

Dr. DOUGLAS H. ROBINSON*
 Pennington, N. J.

"HINDENBURG" RETROSPECT

To those who remember the early days, the busy U.S. Naval Air Station at Lakehurst, New Jersey, is hallowed ground. In the rigid airship era, Hangar I, the oldest and largest, housed the fabled sky giants of both America and Germany. Here is the earth last trod by the fourteen dead of the U.S.S. "Shenandoah," and the 73 who went down at sea in the U.S.S. "Akron." And, though no monument marks the spot, midway between Hangar I and the squadron sheds is the site of an international tragedy, the burning of the German commercial airship "Hindenburg." The unforgettable catastrophe on the evening of May 6, 1937, took the lives of 13 passengers and 22 crewmen, and marked the end of the rigid airship era. Today, the cause is as much of a mystery as it was then. Sabotage or accident? The evidence is conflicting, the authorities disagree. All that can be said with certainty is that the disaster could not have occurred if the Nazi monster had not been supported in the air by inflammable hydrogen.

"Hindenburg" was the 118th craft built by the Luftschiffbau Zeppelin of Friedrichshafen, and traced a proud ancestry back to 1900, when Count Zeppelin made his first flight over Lake Constance. Most of the Zeppelin Company's products flew for the Kaiser's Navy and Army in World War I, and were considered so successful that the Versailles Treaty forbade Germany to build airships. Yet the Allies' own postwar efforts to build up their own airship arms ran head-on into disaster. Britain's R-38, due to faulty design and handling, broke in two and exploded in the air in August, 1921, with 49 dead. The French Navy's "Dixmude," the last of the German wartime raiders, disappeared in the Mediterranean with 50 passengers and crew. America's "Shenandoah," the first rigid airship to fly with helium, broke up in the air in September, 1925, when flown into a storm over Ohio. Only the German-built reparations ship, the "Los Angeles," escaped injury. Ironically, these tragedies contrasted with re-

*Dr. Douglas H. Robinson is a practicing physician and is rapidly becoming one of the American authorities in the field of lighter-than-air history. This is the third article that Dr. Robinson has published in the Journal, and he has a book underway concerning "The Zeppelin in Combat." Dr. Robinson is an honorary member of the German World War I naval airship society, the Marine Luftschiffer-Kameradschaft.

newed German success, for, permitted to build airships once more, they launched in September, 1928, the "Graf Zeppelin." While the British Secretary for Air and 47 others died in the flaming crash of the R-101 in France and while an admiral and all but three of her crew perished when the "Akron" went down in a storm off the New Jersey coast, the "Graf," under the command of Dr. Hugo Eckener, thrilled the world with her achievements. America went wild over her first crossing of the North Atlantic. A flight around the world in 300 hours' flying time, a scientific expedition to the Arctic, were the highlights. She pioneered an aerial route via Spain to Brazil, and after 1932 went into regularly scheduled service on the South American run.

The Germans were proud of a tradition of commercial airship operation that went back to 1910, and could boast that they had never lost a passenger. It was true that the DELAG, or German Airship Transportation Company, had lost three ships in quick succession in the early days, but their passengers and crew had escaped--miraculously, as appears in retrospect. Then, with four small primitive airships, the "Schwaben," "Viktoria Luise," "Hansa" and "Sachsen," the DELAG carried 10,000 passengers in 1911-14 in short sightseeing jaunts of approximately 2 hours each. In the fall of 1919, with a small, high-performance craft, the "Bodensee," the DELAG made regularly scheduled flights between Friedrichshafen and Berlin until stopped by the Inter-Allied Commission of Control. The "Graf" merely carried on the tradition.

Yet, for all the "Graf's" accomplishments, she was far from ideal for intercontinental operations, and lacked the endurance for regular service across the North Atlantic. Critics sometimes forgot that her slender and relatively inefficient lines, and her volume of 3,954,720 cubic feet, were dictated by the dimensions of the hangar in which she was built--one completed in 1916 for war-time construction. Nor would finances have permitted a larger ship. The Weimar Republic had no interest in an aircraft palpably useless for military purposes, and the "Graf" was in fact built largely by popular subscription.

In 1934 the Government support needed to build the ideal intercontinental airship was at last forthcoming--but the price was that the Zeppelin became a propaganda appendage of the Nazi regime. The Byzantine intrigue among the members of the Fuhrer's entourage provided Dr. Eckener with a windfall: for Joseph Goebbels it was second nature to score off his enemy, Hermann Goering, who hated the "gas bag," by backing the new giant LZ 129 then in the early stages of construction in Friedrichshafen. But in rapid succession, Eckener himself was "kicked upstairs" and superseded by executives more imbued with the Nazi spirit, among whom Ernst Lehmann was most prominent.

The new "wonder ship," the largest built up to that time, had nearly twice the volume of the "Graf," though she was only about thirty feet longer. With a much fatter hull, 803.8 feet long and 135.1 feet in diameter, she contained, when 100% full, 7,062,150 cubic feet of hydrogen, and under standard conditions had a gross lift of 242.4 tons. The "fat" hull was a new departure for the Zeppelin.

Company. Large stabilizing fins had been fitted after extensive wind-tunnel tests. There had been fears nonetheless that she might be unstable, but this proved not to be the case in trial flights. In contrast to the "Graf," whose bulky external passenger cabin well forward caused a certain degree of instability about the yaw axis, the passenger quarters in the LZ 129, as in the earlier British R-100 and R-101, were entirely inside the hull. Occupying two decks, the larger and upper of which measured 49 x 92 feet, they provided spaciousness and luxury for her 50 passengers unmatched to this day in any kind of aircraft. They slept in double-berth electrically lighted inside staterooms, each with a washbasin with hot and cold running water and clothes closet. To port was a dining salon where, at tastefully appointed tables, the passengers ate in two sittings. To starboard were a comfortably furnished lounge and a writing room. Outboard of the public rooms were 49-foot promenades with outward-slanting windows, which, rain or shine, could be kept always open, for, thanks to the smooth air flow around the hull, there were no drafts either inwards or out. On the lower deck were toilet rooms, a shower bath, the galley and a cozy smoking room, reached through a double-doored compartment which was at once a bar and an air lock, since the smoking room was kept under positive air pressure to exclude any stray hydrogen gas.

In every way the LZ 129 was designed to uphold the company's reputation for safety--down to the two life jackets in every cabin. Contrary to widespread suggestions which depict the German airshipmen arrogantly boasting that they alone knew the secret of safe flying with inflammable hydrogen, the Zeppelin Company's designers had intended the ship to be inflated with helium. The R-101 holocaust had been the last straw: plans for a smaller ship, LZ 128, had then been shelved, and the larger craft undertaken to provide the same performance with safer helium. Yet hydrogen would not be entirely eliminated. Every airship designer had to solve the problem of the ship, weighted down to capacity with fuel at the start of a long flight, becoming progressively lighter as the journey continued and fuel was burned. In the early days, the Germans simply valved cheap hydrogen to keep the ship in equilibrium. In the "Graf Zeppelin" a gaseous fuel resembling propane was used, weighing the same as air, so that its consumption did not lighten the ship. The American Navy, operating its rigids with expensive helium, could not valve the gas, so they recovered water from the engine exhausts to maintain a constant weight. To the Germans, the water-recovery condensers seemed unduly heavy and their air resistance high. They would, instead, carry small cells of hydrogen totally enclosed within larger gas cells containing helium; the cheap hydrogen "anti-ballast" would be valved off to compensate for the weight of the fuel burned.

For years German airship men had held that gasoline was a greater fire hazard than hydrogen. The British, thinking along similar lines, had fitted experimental diesel engines in the ill-fated R-101, but their multiple shortcomings had contributed to her loss, without preventing the fatal hydrogen fire. For the LZ 129, the Daimler-Benz firm of Stuttgart had developed a 16-cylinder diesel engine with a maximum output of 1200 h.p., and the four of these fitted to the ship gave no trouble after the first transoceanic flight revealed a weakness in

the wrist pins.

The safety program received a setback when Dr. Eckener found it impossible to obtain helium from the United States, the only country where the fireproof gas was obtainable in any quantity. The Helium Control Act of 1927 reserved to the Government all the gas produced in the United States and forbade its export. So the ship would have to fly with hydrogen after all. Probably since nothing could be done about it, none of her operators put any misgivings on record.

On March 4, 1936, the new giant was walked out of the building shed and made her first flight. Significantly, in view of her unlucky career, she took the air for the first time without a name--a sure harbinger of misfortune for every seaman. There were rumors that Eckener was fighting der Führer's demand that the new sky queen be christened "Hitler," but the name "Hindenburg" had been chosen in advance, and this she eventually received. There followed 55 more flights, including seven to South America and ten to Lakehurst, until December 4, when she was withdrawn for winter overhaul.

The uneventful transatlantic journeys almost immediately established her reputation for safety, dependability, and comfort, all the more remarkable in that there was no regular airplane service across the North Atlantic at that time. So routine were her operations that by the end of the season the "Hindenburg's" comings and goings had ceased to be news. Mr. Preston R. Bassett, an officer of the Sperry Gyroscope Co., remarked in an article in U.S. Air Service Magazine that the passengers would not know they were in the air without looking out the windows. Largely because the nearest engines could be located more than 100 feet to the rear, the passenger quarters were "quieter than the best sound-proofed airplane," in fact, the "Hindenburg" was "the quietest form of transportation now available." No vibrations could be felt. "Even when flying through turbulent air with broken clouds and a 30 knot gale on our port quarter in which an airplane would have been jolted and bounced considerably, no accelerations were measurable." Mr. Bassett's spirit level showed that the elevator man kept the ship on an even keel with angles of pitch of not more than $\pm$ or ± 2 degrees. (Indeed, he had been enjoined carefully to keep below 5 degrees, the angle at which, experiments had shown, bottles of wine would be overturned on the dining tables!)

Since "Hindenburg" was forced to fly with hydrogen, she could carry more than the 50 passengers planned with helium, and during the winter of 1936-37, additional cabins were built for 22 more persons. Her first long-distance flight of 1937 took her, on March 16, to South America. Then, on May 3, about 8:15 p.m. Central European Standard Time, the "Hindenburg" took off from the big airship base at Frankfurt-am-Main for the first of 18 planned round trips to Lakehurst. In command was Captain Max Pruss, an airship veteran who had started as an elevator man in a wartime crew in 1914, making his tenth flight in charge of the ship. There were only 36 passengers. The crew numbered 61, many of those being trainees for a new sister-ship (LZ 130, "Graf Zeppelin II")

scheduled to make her maiden transoceanic flight to Rio on October 27.

As with all the North American flights of the preceding year, there were no mishaps, engine breakdowns or difficulties to mar the air giant's progress, via Nova Scotia, Boston, Providence and New York. Headwinds delayed her, and on the evening of May 5, realizing that he could not arrive as expected at 6 a.m. the next morning, Captain Pruss radioed a new E.T.A. of 6 p.m. Eastern Daylight Saving Time. In the late afternoon of May 6 the "Hindenburg" was flying south along the New Jersey coast--a passenger's photograph of Asbury Park passing beneath the ship, which hangs on his wall, is said by Captain Pruss to be the last one taken from on board--and she was first seen over the Lakehurst field about 4 p.m. E.D.S.T. A cold front, accompanied by thunderstorms, was moving eastward past the field at this time and the "Hindenburg's" captain accepted the advice of Commander Charles E. Rosendahl USN, commanding the naval air station, that he delay his landing. The subsequent investigation gave considerable attention to the thunderstorm conditions, yet there is no evidence that they were really severe. Nor was a thunderstorm dangerous to a properly handled rigid airship. During World War I the German Navy had lost two ships with all hands--the L 10 and SL 9--when they were carried over pressure height and valved hydrogen in a thunderstorm. But if no gas was allowed to escape, no harm resulted even if the ship was struck by lightning. The L 42, for instance, flying home across the North Sea on the morning of May 24, 1917, after a raid on England, was struck three times by lightning in twenty-five minutes. The fully-bonded metallic structure absorbed the electrical charges, and in the shed her crew found only a small burned hole in the outer cover at the bow, a hole in the underlying girder, and scorched marks on an after propeller where the lightning had left the ship.

Various messages were exchanged between the station and the ship, which was idling out of sight to the south. At 7.08 p.m. E.D.S.T. Rosendahl radioed, "conditions definitely improving recommend earliest possible landing." The "Hindenburg" acknowledged, and came in from the south-west, passed above the mooring mast about 600 feet high and veered away to the north-west, intending to come back to the mast headed into the wind, which was light and variable from the south-east. The sky was seven-tenths overcast, ceiling 2000 to 3000 feet, and a light rain was falling. The thunderstorm and lightning had passed. All four engines were on full cruising speed, and the ship's air speed was just under 75 m.p.h.

There now followed, in the last ten minutes before the fire, a number of events, or alleged events, described variously by the ship's crew and later by spectators around the mast, and variously interpreted at the inquiry. North-west of the field the "Hindenburg" turned to port to approach the field, and being somewhat light, valved gas from all cells for 15 seconds. Some people on the ground, and Dr. Eckener, after his arrival with the German investigating commission, felt that this turn, "preferably to be avoided," had been so tight as to strain the ship. Dr. Eckener, in fact, concluded that a bracing wire had broken under the

strain and slashed an after gas cell. He states in a recent book, though the inquiry offers no corroboration, that the "Hindenburg's" Chief Engineer, Rudolf Sauter, who was in the stern, saw that an after cell, shortly before the fire, was "high," and therefore must have lost much of its gas from a hole near the top. Rosendahl, watching from near the mast, felt that "the 'Hindenburg' had often been manoeuvred in such fashion," and Pruss refused to concede that the turn was unusual.

As the ship swung towards the mast, all engines were set on "idle, ahead," and for fifteen seconds gas was valved from the forward cells, Nos. XI through XVI. The after pair of engines were run full astern briefly, to reduce the air speed to about 28 m.p.h. Two or three minutes later, gas was again valved from the forward cells, and as the ship, at an altitude of 400 feet, turned slowly to starboard to face into the light breeze at the mast, ballast was dropped three times from Ring 77, 253 feet from the extreme stern of the ship. From tanks containing 5500 pounds of water, 660 pounds, then another 660 pounds, and finally 1100 pounds were released. Six men, furthermore, were sent forward to the bow to balance the ship when the elevator man complained that she was still tail heavy.

These measures--valving of gas forward to make the ship nose-heavy, and release of ballast aft to lighten the stern--provided a trimming moment of 70,000 to 80,000 meter-kilograms (506,391 to 578,933 foot-pounds), and the tail-heaviness which it indicated was attributed by some of the investigators to a major loss of gas aft. Dr. Eckener, who came out most strongly in favor of the theory that escaping gas had been ignited by electrostatic phenomena, held that this indicated that "the ship was very badly out of trim." Yet his own argument as to the development of the tail-heaviness was inconsistent with his belief that the last turn, ten minutes before the fire, had broken a bracing wire which had slashed open an after gas cell. The tail-heaviness, in his analysis, originated half an hour before the landing when the ship flew through a rain cloud, and persisted up to the landing although, in Eckener's view, the tail-heaviness should have disappeared promptly as the ship dried out. The "Hindenburg's" First Officer, Albert Sammt, felt the tail-heaviness was slight and due to consumption of fuel. The Second Officer, H.W. Bauer, and Commander Rosendahl both felt it was "normal" since the ship had been flying somewhat light and nose-down, with excess weight aft to prevent the tail from rising. One might observe also that if the stern-heaviness had appeared serious or sudden, the release of emergency ballast from Ring 47 right aft would have counteracted such a state more effectively. Some American Navy personnel, watching the approach to the mast, felt she was tail-heavy. The elevator man "could not account for the tail-heaviness of the ship after the ballast had been dropped." Captain Pruss, twenty years after the disaster, strongly disagreed with the view that the tail-heaviness had been caused by loss of gas. "In the control car were remote reading instruments showing the percentage fullness of each cell on a panel, as well as the gas temperature and pressure, and I have no recollection of this instrument show-

ing anything wrong in an after cell or in any other cell."

Coming up to the mast, Captain Pruss backed all engines "full astern," checked the headway of the ship, and dropped the port and starboard trail ropes from the bow, while crew men began paying out the main mooring cable from the nose and other handling lines from the stern. High up on the port side aft, over Cell V, an American airshipman in the ground crew observed the fabric outer cover fluttering. To the supporters of the "accident" theory, this suggested free hydrogen ascending inside the cover from a major gas cell leak; to others it might have been caused by a faint breeze which took the ship on the port beam. Moving to starboard, the 804-foot bulk took a strain on the port trail rope, which had been married to the port yaw line and led to a winch. At this moment, four minutes after the trail ropes had first touched the ground, spectators saw flame on top of the ship aft, ahead of the leading edge of the top vertical fin and over Cells IV and V.

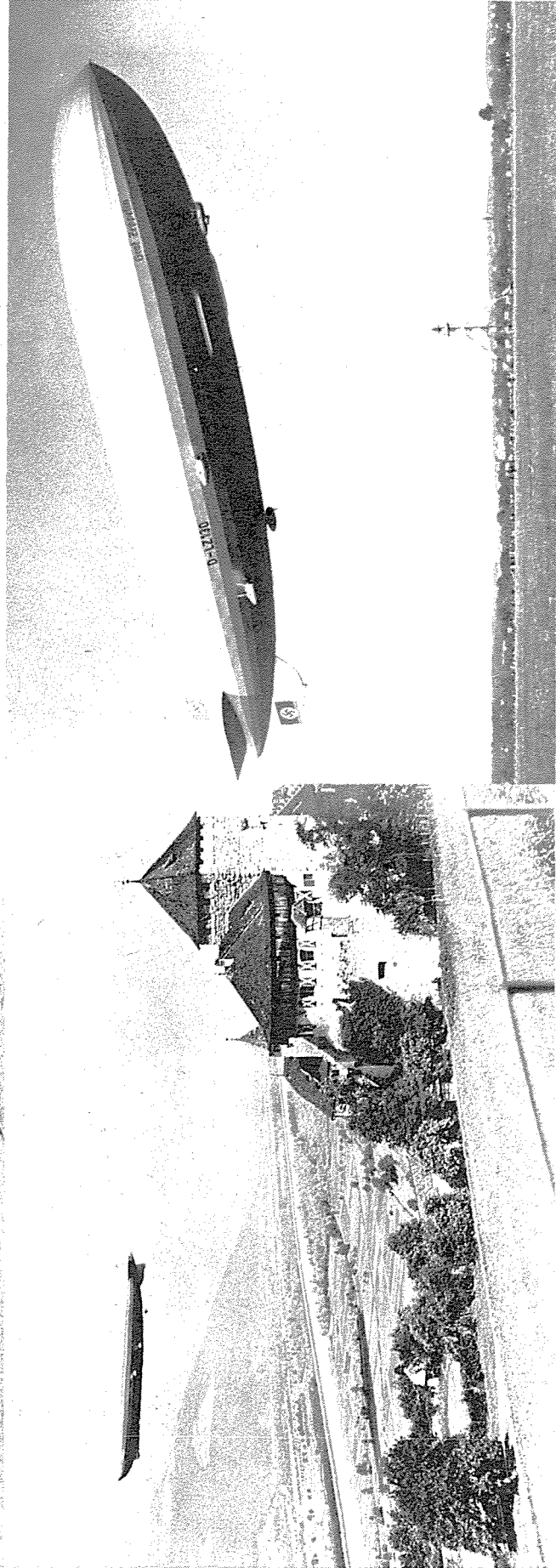
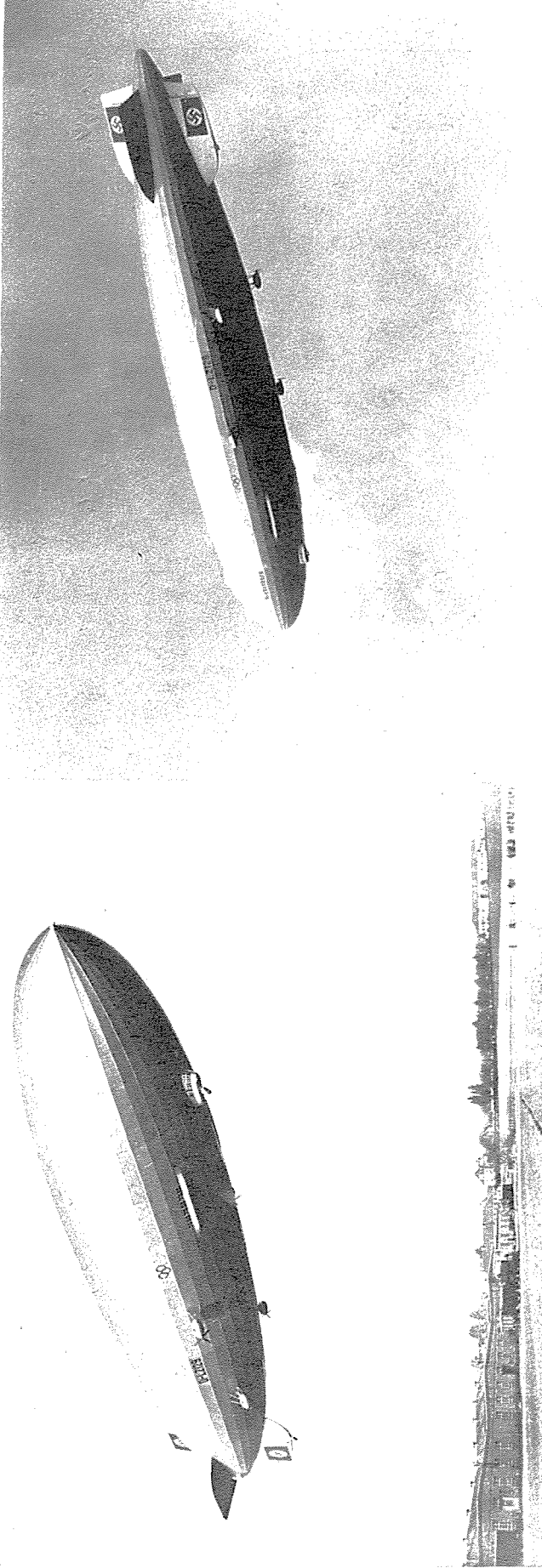
The rest of the story is all too well known, and commemorated forever in photographs which shocked the world. Yet, from the testimony of three crewmen in the stern of the ship when the fire started, and who miraculously survived, the possibility remains that the fire originated inside the ship and spread upwards and outwards. Helmut Lau, Helmsman, standing on the ladder leading up from the lower vertical fin to the catwalk, and hence underneath the after end of Cell IV, apparently saw the start of the fire inside that cell: "Heard above him a muffled detonation and saw from the starboard side, down inside the gas cell, a bright reflection on the front bulkhead of Cell No. 4. He saw no fire at first, but a bright reflection through and inside the cell. The cell suddenly disappeared because of the heat. Then Cells 3 and 5 caught fire. This witness said he did not see the center of the origin of the fire, but it must have been farther up since he saw the reflection of fire through the cell wall material." A man letting out the after mooring cable slightly farther aft "heard a muffled detonation" and "was surrounded by fire immediately." Rudolph Sauter, down in the lower vertical fin, was silent on loss of gas from any cell, but testified that he "first heard a dull detonation, then saw fire in Cell No. 4, a big fire, which he identified as a hydrogen fire."

The day after the catastrophe, the Secretary of Commerce appointed a board "to investigate the facts, conditions and circumstances of the accident involving the airship 'Hindenburg'." The American board met and heard testimony from May 10 to May 28, and on the fourth day was joined by the German Commission appointed by Reichsmarschall Goering to investigate the accident. Among the Germans were Dr. Eckener, Dr. Ludwig Dürr, the Chief Engineer of the Zeppelin Company, and Professor Dr. Max Dieckmann, a noted authority on electrostatics and atmospheric electricity.

Both bodies issued separate reports, but there was a remarkable near-unanimity in their conclusions. After gingerly touching on the possibility of sabotage, both reports conclude that an accident--"a cooperation of a number

of unfortunate circumstances in a case of force majeure" --was the most likely occurrence. It was agreed that free hydrogen must have been present in the stern, and must in some accidental way have been ignited. In reviewing individual statements of opinion, it would seem that the two reports were largely influenced by the views of Dr. Eckener, who persistently held to a belief in a leak in an after gas cell, perhaps caused by a broken bracing wire; and those of Professor Dieckmann, the electrical expert. It was considered that the leakage of hydrogen was demonstrated by the dropping of ballast aft, and by the fluttering of the outer cover immediately before the fire. Some other possibilities were mentioned--gas had been valved from all cells ten minutes before the accident, and it was possible that the manoeuvring valve of Cell IV or V had stuck open, permitting continuing escape of gas. (Standing orders for the German Naval Airship Service in World War I required that when the ship was "light," gas would be released through the automatic valves by rising over pressure height, rather than using the hand-operated manoeuvring valves which tended to stick open and which, in the top of the ship, were practically inaccessible.) Other causes for the presence of free gas, such as decreased or inadequate hull ventilation, a major structural failure in the stern, or breakage of a propeller with fragments flying into a cell, seemed unlikely then and seem so today.

Numerous possible explanations for the ignition of the free gas were considered and discarded: sparks from broken wires, hot carbon particles from the engine exhausts, the ship's own radio (an operator in the radio room at the time of the fire testified that all transmitters had been secured fifteen minutes before) and high-frequency induction in the ship's hull from an external radio transmitter. The only logical possibilities remained in the field of electrostatics. The basic theory here, as set forth in a later paper by Professor Dieckmann, is that an airship flying in the earth's electrical field will develop a positive or negative electrical charge which may differ from that of the ground by as much as 10,000 volts under normal circumstances, and in thunderstorm conditions, may increase to 100,000 to 200,000 volts. If the ship drops a line to the ground there will be an equalization of charges through the line between the ship and the earth; with a poor conductor, such as a dry hemp trail rope, this equalization will take up to several minutes. Thereafter the airship, having the same charge as the ground, "becomes a piece of the ground elevated into the atmosphere." Then, if there is a marked potential difference between the ground and clouds overhead, the ship itself may discharge electricity into the atmosphere--the so-called brush discharge, or St. Elmo's Fire. Professor Dieckmann was impressed by the fact that the fire broke out four minutes after the port trail rope touched the ground--long enough, he believed, for the ship's own electrical charge to have been grounded through the manila line, and for her to assume the same charge as the earth. Though no brush discharges were seen on the ship during the landing manoeuvre, the American report held that they could have been present, unseen, since it was still daylight, and that "such a discharge likely would have ignited any adequately rich stream of leaking hydrogen that reached it; and that from the point of ignition the flame would have shot



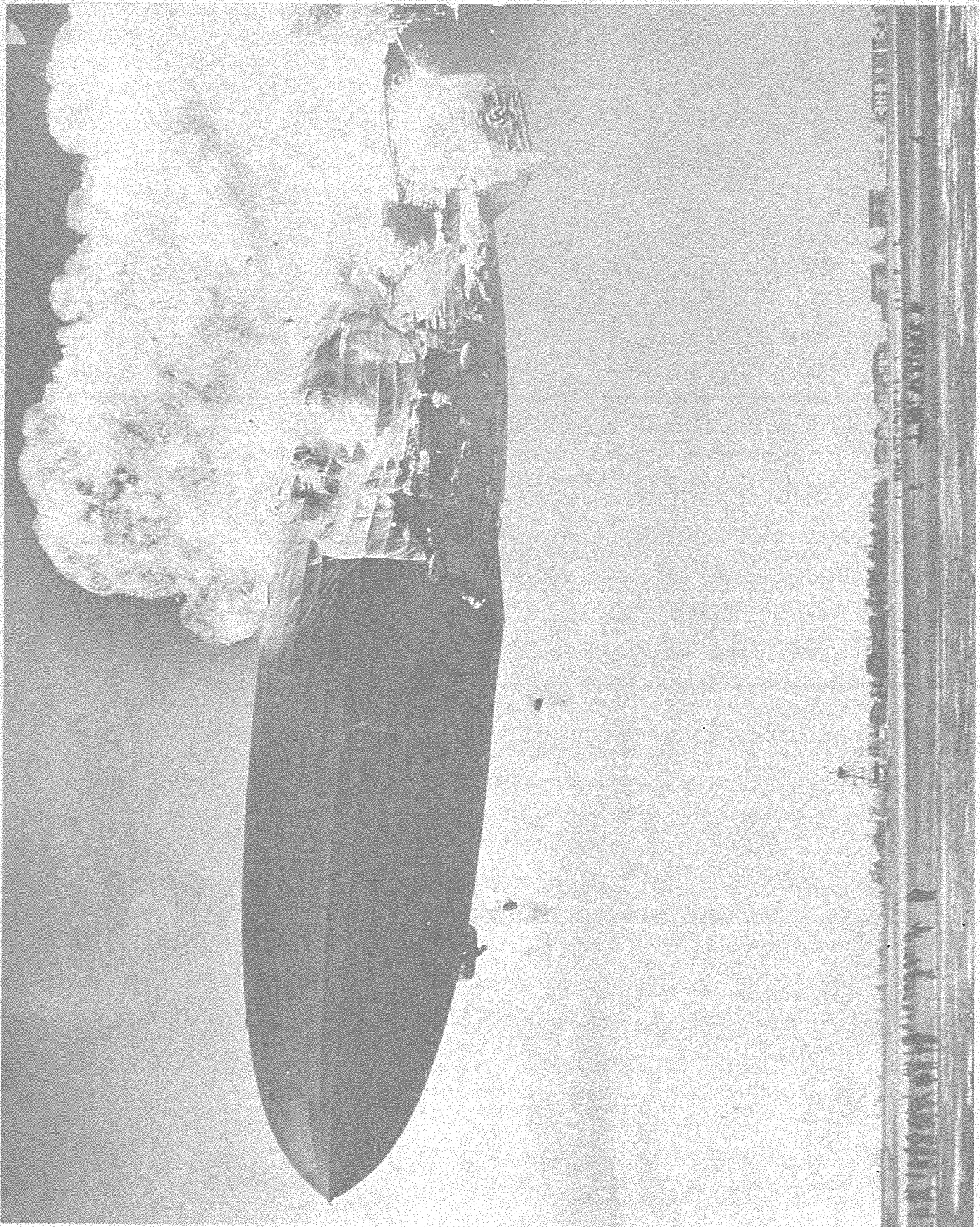
THE GREAT GERMAN RIGIDS - "HINDENBURG" and "GRAF ZEPPELIN"

Upper - Early trial flight of the LZ-129 "Hindenburg". The name was not yet painted on the bow. (Koch)

Lower - The great world traveller, LZ-127 "Graf Zeppelin". (Koch)

"Hindenburg" (Luftschiffbau Zeppelin)

The new "Graf Zeppelin", LZ-130, on its first flight at Friedrichshafen, September 14, 1933, then fitted with tractor engine gondolas. (Luftschiffbau Zeppelin)



END OF AN ERA OF AERONAUTICAL GREATNESS

Keller-I.A.S. Collection

back to the leak, there quickly would have burnt a larger opening and set going a conflagration of great violence and rapidity." The German report offered a somewhat different explanation, a personal opinion of Professor Dieckmann: Dampness of the outer cover could have permitted a spark to jump from the fabric cover, a semi-conductor, to the metallic framework, which, being better grounded, could more rapidly assume a different electrical charge--that of the ground.

Professor Dieckmann lists in his paper five circumstances involved in the causation of the catastrophe:

1. Apparently there was a combustible mixture accumulated under the top cover in the after part of the ship, favored by the absence or decrease of slip-stream ventilation due to the ship being stopped.
2. It was raining and precisely this portion of the stern can be regarded as the wettest portion; one can consider this a very wet area.
3. A high landing was being made, meaning that the potential gradient over the ship, and with it the total difference of potential, was greater than if a low landing was being made.
4. At the time of the landing a secondary thunderstorm was present, and during such a period it is common knowledge that the potential gradient can vary greatly and rapidly.
5. It was raining and the trail ropes were steadily growing wetter and more conductive.

Had any single one of these circumstances been absent at Lakehurst, the fire could not have occurred.

Complicated? Improbable? So it seems, though the German commission, after its return to the Reich, conducted model experiments in government laboratories and at the Zeppelin works which, it is claimed, produced a fire every time when the five circumstances were experimentally reproduced.

"But the possibility of deliberate destruction must be admitted in view of the fact that no other originating cause can be proven,"¹ reads the German report. A finding that sabotage was likely would have been extremely embarrassing to both the American and German governments at a time when public opinion was inflamed by Nazi rearmament, the illegal occupation of the Rhineland, the Anti-Comintern Pact, and the persecution of dissidents and Jews. Both sides seem to have been anxious to discount in advance such an opinion, and Dr. Eckener, after having discussed possible sabotage with a newspaper reporter the morning after the accident, was forced by Government officials to make a broadcast to America denying the possibility. Both reports state, with no details, that security measures before and during the flight were adequate, and that a thorough search of the wreckage had uncovered no

¹Underscoring inserted.

evidence of a bomb. Yet a small non-metallic incendiary device, concealed adjacent to a gas cell, could, in simple and deadly fashion, have caused all the phenomena observed in the Lakehurst catastrophe, and would itself have been consumed. Ernst Lehmann, the experienced operations chief of the Zeppelin Reederei, whose mind remained clear during the long night and a day before he died of his burns, could only conclude in a last conversation with his friend Rosendahl, "It must have been an infernal machine." Within a year, Rosendahl was to publish an account in which he drew attention to such a possibility. He appears to believe that such a device might have been put in place in flight, and might have been pre-set when it was expected that the ship could be moored to the mast at 6 p.m., and would have been empty thereafter of passengers and most of her crew. Captain Pruss pointed out that at Ring 62, between Cells IV and V, a 60-foot ladder led upward from the keel between the gas cells to the axial gangway running through the center of the ship--one of three such access ladders, the others being amidships at Ring 122, and forward at Ring 182, just ahead of the passenger quarters. A saboteur would obviously have chosen the ladder in the quiet, relatively desolate stern, in which to secrete his device. Twenty-two years have passed, however, and none of the post-war anti-Nazi revelations have shed any light on the possibility that the "Hindenburg" was deliberately destroyed. What could be the motive? Who would have done such a deed? The saboteur--if he existed--would almost of necessity have been a crewman--passengers were allowed outside the passenger quarters only under escort--and he could have been one of the 22 who died.

With the new LZ 130 "Graf Zeppelin II" the Zeppelin Company expected to carry on. For a time hopes were high, for American lawmakers, horrified by the funeral pyre on their doorstep, hastened to amend the Helium Control Act to permit the export of limited amounts of the gas under strict control. Six Cabinet members were required, however, to agree unanimously to the issuance of each permit--and one of the six, Secretary of the Interior Harold L. Ickes, resolutely set his face against any aid to the Nazis. In the spring of 1938, after the rape of Austria, Dr. Eckener left Washington empty-handed, still hearing the Old Curmudgeon's accusation--"your Hitler is going to make war!"--and knowing it was true.

Though she never carried a paying passenger, the LZ 130 made a number of flights with hydrogen as the war clouds gathered--the most notable being a secret voyage up the English coast in March, 1939, loaded with electronic gear and technicians to spy on the future enemy's radar network. On the outbreak of war, she and the old "Graf" were hung up in the two hangars at Frankfurt. Hermann Goering was determined to destroy them, and though Captain Pruss, recovered from his terrible burns, enlisted the support of Dr. Todt, the engineering mogul of the Nazi regime, it was not enough. In the spring of 1940 the ships were broken up, and on May 6, 1940--the "Hindenburg" anniversary--the two hangars, by Goering's direct order, were wastefully dynamited.

Was it the end? Max Pruss today still thinks not. With the slogan, "If you want to travel quickly, take an airplane. If you want to travel comfortably, take an airship," he is today striving to win support for a new super-"Hindenburg," to contain some 7,770,000 cubic feet of safe helium, and with diesel engines. After flying the Atlantic by plane in twenty hours of cramped discomfort, I wish him success.

BIBLIOGRAPHY

VDI: Zeitschr. des Vereines Deutschen Ingenieure. Das Zeppelin-Luftschiff "LZ 129." 28 März 1936. p. 378, "Das Zeppelin-Luftschiff 'LZ 129'" von W.E. Dörr. p. 393, "Betriebsanlage des Zeppelin-Luftschiffes 'LZ 129'" von Fritz Sturm.

Preston R. Bassett, "The Hindenburg--Some Measurements," U.S. Air Services Magazine, December 1936.

U.S. Department of Commerce, Report, Airship "Hindenburg" Accident Investigation, July 21, 1937.

Department of Commerce, Bureau of Air Commerce, Safety and Planning Division, Report #11. The Hindenburg Accident. A Comparative Digest of the Investigations and Findings, with the American and Translated German Reports Included, August 1938.

M. Dieckmann, "Bericht über die elektrischen Untersuchungen aus Anlass der Hindenburg-Katastrophe (photostat copy, publication not given.)

Rosendahl, C.E., "What About The Airship?" Scribner's, 1938.

"Massnahmen zur Verbesserung der Zeppelin-Luftschiffe für den Fernverkehr," von Ludwig Dürr. June 17, 1938. Schriften der Deutschen Akademie der Luftfahrtforschung, Heft 2.

Eckener, H., "Im Zeppelin über Länder und Meere," Verlagshaus Christian Wolff, Flensburg, 1949.

Interview July 24, 1957, with Capt. Max Pruss, Neu-Isenburg.
