

# SCIENCE HELPS THE AVIATOR

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eight flaming masses plunge helplessly toward the sea.

Small armor-piercing incendiary shells burst every now and then in the interiors of the bombers. Hectic men scramble to put the fires out. Occasionally a crimson streak flashes across the sky and a plane tumbles to earth. On the left the enemy's aerial cruisers break through the protective screen of pursuit planes and race up alongside the right wing's bombers and torpedo planes. A duel to the death sets in. Around the centre wing a swarm of planes buzzes in angry tormentation. High above, two squadrons of the fleet's pursuit craft dive down in response to the summons of the left wing commander. Here the enemy, not so strong, is beaten off with overwhelming losses.

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ONCE clear of the enemy's main force the left wing is enveloped in an anti-aircraft barrage from the ground. Scouts are already on the way down to interpose an opaque screen of phosphorous smoke between the wing and the ground. A little higher goes a flight of electrical disturbance-makers to fog the enemy's electrical range finders. Now the wing breaks up into a series of small flights at irregular heights. For below, above and in front is the main force of the enemy's air navy. Ten wings against one! But the wing commander knows that reinforcements are overhead—two wings of armor-clads, flying at 500 miles an hour, their sole equipment a light acid sprayer. Still the odds are colossal. The enemy deploys in mass to meet the invaders. Below, enemy planes lay great palls of smoke across the country. Barrages whip the sky. Closer the enemy planes come. The wing commander knows that the die is cast: nothing but a miracle can save his forces from complete annihilation. And the goal is but twenty-five miles away.

A great chance comes. It lasts but a few seconds, but it is enough. The reinforcements drive off the enemy from the now depleted centre and right wings enabling them to re-form and the entire force swings to the right, breaking into a series of large formations at different heights. The enemy commander recalls part of his force on his right flank, and, before the other part can again deploy, the left flank of the wing dives. In an instant the enemy is after them. Too late. The torpedo planes release their 2,000-pound torpedoes at the city. Forty messengers of death speed downward toward big munitions factories, guided by radio. Then the bombers release groups of gliding gas bombs on the capital. Now the centre comes up, and down go twenty 5,000-pound torpedoes, armor piercing with five-second delay action, aimed at railroads and canals. Down go a hundred 500-pound gliding bombs, raining into the financial districts, the government offices and the great traffic centres, destined to blow up the streets and disrupt the city's essential supplies of gas and electricity. And then go down a multitude of incendiary delay-action bombs.

"Fly about!" Wheeling simultaneously the wing runs the fire of the enemy, suffering heavy casualties. But the first battle of the war is over, within twenty-four hours of the declaration. Hardly a hundred planes of the fleet survive. The cost has been tremendous. But far below and to the rear the Commander sees a city with its vulnerable parts in ruins, great fires raging in half a hundred sectors, the railroads torn up for miles, canals blocked for months, the national treasury blown to smithereens, an air force undefeated but cruelly battered. Perhaps an armistice will be declared before the remnant of the fleet gets home.

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# SCIENCE GIVES NEW MIRACLES TO AVIATION

By T. J. C. MARTYN

NOW that the photo-electric eye has brought television to the airman speeding over the fog-bound earth, we have reached a point in the scientific development of aeronautics that calls for the measurement of the future against the present—not the indefinite, hazy future of impossibilities become possible, but the immediate, realizable future against the factual present. When an airman flying through fog can reach his destination without the least danger of losing his way, without even being out of touch for a single second with the blanketed earth; when he can visualize the airport below, calculate the altitude down almost to the last foot, and land as easily upon the surface as if the sun were shining, it is obvious that something of tremendous significance is taking place—a something which not only promises to revolutionize travel by air, but to alter in a practical way our concepts of time and space as they have not yet been altered.

We are thus led to look forward, with the tremulous expectation of an Aladdin about to be served by omnipotent genii, to a not far distant day when we shall perhaps speak of a journey in an airplane or airship as infinitely safer, more comfortable and swifter than in a train, automobile or ship; when neither wind nor rain, snow or sleet, fog or mist can stay the imperious sway of man's dominion over the air. With past incredulity forgot, we shall doubtless come to regard the wonders that science is putting into our hands today with matter-of-fact concern. And when a great tomorrow dawns into actuality—perhaps only to be eclipsed by some other scientific "miracle"—what will ordinary flying hold for the everyday air traveler? And since inventions have, unfortunately, a military equation, what does the scientist hold in store now for a dreaded Armageddon that the whole world hopes will never come?

## I—Flying in the Future.

THREE thousand miles away, in San Francisco, a banker puts down his radio telephone. The vision of a banker in New York fades away from the face of a small disk on his desk. He signals his secretary in another room to book a cabin on the next airship leaving for Berlin, where he is to meet his New York confrère in an important international conference.

At the airport a huge airship, looking stubby despite its tremendous length, is cradled in a device which holds it securely at both ends, head to wind. Passengers and baggage are swiftly put aboard through the nose of the airship and soon all is ready for the departure. The mooring is cast off from the rear mast, while the forward mast, manipulated silently by electrical machinery, slowly increases its height. Powerful engines are started in the airship's engine gondolas and die down again to a smooth hum. The airship, now free

## A Picture of Changes to Be Wrought on Air Travel and War by Strange Devices From the Laboratory

of ground obstructions, casts off from the forward mast. Her engines drone out in unison, the great air leviathan quivers as it gets under way, and presently it is soaring out into the vast empyrean, a speck against the background of the universe.

The banker finds life on an airship little different from life on an ocean liner in the old days. The greatest difference is that he has more conveniences and more facilities for conducting his business, so that not a day is lost while he is

the latter passes his orders on to the mechanics in the engine gondolas.

They go from the engine control room to the captain's deck in the extreme front under the airship's body, from where an unobstructed view of the country is had. The ship is now descending at an angle to get out of high winds. Ahead, shimmering in the afternoon sunlight, is Lake Athabaska, still miles away. Behind, the foothills of the Rockies, their façades unshaded, rear up as somber guardians of a

compass, which cannot take account of drift. In the centre of the cabin is a large square screen, empty now, but as soon as fog should appear, a simple turn of a switch brings into view the earth below.

At night the airship passes over Baffin Island and out across Baffin Bay, a sheet of silver in the soft light of the moon. By dawn the next morning the ship is flying over the middle of Greenland. Nothing is visible but the great glaciers stretching out as far as the

television screen. Soon Tempelhofer Field comes into view. The airship swings above it. The photo-electric eye of the television apparatus shows every detail of the scene below, though the passengers can see nothing. Lower and lower the ship goes, creeping down against the wind to the mooring mast. Within the hour the ship is made fast, drawn down, and a journey of 5,500 miles over land and water comes to an end two and one-half days after it began.

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## II—A Future Air War.

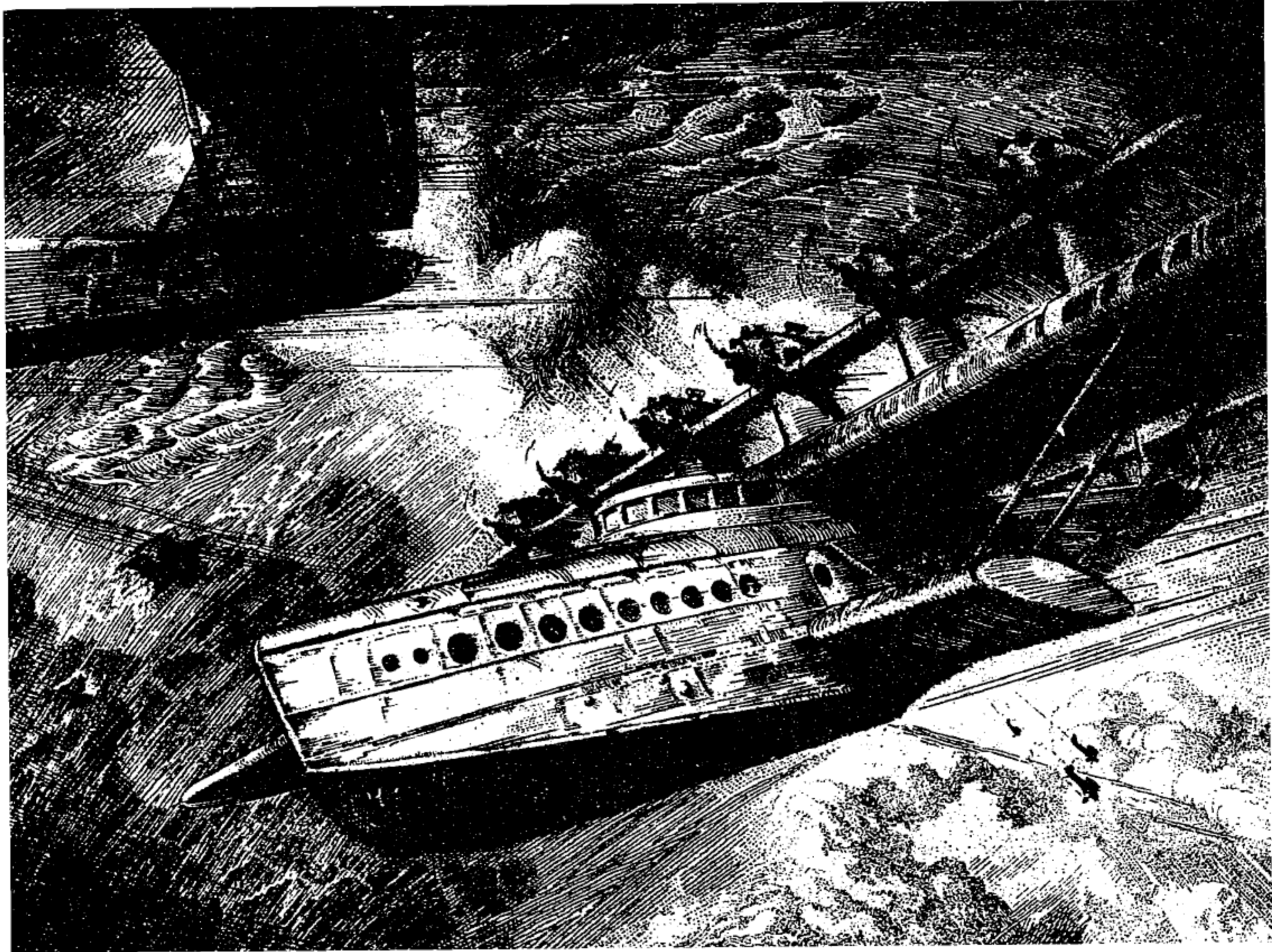
A GREAT aerial fleet drones high over the Atlantic. Many squadrons of pursuit planes convoy two wings of bombers and a wing of torpedo planes. High above, but miles in the rear, great dirigible supply ships follow the fleet. Below the main force is the flag-plane of the commander, guarded by a flight of fleet pursuit planes. Out in front are the scouting planes. An hour later the scouts flash back, "Contact!" Ten miles ahead the scouts are engaging the enemy's vanguard. On a screen before him the commander watches the scene intently. The scouts break off the engagement and fall back on the main body. Roaring at 300 miles an hour toward them is a veritable aerial armada—artillery planes, gas tanks, torpedo planes, aerial cruisers and more than 100 pursuit planes. The odds are overwhelming.

The commander knows that he must reach the enemy's capital, come what may, for the whole issue of the war may be decided by his success or failure. Quickly he orders squadrons to the right and left, some

higher and some lower. His forces are thus well deployed for the battle, but so arranged that a converging attack can be made on the main force of the enemy. The two wings of bombers, eighty planes to a wing, break up into flights and fly in line, one after the other, at varying heights, so as to offer the smallest possible target to the enemy. The orders are to hold the course.

At a distance of three miles the battle begins. A stream of small automobile torpedoes is fired by the enemy at the bombers' formation. Glistening in the frozen sunlight they shoot silently toward the oncoming planes. At once a barrage of small phosphorus shells begins, to burst in front of the fleet to screen the torpedoes. Instantly the whole fleet splits into small formations and changes altitude. The enemy has seen the change through its television screens and the radio-controlled torpedoes change their altitude. The bombing planes, with their torpedo detectors, hold to their course until the last split second, then skid. The torpedoes whizz by. But the enemy has been too quick in some cases and has guessed aright this final manoeuvre. Eight tremendous explosions and

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An Aerial Transport of the Present Which May Play a Big Part in the Skyward Communications of the Future.

Etching by J. MacGilchrist. Courtesy of Kennedy & Co.

away from the office. Most of his afternoon is spent in direct telephonic communication with his office in San Francisco, transacting routine business, giving interviews, one with a man in Chicago and another with a man in Los Angeles, through television. Before night falls a swift plane hitches on to the ship. Passengers are transferred, mail and the latest newspapers from Seattle are delivered. After dinner there is a television concert in the smoking room and a dance goes on in the palm garden to the strains of radio music from Vancouver.

Next morning the airship is flying high over the Rocky Mountains, flying to Europe over the shortest, or great circle route. The air outside is well below zero, but the interior of the ship is comfortably warm. The banker, having devoted his morning to his business affairs, is taken after lunch by the captain to look over the airship. Down in an elevator, below the passengers' quarters, they enter the engine control room. From here the powerful, gas-consuming engines are directed by the chief engineer. Nearly fifty instruments line the wall in front of the engineer, and on a bench below there are more than a score of levers and switches. At one side of the cabin is a signal telegraph instrument by which the captain signals to the chief engineer and

silent prairie. Below, nothing but flat, lake-dotted country, with hardly a sign of green vegetation visible. To the north, barely in view, a reflection of the sweeping grandeur of the Great Slave Lake.

The captain's deck is enclosed with composition glass. A number of bright chromium-finished signal boxes stand in a line on the floor, well toward the front. In the centre is a large instrument, also finished in chromium, within which a heavy wheel spins at thousands of revolutions a minute. At the top is a glass window giving a view of a large compass. The instrument is a gyroscopic compass, which keeps the airship on its course, almost to a foot, throughout its flight.

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IMMEDIATELY behind the captain's deck the captain and the banker enter the navigation room. In one corner the meteorological officer, earphones clamped to his head, bends over a table drawing lines on a map. This is known as the weather map and is kept up to the minute throughout flight. The reports coming through are from Fort Churchill and always the ship is in touch with two or more ground weather stations. In another corner of the room is the radio direction instrument, which keeps track of changes in the wind's speed and direction, automatically correcting the gyroscopic

eye can see, except at long intervals, when an airport for airplanes, with its characteristic radio masts and its emergency dirigible mooring mast, its huts, hotel and hangars, jut up in contrast against the white background. By noon the airship has left Greenland behind and is speeding over the Greenland Sea for Norway, to the north of Iceland. By evening the coast of Norway is in sight and by dinner time the airship is nearing Oslo, capital of Norway. Once again planes race up to the airship, which never once slackens speed, to take off passengers and mail, or to deliver newspapers and supplies. It is only a short hop now to Berlin over the Skagerrack and Kattegat, alongside Denmark and skirting the fringe of the Baltic Sea.

In the navigation room a report comes through that the northern part of Germany is being covered by a dense fog. No mystery is made of this to the passengers. Soon all know what is expected and there is not the least tremor of excitement. Everybody is busy packing up. Porters are beginning to move baggage forward to the disembarkation deck. The first sign that the passenger has of the proximity of Berlin is the hardy perceptible dipping of the nose as the great airship speeds toward earth. Down in the navigation room, Berlin aglow with lights can be seen through the