipes.

Six years later he was taken on as an assistant to his father in firing a stationary engine used at the mine. A few years later he acted as plugman on a new coal pit opened on the Duke of Newcastle's property. Then he became fireman and shortly afterward engineman. He devoted himself to the study of the stationary engine and its gearing. He took the machine apart in leisure hours for the purpose of mastering its parts. The engine became a kind of pet with him and he was never weary of watching and examining it.

Illiterate Till 19.

All of this time he was wholly uneducated. Realizing his disadvantages he began to attend the village night school. Here he displayed a genius for figures, although he was 19 before he had learned to read and write his own name. At this time his wages were 18 shillings a week.

At this period he married and commenced to experience repeated financial discouragement. To add to his distress his young wife soon died and left him with the care of a little son. But shortly afterward his affairs took a turn for the better.

The lessees of Killingworth colliery engaged him to repair a pumping engine. He was successful where all others had failed, and received ten pounds as a gift. From then on he became engineman to the Killingworth works. His skill as an engine doctor was noised abroad and he was called upon to cure all of the old wheezy machines in the district. Now he was ascending the hill of prosperity and ready for his great work. And his age was only 33 years.

Two years after the "Blucher" had made her first trip on the Killingworth track, while the colliery engineers stood by and jeered her, Stephenson was still working for her final perfection. He had made various improvements, but he was not completely satisfied. Steam springs were introduced for the purpose of easing the engine weight upon her axles. Attention was given to the improvement of the tracks. Plans were made for perfecting rail joints, so that their ends would not separate. His locomotive was in daily use upon the Killingworth railway, but it did not come up to Stephenson's ideals. About this time people became awakened to the practicability of the use of steam for all manner of land conveyances, and the inventor's enthusiasm was refired.

The First Passenger Train.

In 1825, 11 years after he had tried out the "Blucher," Stephenson participated in the celebration of the opening of England's first passenger railway—the Stockton & Darlington. He was appointed chief engineer of the road, and drove the engine "Locomotion," which he had built especially for it. The train to which he harnessed his engine consisted of six wagons loaded with flour and coal. After these came a passenger coach—the first in existence. It was in reality an old stagecoach taken off its usual supports and mounted upon wheels taken from a coal car. The directors rode in this coach over the entire eight miles of the railway's length. Behind them were 21 wagons fitted up for other passengers, and, lastly, six wagon loads of coal, making in all 38 cars. The train traveled at a steady pace of from four to six miles an hour. On its arrival in Stockton great crowds gathered in the streets to see and cheer it. The railway was indeed a success. Eventually a speed of eight miles an hour was attained.

Traffic in that vicinity grew apace. The Liverpool & Manchester line was chartered to share the increased commerce. Stephenson was offered the post of chief engineer of this new railway, and upon accepting offered to construct a new engine that would attain a greater speed than that of "Locomotion."

Parliament Would Have Doubted.

"When I went to Liverpool to plan a line from thence to Manchester," said he, "I pledged myself to the directors to attain a speed of ten miles an hour. I said I had no doubt the locomotive might be made to go much faster, but that we had better be moderate at the beginning. The directors said that I was quite right, for that if, when they went to Parliament to obtain the grant, I talked of going at a greater rate than ten miles an hour, it would put a cross upon the concern. It was not an easy task for me to keep the engine down to ten miles."

Nor did he. His famous locomotive Rocket, on her first trial, covered 12 miles in 43 minutes, carrying three times her own weight. She weighed seven and a half tons and subsequently hauled 44 tons at a speed of 14 miles an hour. She represented the culmination of Stephenson's work with the locomotive. Strange to relate, she brought him fame as a locomotive builder along lines that are almost as far removed from his other efforts as though he had never before constructed one.

The multitubular boiler and the steam blast were the essentials of his latest success. His steady experimentation with exhaust steam to relieve noise had finally met with success, and he had at last quelled popular objection to the noise upon the public highways. Applying his steam blast, he made the exhaust a means of increasing the draught. Other inventors had not realized that their engines made steam faster when the exhaust was turned out into the open air.

Exhibited Now in Washington.

In the National Museum at Washington is the oldest iron horse in the Western Hemisphere, the veteran John Bull. This rugged patriarch is another of George Stephenson's products. It is the direct ancestor of the whole modern American species of locomotives.

Hearing of the success which attended the demonstrations of the locomotives in England, an American engineer, Robert L. Stevens, embarked for England in 1830 to order one of these queer craft for his American line, the Camden & Amboy, in New Jersey. Soon after Stevens' arrival at the Stephenson locomotive works at Newcastle-on-Tyne he witnessed a demonstration trip of one of George Stephenson's newest engines. Its performance pleased him so much that he ordered a similar engine to be built immediately for his company. Thus was the first American order given to the pioneer locomotive builders at Newcastle-on-Tyne.

John Bull breathed his first breath of life in May, 1831, and the next month was shipped to Philadelphia. The bill of lading showed that the price paid was £784, or $3800. When the Jersey machinists finally got the parts assembled they dubbed it John Bull, and the name stuck thereafter.

When first set up John Bull weighed a trifle over 10 tons, or 22,409 pounds. A locomotive now being built for one of our northern lines weighs 33 times as much. The boiler of John Bull was 13 feet long and only 30 inches in diameter. The four 50-inch driving wheels were mainly of wood. The firebox was constructed for burning wood, then plentiful along the Jersey shore of the Delaware.

Steam was raised in John Bull the last week in August, 1831. The first cars drawn by him were two stagecoach bodies, mounted upon trucks. They have been described as a cross between a hayrack and an open streetcar of today, but the two pairs of big wheels were close together under the center of the floor. They were of the English pattern, and in general arrangement modern English railway coaches have deviated from them but slightly. They were originally made to be drawn by horses, for our great-great-grandparents had little faith in the success of steam upon their railways.

John Bull was the progenitor especially of that type of American locomotive which has survived through the long years of experimentation in locomotive construction. Its multitubular boiler, horizontal cylinder and artificial draught, caused by the exhaust of steam, are features still found in the best type of American locomotives.

LIEUTENANT PORTE'S ATTEMPT TO CROSS THE OCEAN BY AIR

(Continued From First Page.)

endless sequence during similar conditions of the air.

Lessons From the Flight of Birds.

This is the real work that is opening up the "air lanes" for future air travel. Nature provides both the facility and power to navigate the air regularly when men apply knowledge to the use of the air. The problem of how high to fly to depend on wind currents at least four times as strong as those nearer the ocean will not be left to speculation and guesswork. Often a 15-mile wind at the surface has a 30-mile current speeding across the skies at a height of 5000 feet.

Now sanity dictates that an air craft which uses up its fuel by driving against the wind is not of practical use. It will only begin to be navigated when it embarks on currents that carry it rapidly to its destination. A migrating bird still far outstrips an air craft in endurance and distance traveled.

Why should a bird beat an engine?

The answer is that the bird selects the wind blowing in the direction it wants to travel. The creature covers distance with the speed of the wind. That is the natural and simple way by which air liners will maintain a schedule superior to rail or water. The system of using the air is no longer theory.

How Salmet Flew Across Channel.

Both airships and aeroplanes all over Europe are timing their flights to travel with the assistance of the prevailing winds ever since Henri Salmet flew from London to Paris without stop, 222 miles, in two hours and 50 minutes, above the clouds, with a useless compass. He was shot from England into France on a swift wind, traveling more accurately than the airman, who realized his good fortune and gave himself into the keeping of nature. In practical locomotion this surpassed all human travel. It was fully equal to the migrating birds and it demonstrated beyond doubt their method of traveling vast distances.

Germany has already mapped out her future airship routes to and from America on what is known of the prevailing winds of the Atlantic. Professor Hugo Hergesell's report to the German admiralty of his soundings of ocean air currents in 1903 and 1909 gave the definite information that airships bound for America can use the trade wind with certainty, even during Winter months, as far north as the Azores, because that wind always blows in this general direction throughout the year.

This is as simple a proposition as a low-powered steamer making use of the Gulf stream to increase its speed and save fuel. An airship traveling only 40 miles by its own power would cross the ocean in two days. The natural drift of the whole air from America to Europe simplifies the return voyage exactly as this fact is now a necessary medium for Lieutenant Porte's attempt.

All this means that airships will often arrive far ahead of their schedules. When the higher air currents over the ocean have been thoroughly sounded and charted an air craft navigating at 5000 feet may frequently go to Europe in 36 hours. The constancy and duration in the speed and direction of the higher Atlantic air currents will have an immense value for establishing the permanency of travel across the "big pond," as demonstrated for centuries by the remarkable flights of migrating birds over the ocean.

Count Zeppelin's advent in the race to cross the Atlantic by air is foreshadowed in the construction of larger and larger airships. These huge craft must have tremendous lifting power to rise into the higher and swifter air currents and remain there throughout a voyage. Their ability to do this is demonstrated by the most modern of his great vessels, which has already remained for 20 hours at 6500 feet with a full load without losing any efficiency. No attempt is promised for a Zeppelin ocean flight this year, but this speediest of all airships is a far more finished production than a mammoth aeroplane, and with its multiple motors is much better equipped for ocean passage.

The vital part that wind plays with air travel over sea is best illustrated by an imaginary trip across the ocean with the type of aeroplane which builders have conceived. From west to east, with the general drift of the air in these latitudes, the trial would be favorable for an "aeroplane of tonnage," when we know how to construct it by a new principle. This machine, with a reserve of engines, fuel, oil and food for at least one-third more than the estimated time of the trip, might fly at a speed of 70 to 80 miles an hour. It would mean getting over sea in 40 hours.

If the machine traveled at 5000 feet, where soundings show that the air currents have an average flow of 40 miles an hour, the crossing would require only 33 hours. The aeroplane's own speed, in the thinner air of high altitudes, is greater than near the water. It would attempt to fly over established steamship or airship routes and to summon assistance by wireless if compelled to alight on the sea. Accurate bulletins of the weather would enable it to make the best of the wind situation.

The adventure might be accomplished with not fewer than five skilled operators, who would combine in relay work. Duplicate controls being in every cabin, each of the travelers having a cabin to himself, can thus spend the time of the passage in comparative comfort. But this trip shows immediately the tremendous advantage of the airship over the most highly developed aeroplane as a means of comfort which the modern world demands for travel.

Lieutenant Porte's flight may depend entirely on the meteorological conditions over the North Atlantic. That fact has caused us to begin talking here in America about the necessity for mapping the air ocean, so that the airman may go aloft with his chart and his data concerning the shifting air currents and be in a position somewhat similar to a salt-water navigator.

Some Preparations Necessary.

Some idea of the vast extent of the labor in preparation for navigating the air will be found in the following branches of the work:

Systematic soundings of all air levels by weather stations.

Results by hours telegraphed to central stations.

Central stations' preparation of air charts of different levels.

Transforming the ordinary weather map into an aerographic chart.

Weather stations' frequent wireless reports to air craft in the air.

Practical demonstration of the use of wireless weather information after it is received on board.

New aerographic navigating instruments used on board airships.

Longitude and latitude determined in the air by new instruments.

Determining longitude and latitude during fog, in the clouds and over the sea.

Measuring the drift of the wind, the speed of the ship through the air and the ship's speed over the ground to get the vessel's direction when the drift is so strong that the compass is useless.

The ship's exact position in space, found without reference to the ground by wireless communication between two stations on the ground.

How the distance and direction of one ship in the air is found by another ship, as actually demonstrated in maneuvers.

Demonstrations of communicating weather reports by relaying from airship to airship.

Conserving the buoyancy of airships to insure endurance—getting 30 per cent more endurance out of the ship by conserving gas—running low near the ground the first part of the journey.

Radius of action; its meaning in cruising, fast flight and high flying.

The folly of naively seeing in the aeroplane an aerial transport for crossing the ocean becomes apparent by the absence of the airship's navigating advantages. The aeroplane cannot take advantage of the airship's cunning use of the winds. If larger aeroplanes are possible they may carry a wireless and a sort of staff. They would gain much from the airship's advanced navigating methods, but the aeroplane will still be hampered by the short range of its receiving wireless station. A long range means a colossal aeroplane, which must be built after other principles than those we now know. The aeroplane is affected by winds that do not hinder the airship. An unfavorable wind retards speed and makes the aeroplane's direction unsteady. Its pilots do not comprehend other than the few obvious features of the wind's actions over the land. These were long ignored and caused the majority of the aeroplane accidents.

But Lieutenant Porte is not blind to the great hazard of his adventure. He realizes the danger of storm and the scant opportunity of preventing the winds from losing him in the vast void. Doubtless he trusts to timing his start with a favoring breeze and puts his faith in the very swiftness of his flight. With his great experience on the sea and in the air he feels qualified to pronounce upon the airworthiness of his craft and its engines, and he believes they will stand the test. The only note of misgiving in his whole preparation has been, "God help us if my compasses fail!"

As for the rest, he faces his ordeal with the traditional fortitude of an Englishman. He is willing to risk all for the immortality that comes to him if nature smiles on the pioneer and permits him to point the way to new achievements for civilization. But if she frowns he will accept the consequences like a brave man.

Speed him on his way!

DISTANCES FLOWN.

Lieutenant Frank Milling and passenger, 260 miles, in Texas, 1913 (Wright's army biplane).

Lieutenants Canter and Boehmer, German army officers, 372 miles, Berlin to Plauen, 6 hours 9 minutes. World record non-stop flight with passenger.

Roland Garres, St. Raphael, France, to Bizerta, Tunis, crossing the Mediterranean, a distance of 956 miles, the longest non-stop water flight yet made. It represents a distance equal to that from Philadelphia to Charleston, S. C. He was 7 hours and 53 minutes in the air, (Morane monoplane, 60 h. p.)

Victor Stoeffler, 16 hours, cross country (Aviatik monoplane).

Bruno Langer, 18 hours over an aerodrome (Etrich biplane).

Oscar Friederich and passenger, Paris to London, nonstop (Etrich biplane).

Anatole Seguin, Paris to Berlin and back, non-stop, 10 hours 51 minutes (Farman biplane).

Anatole Seguin, Paris to Bordeaux and back, non-stop, 646 miles, in 13 hours 5 minutes (Farman biplane).

Victor Stoeffler, Warsaw to Berlin, non-stop, 341 miles, 4 hours 2 minutes (Aviatik).

Adolph Reiterer and passenger, Berlin to Copenhagen, non-stop, 229 miles (Etrich).

Herr Landmann, at Berlin, June 28, non-stop, 21 hours 49 minutes. Claimed as the world's record.

THE AMERICA.

Pilot—Lieutenant John Cyril Porte.
Assistant—George E. A. Hallett.
Designer and builder—Glenn H. Curtiss.
Backer—Rodman Wanamaker.

Dimensions.

Upper wings spread	72 feet
Lower wings spread	46 feet
Width of wings	7 feet
Total wing area	798 feet
Length of the hull	22 feet
Beam width	4 feet
Thickness of hull	¼ inch

Weights.

	Pounds.
Weight of the hull	500
Weight hull supports (machinery, oil, men)	4,500

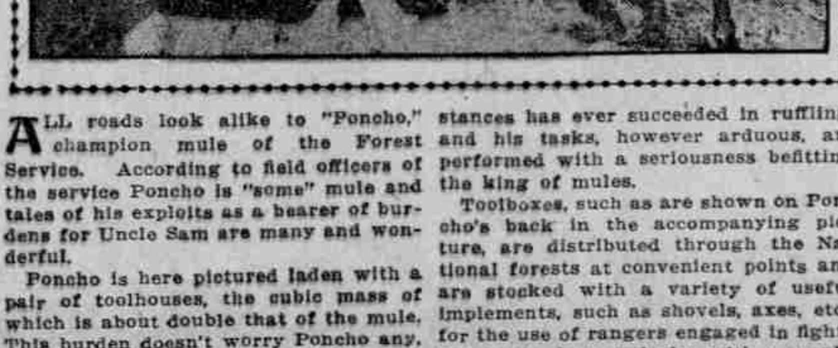
DISTANCES.

	Miles.
First lap—Newfoundland to Azores	1,198
Second lap—Azores to Vigo, Spain	963
Third lap—Vigo, Spain, to Ireland (via Bay of Biscay)	523
Total	2,684

Estimated Time.

First lap	20 hours	55 hours
Second lap	16 hours	
Third lap	9 hours	
Stopovers	10 hours	
Time limit	72 hours	
Prize	$50,000	

Champion Mule of the Forest Service



ALL roads look alike to "Poncho," champion mule of the Forest Service. According to field officers of the service Poncho is "some" mule and tales of his exploits as a bearer of burdens for Uncle Sam are many and wonderful.

Poncho is here pictured laden with a pair of toolhouses, the cubic mass of which is about double that of the mule. This burden doesn't worry Poncho any, however. Poncho is used to awkward burdens. He is also noted for his dignity, which no combination of circumstances has ever succeeded in ruffling, and his tasks, however arduous, are performed with a seriousness befitting the king of mules.

Toolboxes, such as are shown on Poncho's back in the accompanying picture, are distributed through the National forests at convenient points and are stocked with a variety of useful implements, such as shovels, axes, etc., for the use of rangers engaged in fighting forest fires, and also with a supply of tinned provisions for the sustenance of the men on "fire duty."