

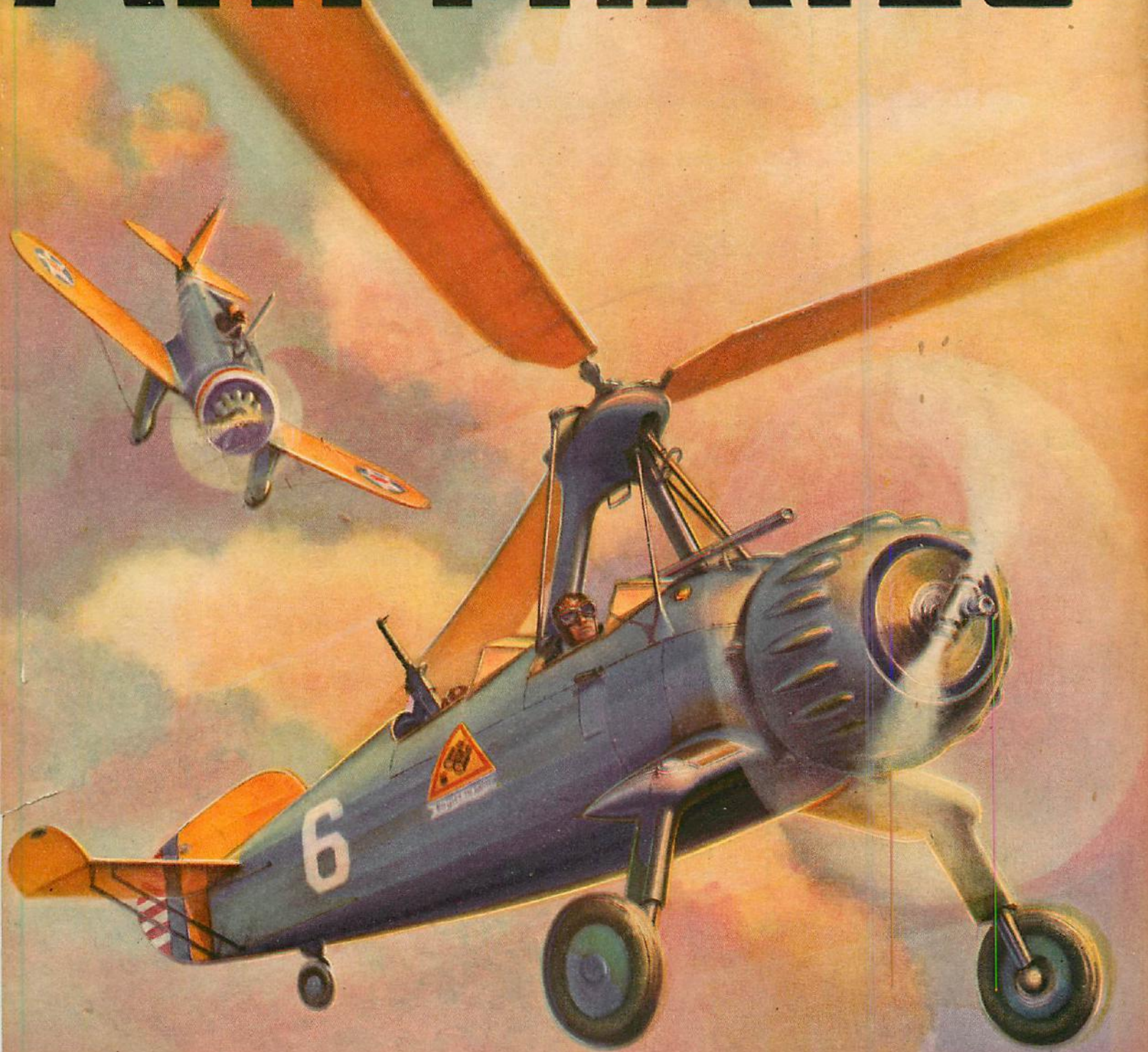
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1936

BILL BARNES

JUNE 1936

# AIR TRAILS



BILL BARNES ROARS THROUGH THE SKIES TO ANOTHER AMAZING ADVENTURE  
**BRETHREN OF DEATH** by **GEORGE L. EATON**  
MODELS • FEATURES • SHORT STORIES • NEWS



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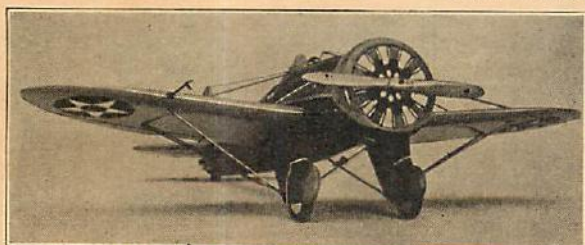
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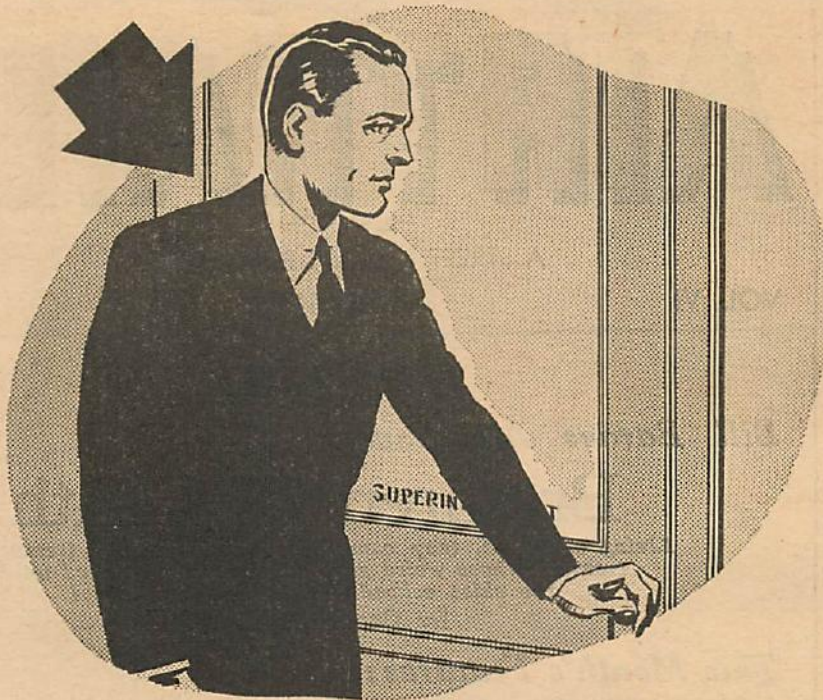
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Official U. S. Navy photo

CAPTAIN  
ARTHUR B. COOK

Into the leadership of the navy's air affairs next month comes Captain Arthur B. Cook. He will assume the post of chief of the Bureau of Aeronautics vacated by Rear Admiral Ernest King, whose tour of duty expires then, and who will become aircraft base force commander. Captain Cook, like Rear Admiral King, was a navy man for several years before aircraft began to be considered seriously as a service arm. He came to Annapolis from Evansville, Indiana, his birthplace, was graduated in 1905, and thereupon began a busy career that carried him aboard 13 ships and into many shore stations. He caught up with aviation in 1928 at Pensacola, qualifying as naval aviator. Since then he has served in several air jobs, among them commander of the carriers "Langley" and "Lexington." He will take the title of rear admiral when he shortly becomes head man of all naval aviation.



Next Month:

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LANCER STRIKES  
A great Bill Barnes novel in  
a bigger magazine packed  
with surprises!

# BILL BARNES AIR TRAILS

Reg. U. S. Pat. Off.

A STREET & SMITH PUBLICATION

VOL. VI

JUNE, 1936

NO. 3

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## Brethren Of Death

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*Living skeletons, they came to regain a deadly treasure—a treasure whose weird glow inflamed men's greed until the skies echoed with bullet-borne hate!*

by George L. Eaton

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# Bill Barnes—Air Trails

## Will Be Bigger Next Month

The magazine has grown in the favor of aviation readers until it becomes necessary to increase its size in order to include all the features the readers demand.

There has been an increasing number of requests for more models, more pictures, more special articles, more stories, more of everything—and there hasn't been room enough between its covers!

So—we are giving you more—of everything

### NEXT MONTH

The July issue will carry the finest collection of authoritative model plans we can assemble; including flying models and scale models.

In addition to the Bill Barnes Novel there will be novellettes and short stories of the air. More fiction!

We will have room for more photographs, more features—more of everything that goes to make up the finest aviation magazine on the news stands.

Watch for it. Mention it to your friends. BILL BARNES—AIR TRAILS is going ahead with its program of expansion. It has every worthwhile feature in aviation.

The bigger, more complete magazine will be 15c per copy. You'll like it better.

Don't miss the July

# Bill Barnes—Air Trails

15c per copy    Out in June    15c per copy



# This Winged World



U. S. Navy official photo

STEARMAN NS-1 primary trainers, part of the fleet of 61 recently delivered to the navy for cadet instruction, line up before the air training station at Pensacola. Engines are 220 h.p. Wrights.

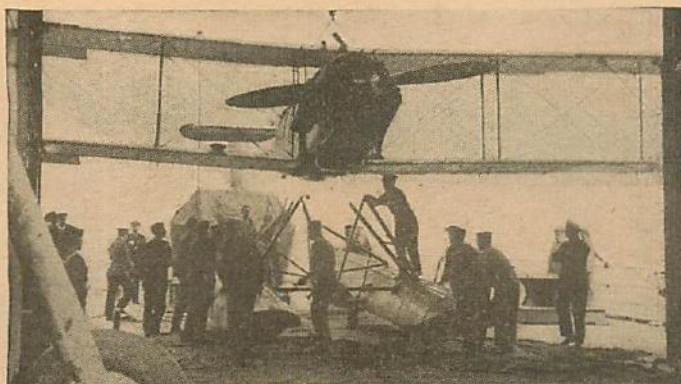
BEAR hunting with camera seems to be hobby of Igor Sikorsky, famed plane designer, shown on vacation at Miami.

ONE-EYED monster; akin to Cyclops of ancient myth (the man's looking it up) pleases Delta pilots who differed on location of lights. Other light is in Lockheed Electra's left wing.



SNOW may fall and thermometer freeze solid, but army Martin bombers weather it out during winter tactics with portable shelters.



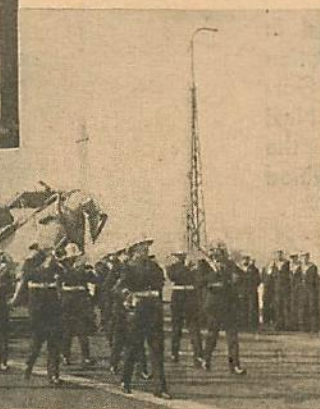


THREE views of life aboard a British aircraft carrier show what you'd see if you could drop in at different times. These pictures were taken on the "Furious," 10,100-ton former cruiser converted after the war. At left, aircraftmen are hard at work changing a Fairey III-F to seaplane use.

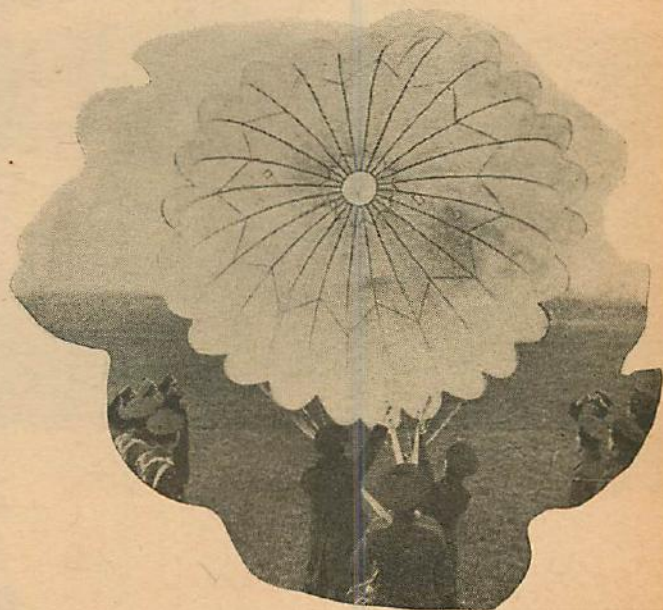
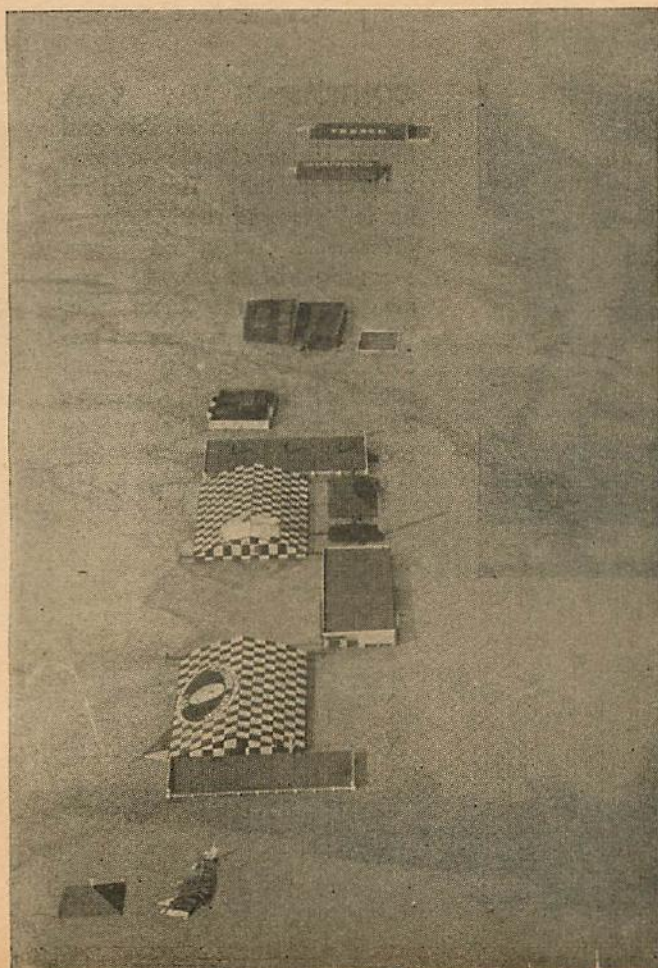
DRESS parade and inspection brings out the band, with everybody slicked up and the planes posed in orderly lines, each with prop in "present arms" position.



FLOOD from Connecticut River covered Hartford's airport 14 feet deep, hindering here the fine relief work done by planes during spring disasters. This is a good argument for amphibians!

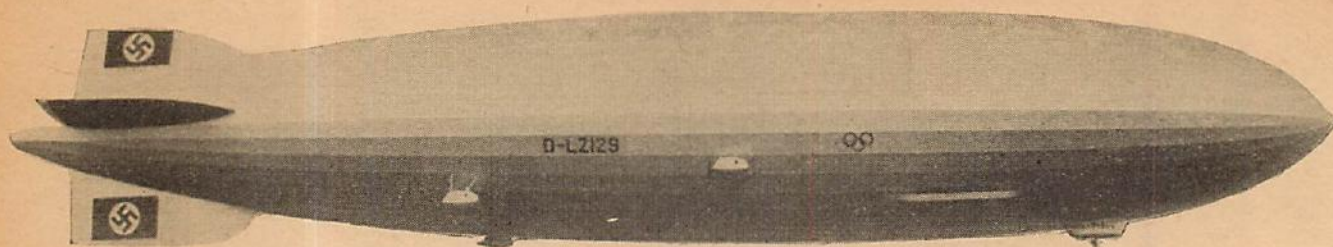


WHAT'S this below? Are these the furious fliers, the doughty warriors of the sky? Yep, and they're playing a game of hockey after the day's work.



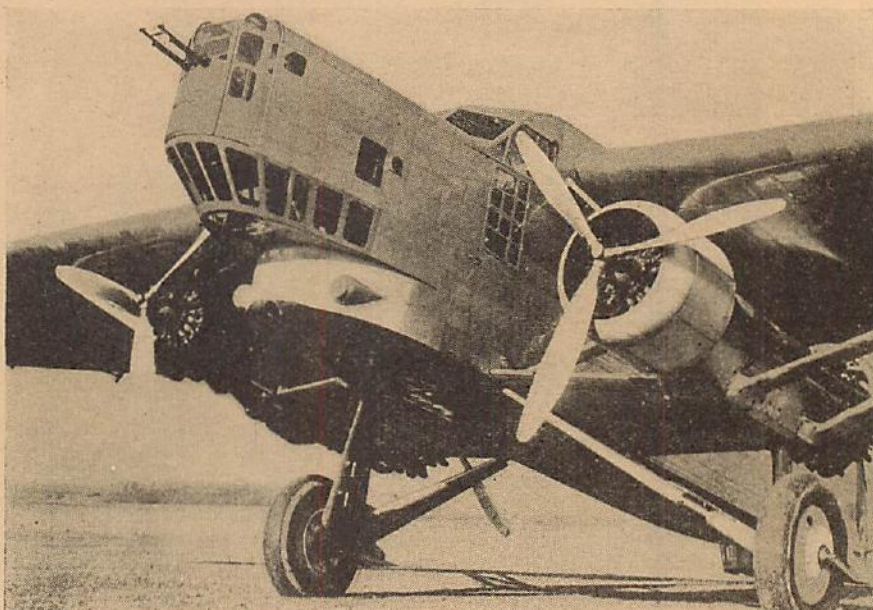
SPILLING the wind out of a parachute is an art that has to be learned. Judging from the patches visible in the silk, this "aerial lifebelt" has suffered considerable practice.





D stands for Deutschland in the international registration number of the LZ-129; Germany also displays the Nazi insignia and advertises the Olympic Games' intertwined loops.

FRANCE'S Farman F-221 all-metal bomber looks business-like. In that aggressive nose, besides gunner's cockpit, are bomb releases for the load of destruction carried within the fuselage. Four engines are arranged in puller-and-pusher pairs. Top speed is 171 m.p.h.



CONTRAST in Uncle Sam's bombers is shown at side and below. Recognize the Keystone B-6A at the left? This "old reliable," pictured ready to leave Brownsville, Texas, on recent mass flight of 24 army replacement planes to the Canal Zone, "struts" through the air on two 575 h.p. Cyclones at a top speed of 121 m.p.h. Boeing's 299 below, 13 of which are on order, flies twice as fast and two or three times as far!

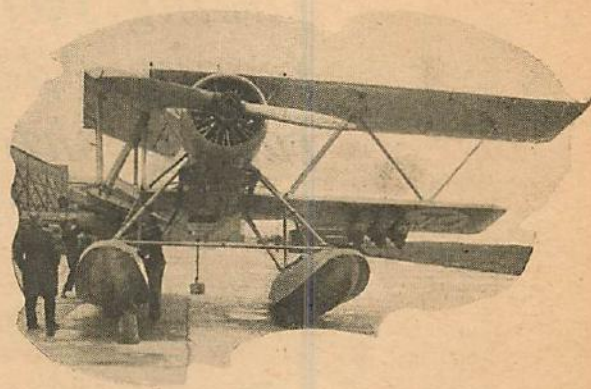






TRAGIC transport came to light after five months' submersion in Great Salt Lake. The Douglas DC-2 of the Standard Oil Company disappeared Oct. 6 with two pilots and mechanic on flight to Alameda. Located after long search, it was towed under water 23 miles by tugboats to railroad trestle for hoisting.

PORTUGAL, whose insignia can be seen under lower wing, is adding six Blackburn Shark folding-wing reconnaissance-bombers to its air force. Here's one preparing for test. It does 152 on 14-cylinder Tiger.



SHEEP serve as lawn-mowers on England's Lympne airport. When a plane wants to land, the shepherd's dog drives them off in a jiffy.

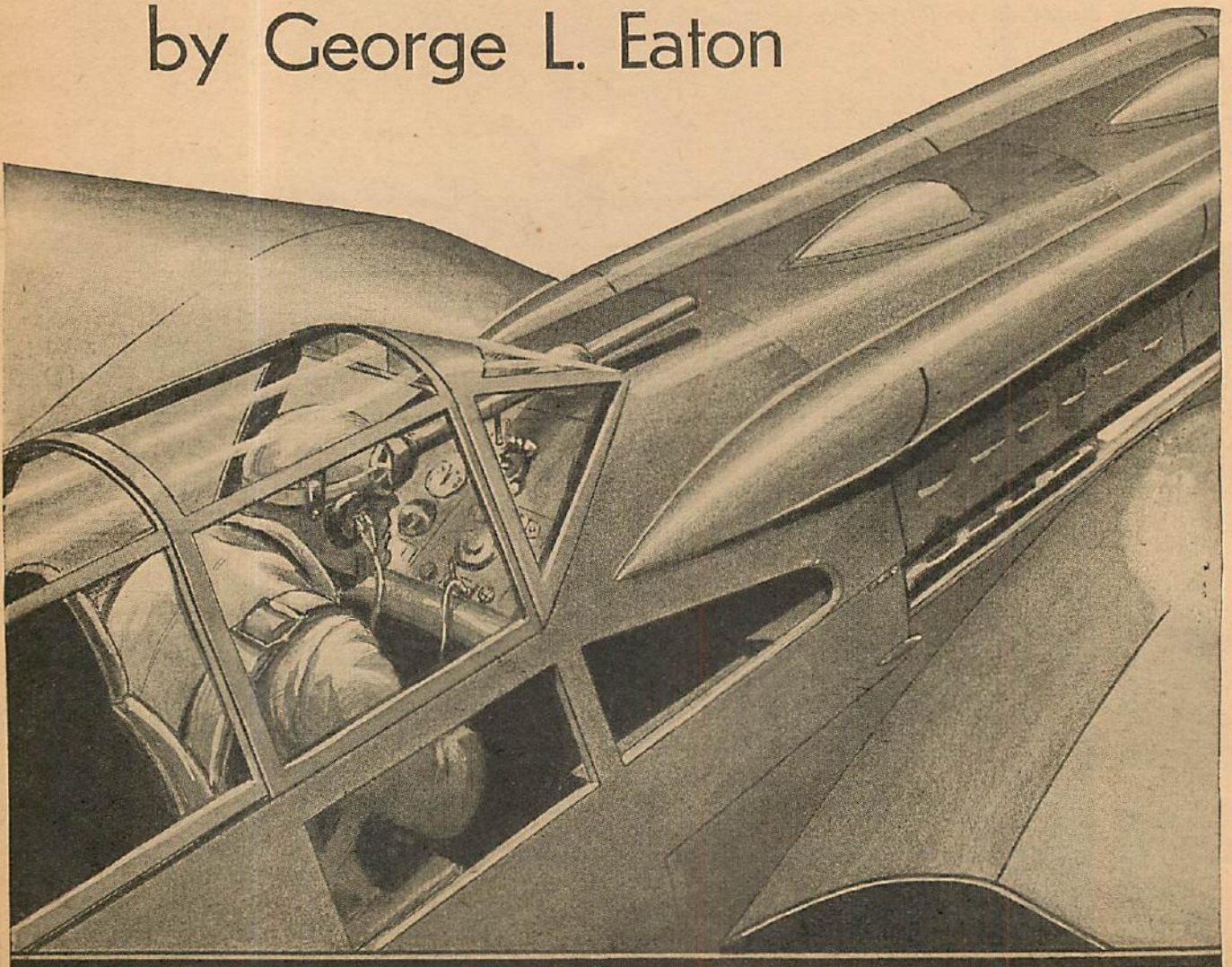




# BRETHREN of DEATH

*Living skeletons, they came to  
regain a deadly treasure that  
cast a shroud of hate over  
bullet-streaked skies!*

by George L. Eaton







*A Great  
Bill Barnes Novel  
of Air Adventure*

F. HINSLEY



THE long-term convict, hard-eyed and pinch-faced, crossing Sing Sing's recreation yard, brushed past the youth who was to be paroled the next day, and said from motionless lips: "Go see Nick Laznick."

The craven, yellow-skinned killer, slipping through the crowded Singapore streets, heard a stifled voice say: "Nick Laznick in New York."

The suave confidence man, lolling back in his luxurious suite in the Hotel Imperial in Melbourne, Australia, said softly into the telephone: "Nick Laznick sent me."

The brutal-faced sailor, leaning across the stained bar in Nome, Alaska, motioned the barkeep to him and muttered: "It's a Nick Laznick job."

The name was carried by hushed whispers from underworld to underworld; from London's Whitechapel to San Francisco's Chinatown; from the dives of Cairo to the night clubs of Chicago. It purred into cautious ears and out of guarded mouths. It spread like an evil plague and became not only a name, but a legend—a symbol of the might and power of organized crime. It brought hope to some and to others, terror.

It crossed the hearing of the murderer, Captain Gregory Slade, more than once in his headlong flight from England and the man hunters of Scotland Yard. He heard it murmured on the high seas as he labored, hidden, in the hold of the freighter. He heard it in the dives of Rio de Janeiro and along the wharves. He heard it again as he sweated in the engine room of the liner bound for the United States and New York.

The name was ever before him, vibrating through his senses, bringing the only ray of comfort to his never-ending nightmare of blood. It drew him finally from the belly of the ship as she lay docked in the East River. It guided his furtive steps along Manhattan's teeming thoroughfares and brought him, cautious and wary, into the gloom of the elevated tracks which roofed Third Street. It directed his eyes to a brownstone house and to a large neon sign that blazed outside.

He read the words: THE DECK. Then the haunting fear that had tormented his twisted little soul abated. The feverish pilgrimage to the mecca of evil was over. Before him was shelter from pursuit—the headquarters of the fabled crime director—the headquarters of Nicholas Laznick.

He stepped rapidly under the green canvas canopy and up the dull, red-stone steps. He pushed through plate-glass doors and stopped, blinking, in a dimly illuminated anteroom. He saw a man in dress clothes glide out from the shadows. Slade wet his lips to speak. But all the confidence and glibness that had once been his suddenly deserted him. He realized that all his pent-up, terror-stricken hopes had been based on rumor alone. Stumbling, meaningless words came to his lips and died unspoken.

The man beckoned, turned and went down a narrow passageway. A door was thrown open and Slade was motioned through. The door closed behind him, and his guide vanished without uttering a word.

Slade stood motionless, suddenly acutely aware of his unkempt appearance. The windowless room was luxuriously furnished, and beyond, through an opening, gleamed a tiled bathroom. Clothing was laid out on the single bed. And Slade, hardened to the sequence of strange events, could scarcely stifle a gasp of amazement as he inspected the clothes.

The suit was of heavy brown tweed, the precise style

and quality he had always worn. The underclothes, the white broadcloth shirt, the socks, were his correct size. On the floor was a pair of heavy Scotch brogues, perfect as to fit and taste. On the dresser were gloves, tie, soft hat and a cane. The entire outfit, from shoes to hat, was as perfect as if he, the once-discriminating dresser, had himself chosen it.

He inspected the bathroom, and his eyes widened in amazement. The bathtub was filled with water, heated to the right bathing temperature. On a gleaming shelf, shaving equipment had been neatly laid out.

He eagerly bathed, shaved and dressed. He stood in front of the full-length mirror, arrayed in his new garments, and stepped back to survey himself. His long, lean face was pink from the soap and the razor. He stroked his inky-black mustache, flattened his thick eyebrows and wet his lips. He straightened his shoulders and smirked in delightful appreciation of the tall, well-groomed, distinguished man in the glass.

Gone was the slinking, filthy fugitive from justice. In his place was once again the smooth, confident Captain Gregory Slade—the polished gentleman adventurer, the poised craftsman and the dangerous foe. Gone, too—or rapidly dimming—was the fear that had remained his constant companion for months. And fainter now in his ears, almost indistinguishable, was the death rattle of his slaughtered victim. He had come to Nick Laznick—and a miracle had happened.

He smoothed back his sleek, black hair, thrust his hands in his pockets and rocked on his heels. His smirk turned into a laugh. And his old conceit swept back in an intoxicating rush.

Laznick had obviously known and prepared for his coming. Laznick had heard of his brilliant operations in England and on the Continent. Laznick could overlook his one blunder when rage had superseded judgment and he had killed. Laznick knew a criminal genius when he saw one.

He would be coming soon to confer—perhaps even to propose that they make an alliance—the brains of Europe and the brains of America. It would be as well to be prepared to offer a brilliant scheme that would dazzle even the great crime director. The germ of such a scheme had been resting in Slade's mind ever since he had overheard some confidential information on board ship—information of the secret activities of the world-famous ace, Bill Barnes.

He turned from his self-adulation, selected a cigarette from a container and dropped into a comfortable chair. He lay back, smoking, mulling over the enormous profits that would certainly be gained by his daring plan. And he waited in a rosy glow of speculation for the expected visit.

But no one came. No sound was heard. Latent curiosity took Slade to the one door in the room—the door through which he had entered. It was only then that he perceived that it was a solid-metal slab, fitted flatly into the wall, without knob or projection of hinges. He ran exploring fingers around its edge, seeking a hidden spring and, finding none, applied his shoulder roughly against the panel. The door held, firm and unyielding. And, with vague misgivings, he realized that he was—a prisoner.

OF NICHOLAS LAZNICK'S history prior to 1930, there was little, if anything, known. He had suddenly



come into notice that year when he had purchased a run-down Bohemian restaurant on Third Street in Greenwich Village.

With a lavish hand, he had converted the ground floor into a luxurious night club and the three other floors into undercover gambling rooms. The success of his venture had been practically instantaneous. The floor show, the orchestra, the cuisine, were the best that money could buy; the gambling rooms offered every known game of chance from roulette to faro, in a Park Avenue setting.

Millionaires and professional gamblers flowed through the portals of The Deck and mingled with débutantes and small-salaried clerks. Some came to sway to the Deckhands' seductive music, others to wager bank notes on the roll of the dice.

To the public at large, that was all The Deck was. But in England and elsewhere, Slade had heard a different story—a story of secret rooms in the old house and sliding panels; of subterranean passages and mysterious exits; of a flourishing crime agency with law-

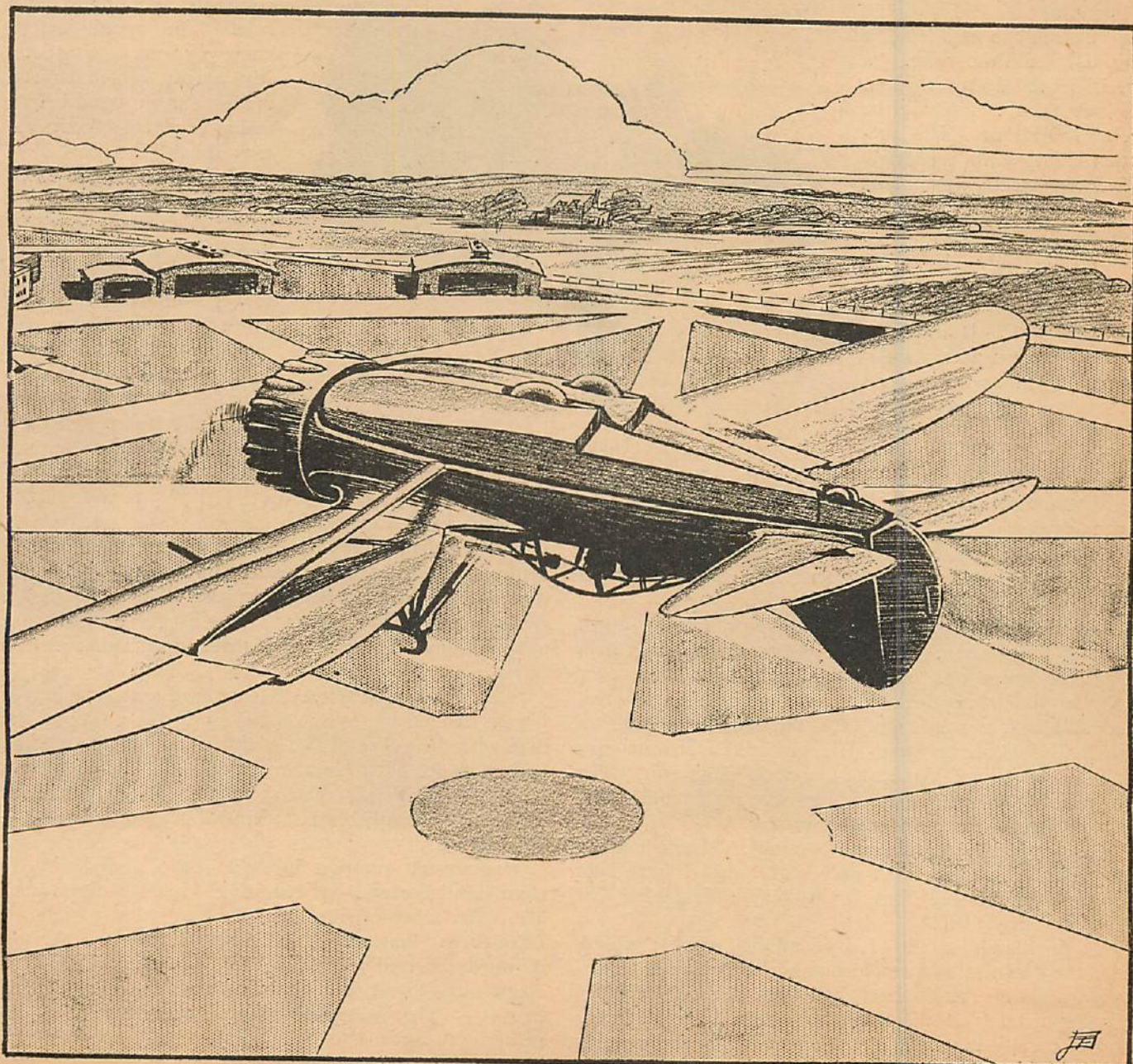
breakers of all classes registered and always on call; of Nicholas Laznick in a hidden office, controlling a network of agents and directing cunning machinations.

He had heard of vital information crackling into the secret headquarters by coded short-wave messages and of careful assignments to picked men; of a percentage of all profits automatically reverting to Laznick and of disaster falling swiftly on double-crossing clients and cheaters.

He had heard, also—and a shiver coursed through him—that whoever registered with Nicholas Laznick had, in effect, sold his soul to the devil. From that moment on, Laznick was his master and the dictator of his destiny. It was the price to be paid for the rewards and protection that the crime director guaranteed.

With growing nervousness, Slade waited. Every minute was an eternity. He found himself regretting that he had ever come to The Deck. He found himself lapsing back into his old terror-stricken state of mind.

He waited another hour—and then he met Nicholas Laznick.



The sleek little monoplane was roaring dead for the field—upside down!



It happened with terrifying suddenness. Slade had ground out a cigarette on an overflowing tray when he heard a sharp hiss. He swung around, startled, and saw billowing clouds of white vapor sweeping across the room.

He lunged to his feet, a shout of alarm wrenched from his lips. The entire room had suddenly been filled with the swirling whiteness. The walls, the ceiling, even the floor, had vanished. The stuff swept over Slade, blinding and terrifying him. He took one frenzied step forward and froze as a voice came through the fog—a voice near at hand, directly in front of him.

"Don't be alarmed, captain." The words were soft-spoken in the slow, precise English of a foreigner.

Slade felt perspiration ooze out on his body. "Who's that?"

He could see no one. He thrust out his arms, slashing at the white vapor as a swimmer in water. The whine of an electric motor sounded. The fog began thinning and Slade saw a vague shape materialize before him.

"Permit me to introduce myself," said the voice. "I am Nicholas Laznick. In a minute the room will be clear of fumes. The suction pumps are working."

Slade stood motionless, his eyes staring through the diminishing mist. The figure of the man came nearer, clearer.

"Please sit down," Laznick said. "I am afraid my smoke screen has startled you, captain. It is quite theatrical—but quite necessary. No one must know of the secret entrance to this room."

Slade sank back to his chair, unnerved. He saw that narrow vents near the ceiling of the room had opened and that the vapor was being sucked swiftly through them. And then, as rapidly as it had filled, the room was back to normal.

Laznick was standing, hands on hips, looking down at the Englishman. Slade's eyes swept over him in a hurried inspection. He was a giant of a man, over six feet tall, with the physique of a professional wrestler. His face was round and fat, with deep pouches under bright agate eyes. He was bald. His massive figure was incredibly neat in a dark serge suit. The huge fists that rested on his hips were pudgy and white. On one finger glinted a great diamond.

The master criminal smiled genially. "I am honored by your visit, captain. I only regret that I have kept you waiting so long, but I was busy with a plan that may concern you."

Slade found his throat dry and his mind confused. All the coolness and confidence he had planned to display when he met Laznick had been completely routed by the manner of the man's arrival. He tried frantically to rally his wits, to tell this man of the cunning plan he had conceived, but when he spoke it was to blurt abrupt questions.

"How do you know who I am? How did you know I was coming here?"

"You are too modest, captain," said Laznick. "Who has not heard of the daring sky bandit who swooped down from the air to terrorize all England and France and Germany? I have followed your career with great interest and admiration. And I was extremely grieved when I heard the news that you had been forced to shoot and kill a Scotland Yard detective. It was unfortunate. It definitely spelled the end to your brilliant career overseas. And Scotland Yard operatives are persistent fellows—especially when one of their own number has been killed."

Laznick paused and leaned forward. "It might interest you, captain, that Scotland Yard has already traced you to this city. Our local police has been asked to pick you up."

Slade came half out of his chair. "Do they know I'm here? Are they coming after me?"

The big man gestured with both hands. "While you remain with me you are safe. You asked how I knew you were coming here. My agents reported your movements in detail before and after your fatal encounter with the detective."

"When you headed north from Rio de Janeiro on a New York-bound liner, I knew you were coming to see me. They all do—when they get into trouble. If I think they will be of use in my business, I do all I can to help them—as I have for you. If I have no use for them—the police generally pick them up before they arrive here." Laznick laughed

softly. "So, my dear captain, I believe you will be useful to me and me to you."

His eyes drilled into Slade. His manner changed suddenly. He sat up erect. His words were crisp as he shot out: "You are a good airplane pilot, Slade, and a clever, unscrupulous crook. I have use for both of those qualifications. You wish to register in my agency? Yes or no!"

Slade's body was tense. He realized with a feeling of horror that he was now completely in the power of the man with the police of two countries hot on his trail; he had no choice but to mutter: "Yes."

Laznick nodded. "You are wise." He jabbed a fat finger at the Englishman. "You've heard of the pilot—Bill Barnes?"

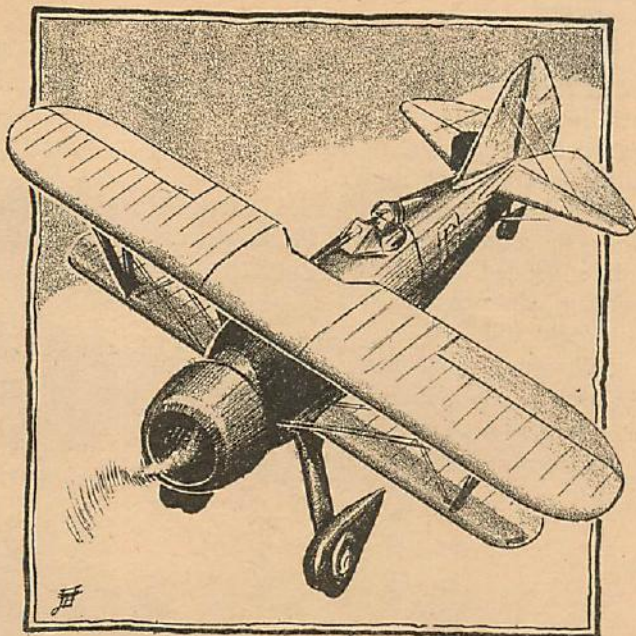
The abrupt question brought Slade upright in his chair. Bill Barnes! Of course he'd heard of the famous ace. The scheme with which he had hoped to impress Laznick had concerned this same Bill Barnes. A rush of words hurried to his lips: "I was going to tell you about him—about Bill Barnes. He's doing something that— There's something we can pull on him—together. A fortune to be made—"

Laznick's eyes had been swallowed by the fatty folds of his face. "Let's hear it."



Nick Laznick





A biplane of the killer fleet.

"I have inside information that Barnes is building a new superplane. A ship that outclasses his famous Stormer. He's building it secretly. It's going to be a sensation. A lot of people would like to own it. I mean the war departments of any number of nations. They'd pay a fortune for it. I thought we might plan to get hold of it or the detailed plans."

The master criminal's lips twisted. "Yes. I know about this airplane. It is now nearing completion at Barnes Field out on Long Island. What you say is true, captain. Many people *would* like to possess it. I have, in fact, received a definite order to secure this plane for an Eastern power. They are willing to pay a staggering amount of money for it. I turned them down."

"What!"

"I turned them down." Laznick stroked his big hands. "You must know very little about this man Barnes to question my decision. To get that plane away from him by force is virtually impossible. His airport is protected in every conceivable manner. He has a fleet of fast-fighting ships and a squad of loyal, expert pilots."

"Since the construction of that plane was first started his guards have been doubled. Every precaution has been taken. We would be up against terrific opposition. A clever idea of yours, captain, but quite impractical."

Laznick's eyes smoldered. "I asked you if you knew of Barnes. You do. What I am about to tell you has nothing to do with this new airplane. It concerns Barnes only in a very minor degree, fortunately. Otherwise I would have nothing to do with it. I am about to relate the details of your first assignment from my agency."

Slade sat motionless. He listened, spellbound, as Laznick continued.

"FIVE YEARS AGO, an ounce of radium worth two million dollars was stolen from the Hudson Research Foundation of this city. The thief was a Dr. Benjamin Hawthorne. Neither he nor the radium have been found to this day. Dr. Hawthorne had been a scientist on the staff of the foundation.

"His work had to do with radium research. He was a brilliant man and believed that he was on the threshold of discovering an elixir of life—a cure-all—by the use of

radium. The foundation frowned on this phase of his work and refused to permit him to conduct further research along these lines.

"The theft was made on a Friday and wasn't discovered until the following Monday. The doctor had left a note in the empty radium safe frankly stating that, as it was impossible to carry on his work at the foundation, he had 'borrowed' the radium and was going to a secluded spot to work in peace. He promised that when his work was successfully terminated he would return the radium. So far, nothing has been heard of him.

"The foundation immediately began an intensive search for Dr. Hawthorne, and it was learned that he had hired a young free-lance pilot to fly him out to Seattle. The man was located and told of landing the doctor at the Seattle airport and then returning back East. He knew nothing more. That young pilot was Bill Barnes.

"Seattle and the surrounding country was searched for the doctor without any success. He had simply vanished without leaving a clue. The investigation was hotly pursued for two years and then dropped.

"Dr. Hawthorne was a widower with two sons—Howard and Ralph. They lived in the old family house in the village of Leamington, New York. The elder son, Howard, had just begun practicing medicine when his father disappeared. He felt the disgrace keenly and, not being an overly strong-willed person, took to liquor and finally to dope. That's how he became affiliated with me. He's now registered with my agency—my staff doctor.

"The other son, Ralph, was just a boy when his father left. A year later he became crippled with arthritis. Recently, he has moved from the family house in Leamington to a small farm ten miles to the north to spend the summer. I tell you all these details for very good reasons, captain."

Laznick paused, drew a handkerchief from his pocket and mopped his broad forehead.

"While you were waiting here this morning, Slade," he went on, "I was talking to the older son, Howard Hawthorne. An extraordinary thing has happened. Ralph Hawthorne has received a letter from his long-missing father!"

"Howard found out about the letter a few days after its arrival. Ralph had destroyed it by then but his brother learned these facts: From the date on the letter it had been written two months previously. Yet the envelope had been postmarked in Seattle but three days ago.

"The father wrote that he was being forcibly detained somewhere and that he was dying. His experiments had failed. But before he died he wished to get the radium back to the foundation. He gave detailed directions as to how to reach him and instructed Ralph to hire Bill Barnes to fly him out. He doesn't know of Ralph's crippled condition. He further instructed the boy to tell the directions to no one but Barnes and to burn the letter.

"Ralph immediately got in touch with Bill Barnes and the flier has wired that he'll land his Stormer at the farm to-morrow morning at eleven o'clock. After hearing all these details, Howard came directly to me. He hates his father bitterly, blaming him for his own disgrace—and he knows the value of that radium.

"There's the history of the case. I need an expert pilot. I'm dealing you in, Slade. You're getting the biggest break I've ever given any man. Remember, I



hold your life in the palm of my hand. The slightest indication of double-crossing means your finish. Understand?"

Slade understood all too well. He said, hesitantly: "Yes. But, Barnes—is going to land up there to-morrow morning. He'll learn the directions——"

Laznick shook his head impatiently. "Of course, he's going to land. We won't try to stop him. Ralph cannot move from his bed, but he'll be watching for the Stormer. Barnes will land all right, but Barnes will never hear those directions."

"But, this Ralph—he won't tell them to any one but Barnes. You said that. How're you going to——"

"Everything's figured out. Ralph will talk to no one but Barnes. True enough. Wherein lies my plan: Howard Hawthorne, a few of my men and you will leave immediately for the farm. With you will go an actor similar in build and looks to Bill Barnes. My make-up man, an expert in disguise, has been working on this actor. He's created a duplicate Bill Barnes."

"To-morrow morning——" Laznick's voice fell to a whisper. The Englishman leaned forward, strained to catch each word of the cunning plan that was to ensnare the king of pilots and bring great wealth to the murderer, Captain Gregory Slade.

## II—THEFT

IT WAS ten o'clock on the black night of June 10th when Bill Barnes, the world-famous pilot, left the business offices in the administration building, his arms crowded with business books and records. He went direct to his secret study.

Two hours later, the armed guard swung open the door to admit "Shorty" Hassfurth. The veteran pilot's rugged face was smeared with oil and grease, and his white overall suit was grimy.

"Yeah, Bill?"

Bill swung down from a stool in front of a crowded drafting board. His broad shoulders were slumped. He motioned to an easy-chair.

"Sit down, fella. I want to talk."



Not faces of flesh and blood, but glowing human skulls glared from the black hoods. Only as the gun blasted scarlet flame did Bill, numbed with horror, throw himself aside.

His lean face was haggard. Blue smudges underlined his red-rimmed blue eyes. He was wearing a white shirt open at the neck, and tan corduroy slacks.

The two men sat on either side of a long table. Bill slapped down a file folder and pushed a stack of business books aside.

"Everything all right upstairs?" he asked.

"Sure," said Shorty. A gleam brightened his eyes. "She's a honey, Bill. You've sure



gone to town on this design. She's going to make the old Stormer look like a crate. Two months ago I would have shot any one for saying that."

A half smile lifted the corners of Bill's thin lips and then vanished.

"It better be good." His words were mumbled.

Shorty looked at him sharply. "What's biting you, Bill? You look all in. Hell, you ought to get a good night's sleep. Take it easy. Everything's almost set."



Bill stared down at the file folder. "I called you in, Shorty, to tell you something that I don't want the rest to know." He hesitated and then went on. "We're dead up against it for money. I just got wise to the situation this afternoon. I should have been sticking to business instead of the drafting board, I guess. I must be getting old. I would have trusted Bennie Warwick to the end of the earth."

Shorty started forward. "Bennie Warwick! What's up?"

Warwick had been business manager at the Barnes Airport. For the previous six weeks he had been away on a doctor-prescribed vacation to stave off a complete nervous breakdown.

Bill shook his head. "I see it now. I gave the guy too much leeway, put temptation in his way. I should

have known better." His eyes locked with Shorty's. "When Warwick left he had falsified the books to the extent of forty thousand dollars."

Shorty sucked in his breath. His face went livid. He started from his chair, his lips twisted. "Why the little——"

Bill put up a hand. "Take it easy. We can't do anything about it. It's gone."

"Can't do anything about it! We'll drag that crook back here by his heels. No guy's going to get away with——"

"No, Shorty," Bill put in quietly. "I've just received word that Warwick shot himself. He's dead. They



found him in Mexico City—penniless.” He shrugged. “It’s gone. We’re in a hole. And we have to get out of it.”

“When did you get wise?”

“This afternoon. The bank phoned. They said we were away overdrawn. I said that was impossible and looked up the books. Everything’s a mess. No sense going into detail. I’m having accountants come in in the morning.” He ran his fingers through his disheveled mop of blond hair.

Neither man spoke for minutes. Then, Bill looked up and half smiled. “You know, fella, the money’s bad enough. But, we’ll get out of that somehow. But, what hurts is that Warwick would double-cross me. He’s been here almost from the start. It wasn’t a natural thing for him to do. I may be overly suspicious, but it looks as if some one else is back of it all. I hope I’m wrong.

“But, we have to have money—fast. We’ve had precious little come in for months. Plenty of work, sure. Pulling other people’s chestnuts out of the fire—and suffering plenty of loss doing it. Not that I’m complaining.

“The damage to the field here from that last bombing cost a fortune. That and the ships that’ve been washed out. And on top of everything, I’ve been spending money like a drunken sailor on the new plane. More than I figured. But, I wasn’t worried until this—”

Shorty glowered. “To think of that little sawed-off shrimp clipping us for forty grand. If I could get my hands on him, I’d choke the life clean out of him.”

“The life’s gone,” said Bill gently. He sank back in his chair and opened the file folder. “We’ll just have to line up some paying business. I’m flying up-State in the morning. Something may be stirring. I don’t know. It’s sort of a sequel to an old job I did, years ago, before I got the gang together here.”

He pushed a small stack of newspaper clippings across the table.

“Read ’em. They’re from sheets five years back.”

Shorty read the faded pieces of newsprint. He looked up.

“Yeah, I remember something about this Dr. Hawthorne. Forgotten you flew him. You mean this thing’s opened up again?”

Bill nodded. “Maybe. The other day I received a letter from his young son, Ralph. The kid didn’t tell me much. He was anxious to see me and said he’d had news of his dad. He asked me to fly up to his farm.”

Shorty scowled. “You’d better tell the coppers. Two million bucks—”

“No. The kid wants it treated confidentially. You regard it the same way. I’m telling you about it just in case of trouble, understand? The kid’s a cripple, can’t move from his bed. I wired him I’d be up tomorrow morning at eleven.”

“You think there’s a good dough angle?”

Bill shrugged. “Perhaps—if we could recover the radium. The Hudson Foundation has posted a standing reward of fifty thousand for the return of the stuff. It’s worth over two million. The old doc went away to work on his experiments. He promised to bring the radium back when he’d completed them. The kid’s letter shows

he’s still alive. He may want me to fly him back to New York. If he has the radium, I’d collect the reward, or part of it. Sounds simple.”

“Fifty-thousand reward!” Shorty’s eyes brightened. “That’d wipe out this other thing, huh?”

“Won’t do any harm to have a look in any case. While I’m away, stick to the usual routine. No visitors. Keep the boys driving ahead. I want to test that ship as soon as possible. And watch for the slightest sign of trouble. Nothing’s happened so far—but that doesn’t mean that nothing will.” He leaned back in his chair. “That’s all, Shorty. Keep quiet about Warwick and the rest.”

BILL remained in the study long after that, going carefully over the business ledgers. The clock showed three a. m. when he closed the last book and went with leaden feet past the armed guard and up the steps.

The blackness of the moonless night hung like a pall over the entire airport when he came out of the administration building and started down the roadway toward his bungalow. All field lights had long since been extinguished in obedience of strict orders. From the air above, nothing was to betray the presence of the airport to spying eyes.

Bill stopped, his gaze swinging instinctively toward Hangar Number 6—the construction hangar. A faint thread of light showed beneath the closed metal doors and from inside came the muffled whine of racing machinery. Those were the only indications of the feverish activity within. Squads of men, on a night shift, were laboring under high tension over the airplane that was rapidly nearing completion.

Since the very first, Bill had taken no chances with the safety of his new plane. The detailed drawings and plans had scarcely left the drafting boards, the actual construction work had barely begun, when to the ears of the famous pilot had come rumors and threats. And he had realized, bitterly, that in spite of his strict censorship the secret news had somehow filtered to the outside. From that moment on, the guards had been redoubled and every precaution against violence and stealth had been taken.

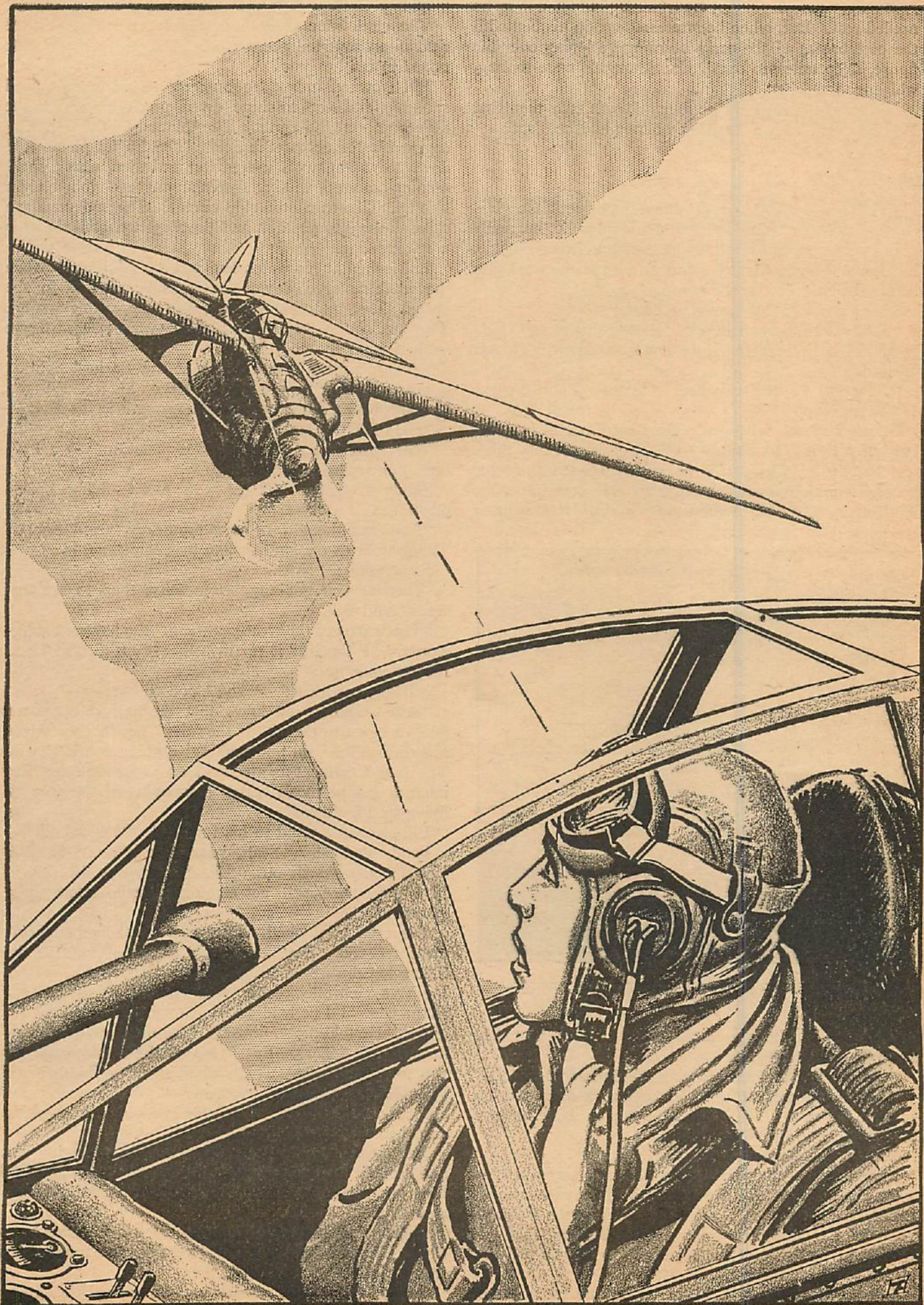
Bill stood in the cool blackness, his eyes staring unseeing in the direction of the hangar. He saw in that moment the plane completed—a superplane—the fastest thing in the world—a comet of speed—a blur of silver as it slashed across the skies. Its name—the Lancer—

His worries vanished under the spell of the vision and his airman’s soul responded. And then, he dropped back to reality with a jarring thud. The image of the Lancer was gone; the powerful scream of pounding Diesels fell away; the silver thing of beauty that had streaked through his mind vanished. He was once again standing alone on the concrete roadway. Once again the bitter truth he had learned that day confronted him.

He hadn’t told Shorty everything. He hadn’t realized it himself, then. His final examination of the books had shown that he was standing on the very threshold of bankruptcy. And if that happened—everything would be swept away. His dreams would crumble to dust. He would have to start all over again.

He moved ahead, slowly, his head bowed, his straight, muscular body drooping. He walked to his bungalow.





Terror seized Sandy as he saw tongues of flame leap from the guns in the Stormer's wing stubs.



And once inside, he slowly undressed. He knew that he needed rest. But, when he stretched out on his bed with the cool breeze of the early morning sweeping over his figure, sleep failed to come. His thoughts were milling, whirling, torturing.

He heard the clock strike four. It was only then that his exhausted body stifled his worries and he slept.

### III—THE TRAP

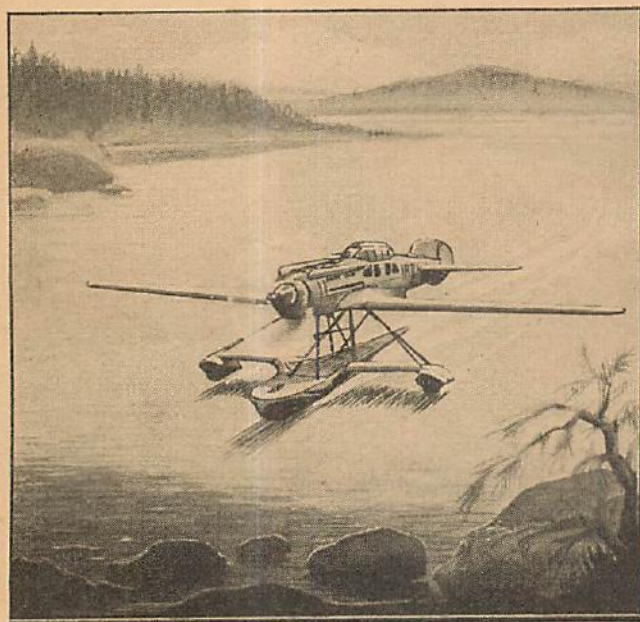
BILL had been busy in his office since breakfast. His watch read ten minutes after ten when he hurriedly pulled on a white overall flying suit and went outside. He found Shorty, Martin, and two mechanics waiting beside the Stormer on the apron.

"Seen the kid?" Bill said to Shorty.

"Sandy?" Shorty shrugged his broad shoulders. "He's in town—been in town since crack of dawn. This is Thursday."

"Thursday?" Bill frowned. "What's Thursday got to do with it?"

Shorty's mouth fell open. He stared at Bill incredulously. "You don't know—" He slapped his thigh and laughed. "Don't tell me you've missed this one. Sandy's worried about getting bald. He goes into New York every Thursday morning for a scalp treatment or



The Lancer's pontoons touched the lonely waters.

something. I thought you'd have smelled that hair tonic he uses a mile away."

"Getting bald! That kid gets the darnedest notions."

The pilot swung abruptly around as a distant drone came to his ears. He put his hands up to shade his eyes and stared into the distant skies.

"That's the Eaglet now."

Silhouetted against the bright-blue sky was a match-sized plane. The drone increased; the plane raced nearer, became a gull-winged monoplane. It was the Eaglet—"Sandy" Sanders' little private ship; the ship that was carried in the belly of the transport to be released and picked up in mid-air.

Bill scowled. "Look, Shorty—you see what I see? The kid's flying her in on her back."

Shorty emitted a grunt. "Sure is. What the hell?"

The sleek monoplane was roaring dead on for the field in an inverted position, the retracted pontoon gear raised to the heavens.

Bill frowned in sudden concern. The nose dropped suddenly and the machine dived precipitously for the little group on the apron. The thunder of the pounding engine blasted across the field. The Eaglet plummeted down to within two hundred feet and then, with a shrill scream, zoomed wildly, flattened out and rolled right side up. The trim little ship circled. The undercarriage came down into position and the Eaglet fishtailed in for a fast landing.

Bill looked at his watch and waited, grim-faced, while the machine sped down the concrete runway to the apron. The Eaglet came to a braked stop, swung around. Two mechanics ran to it as a small, white-garbed figure vaulted from the cockpit.

Sandy Sanders, the kid ace of the Barnes' fighting pilots, came over toward Bill, a grin on his freckled face. He pulled off a white helmet and swung it at his side.

"Hi, Bill!" he said breezily.

"Hi," said Bill. "I don't like that stunting a little bit. You trying to kill yourself?"

Sandy frowned. "What you mean—flying upside down?"

"I always thought he was top-heavy," said Shorty. "You ought to try landing like that sometime, kid."

Sandy said: "Nuts."

"Haven't you got any better sense than to act that way?" said Bill.

"That's part of the treatment, Bill," the boy said indignantly. "I thought it up myself. It makes the blood rush to your head."

Bill's eyes widened. "The blood rush to—"

"Sure. Didn't you know that the hair cells need a flow of blood to them? If they don't get it, they starve and die. Then you get bald and nothing can help you. The real treatment is to stand on your head for five minutes before meals. But I thought up the idea of flying upside down."

Bill clapped a hand to his forehead. "Ye gods!"

Sandy nodded. "Yeah, your hair is receding, Bill. You'd better watch out. Blond hair goes the fastest. Now my advice is to get some treatments before those glands all die."

His eyes brightened. "Look, I'll make an appointment for you. Say, to-morrow at ten o'clock at the Salon de Coiffure on Fifth Avenue. That's where I go. I'll have Henri look after you. He's the best *coiffeur* in the city. I'd be bald as a billiard ball now except for Henri. He told me so himself. The price for each treatment is five dollars. But I can get the whole series for you for fifty bucks. That's all I paid. With that you get a pint of Scalp Awakener—a tonic, and lotion especially prepared by Henri, himself. And it comes in an expensive French container—"

He tugged at a bulging side pocket in his flying suit and brought out a round white object the size of a grapefruit and cleverly modeled to resemble a miniature human skull.

Shorty nudged Bill. "I forgot to tell you about the skull. That's what you'll look like when you finish using that tonic."

Sandy ignored the remark and unscrewed the top of the pottery object. Inside was a cavity (Turn to page 46)

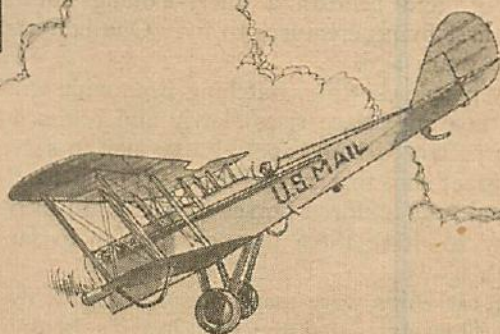


# Development of Mail Planes



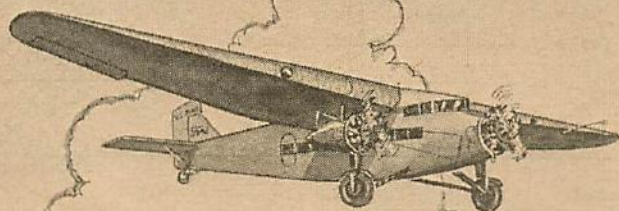
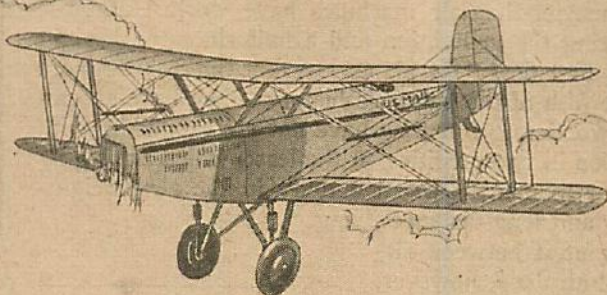
THE FIRST AIR MAIL FLEW FROM SHEEPSHEAD BAY, L.I., N.Y., TO JAMAICA, L.I., N.Y., SEPT. 14, 1911. THE FIRST REGULAR SERVICE BEGAN MAY 15, 1918, FROM NEW YORK TO WASHINGTON

1918 DE HAVILAND MAIL PLANES FLEW 110 M.P.H. AND CARRIED 2,000 LBS.

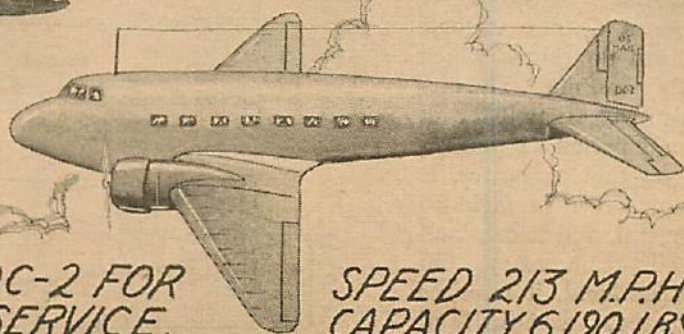


1926 CURTIS "CARRIER PIGEON" MAIL PLANE COULD DO 125 M.P.H. AND CARRY 2,017 LBS. OF MAIL.

1927 DOUGLAS M2 MAIL PLANE FLEW 145 M.P.H. AND CARRIED 2,058 LBS. OF MAIL



TYPE OF 1930 FORD MAIL PLANE. SPEED 152 M.P.H. CAPACITY 5,000 POUNDS



THE MODERN DOUGLAS DC-2 FOR MAIL AND PASSENGER SERVICE.

SPEED 213 M.P.H. CAPACITY 6,190 LBS.





Dr. Hugo Eckener

# The World's

*Here's a bow-to-stern survey of the*

by John DuBarry

**A** SHEEP, a rooster and a duck. Bleating, cackling, quacking in wild alarm as their cage sways off the ground beneath a queer-looking hot-air balloon. The first living creatures to fly. One hundred and fifty-three years ago.

To-day, fifty people chatting, watching from wide windows as their floating palace rises slowly and begins to move over the patterned landscape. Forty men to serve them and the great ship that carries them. The strength of four thousand four hundred horses harnessed in intricate machinery to drive them through the air to far-away countries.

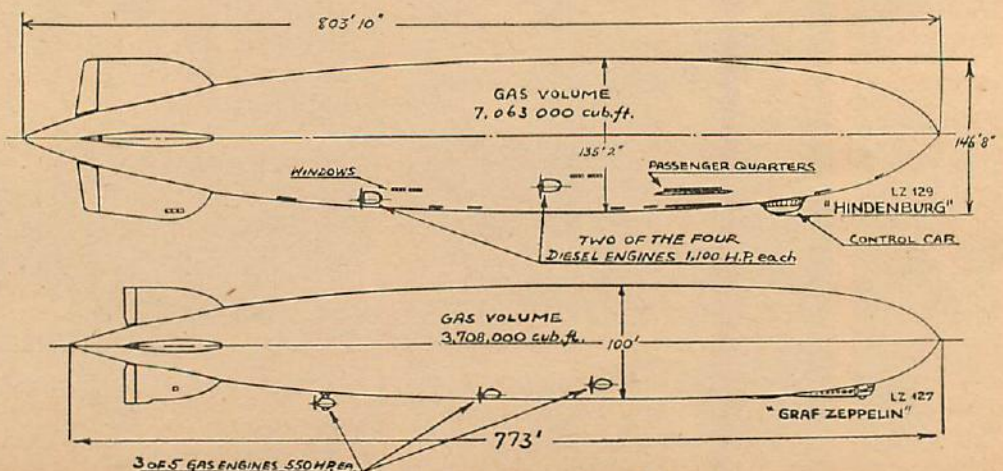
Lighter-than-air ships were man's first successful flying vehicles. They antedated the first heavier-than-air planes by considerably more than a hundred years. Perhaps it was that long head start that enabled the airship to develop the perfection that is embodied in the latest marvel of the skies—the new rigid dirigible balloon LZ-129.

There is no doubt that the airship to-day can outlift and outdistance the most powerful airplane. Designers of the heavier-than-air machines have worked at tense pace during the generation and a half since the Wright brothers first flew their plane. In that time—little more than one-fifth of the balloon's history—they have accomplished wonders. But they have not yet caught up with the balloon in two qualities, at the least, which are highly important to man's current activity in the air—weight-carrying and long-distance flying.

The contest between airship and airplane, however, has never been clear-cut. There is too much to be said for each side to give either of them a definite victory. Each can do things which the other can not. The airship can remain aloft for an indefinite period without relying on fuel or power, it can slow down in flight to a standstill, and it can land vertically, if necessary. On the other hand, it requires elaborate, specialized ground-handling facilities. The airplane can land by it-

## LZ-129

|  |                       |
|--|-----------------------|
| Length .....   | 803 ft. 10 in.        |
| Height .....   | 146 ft. 8 in.         |
| Largest diameter .....   | 135 ft. 2 in.         |
| Fineness ratio (length divided by diameter) .....                            | 6:1                   |
| Total lifting gas volume .....   | 7,063,000 cubic ft.   |
| Nominal gas volume .....   | 6,710,000 cubic ft.   |
| Number of gas cells .....  | 16                    |
| Weight of ship with necessary equipment and fuel .....                       | 430,950 lbs.          |
| Payload in form of 50 passengers (including food and other requisites) ..... | 15,470 lbs.           |
| Payload in form of freight, mail and baggage .....                           | 26,520 lbs.           |
| Total payload .....  | 41,990 lbs.           |
| Total lift (under standard conditions) .....                                 | 472,940 lbs.          |
| Engines: 4 Mercedes-Benz Diesel motors, each .....                           | 1,100 h.p.            |
| Total power output .....   | 4,400 h.p.            |
| Auxiliary Diesel electric generator engines .....                            | 2x50 h.p.             |
| Top speed in still air .....   | 84.375 miles per hour |
| Cruising speed .....   | 78.125 miles per hour |
| Range at cruising speed .....  | 8,750 miles           |
| Maximum fuel capacity (Diesel oil) .....                                     | 143,650 lbs.          |
| Crew .....   | 40 men                |

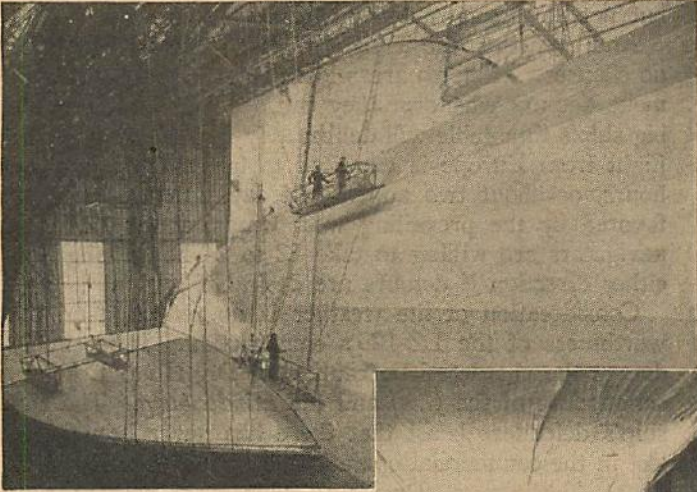


A comparison of two giants of the air.



# Biggest Aircraft

*LZ-129 dirigible, newest luxury liner of the sky and first craft to start North Atlantic air mail and passenger service.*



self on almost any level surface of moderate size; in the air it is capable of intricate maneuvers and can change its position and location rapidly within a large or small area.

In characteristics that can be held common to both types of aircraft, namely straight-away speed, traveling range, load, and practicability of construction, the airplane is admittedly the airship's master in speed and construction cost. These are important items in our present-day hurried, depression-stricken world. They are the reasons, the airship's defenders will argue, why the Pacific Ocean is being spanned to-day by airplanes of the giant flying-boat type.

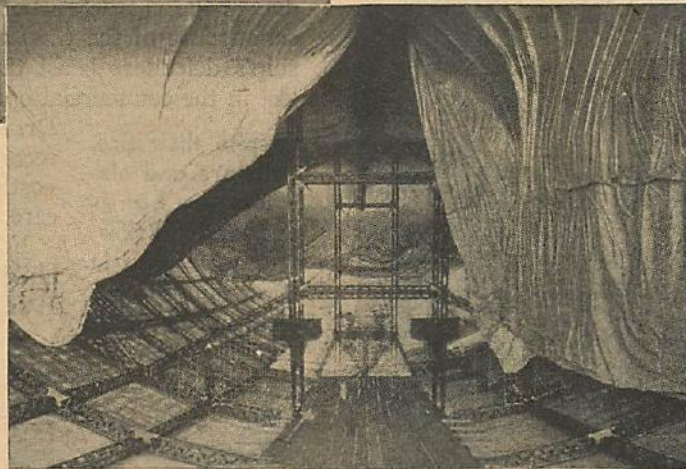
For they insist that airplanes must eventually take second place to airships for trans-oceanic travel in the desirable matter of payload carried on long non-stop hops.

They point first to the famous *Graf Zeppelin* and its seven years of passenger, mail and freight service. Flying from Germany to Brazil and back again regularly every two weeks during the summer season, the *Graf* has built up a record of dependability that compares with

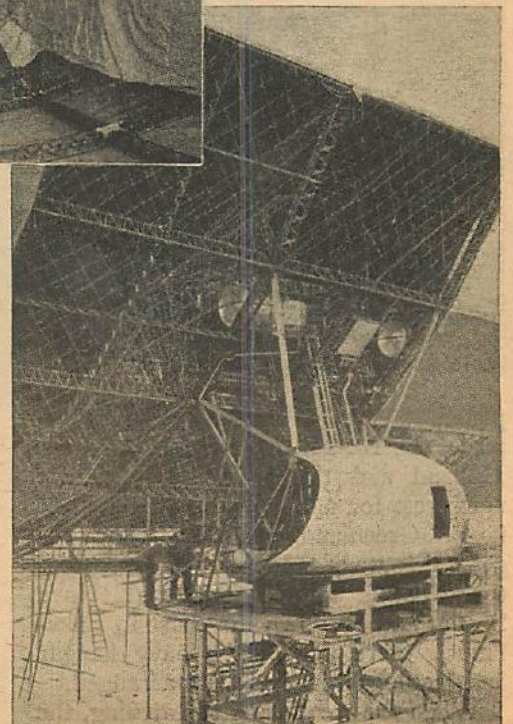
the performance of the leading ocean liners. It has transported more than a thousand tons of freight cargo alone. And it is still going strong.

They hail, secondly, the new *Von Hindenburg*, the LZ-129. With transatlantic airplane lines being planned jointly by the United States, Great Britain and France, the airship's defenders claim that the huge blimp will show the big flying boats how a North Atlantic ocean air service should be flown!

Time will tell. We don't pretend to be able to settle the controversy, nor are we taking sides. At the time this is written, ten round-trip flights between Germany and the United States are planned for the new airship. The first was scheduled to leave the



These three views of the "Hindenburg" during construction help to show its size. The tail portion at top that dwarfs the workmen is the smallest part in point of diameter. Above, the uncompleted keel corridor and partly inflated gas cells. Right, a motor car being joined to the hull.





European terminal on May 6th and arrive at Lakehurst, New Jersey, on May 8th or 9th, starting on the return flight a day or so later. Another trip is planned for later in May, one in June, two in July, two in August, one in September, and two in October. Besides these, a flight or two to South America is contemplated.

These trips will either go a long way toward proving the airship's case, if successful, or they'll leave the controversy open until the airplanes begin their watery hops in a year or two, if any mishap should befall the big dirigible.

The North Atlantic is no semi-tropical region of balmy zephyrs. Even in the summer time the weather is uncertain, as Lieutenant Commander Noville pointed out in an article in this magazine a few months ago. The LZ-129 will face a constant testing considerably more severe than that confronting the *Graf Zeppelin* on the South American run.

The regular point of departure will be just outside the city of Frankfurt-am-Main, near the lower border of Germany, where a great new hangar has been com-



route will probably lie in a southwesterly direction over France and directly out over the ocean—longer than, but not so stormy as the more northerly route.

And even then the navigators of the LZ-129 will take no chances. If storm areas loom in their path, they will make detours whenever they can. For this reason, the big ship's time-table will deliberately be left elastic. The flight from Europe is expected to take a little over 60 hours, or about two and a half days; the return trip, favored by the prevailing west winds, about 45. The navigators are willing to take 12 to 24 hours longer in either direction if detours are desirable.

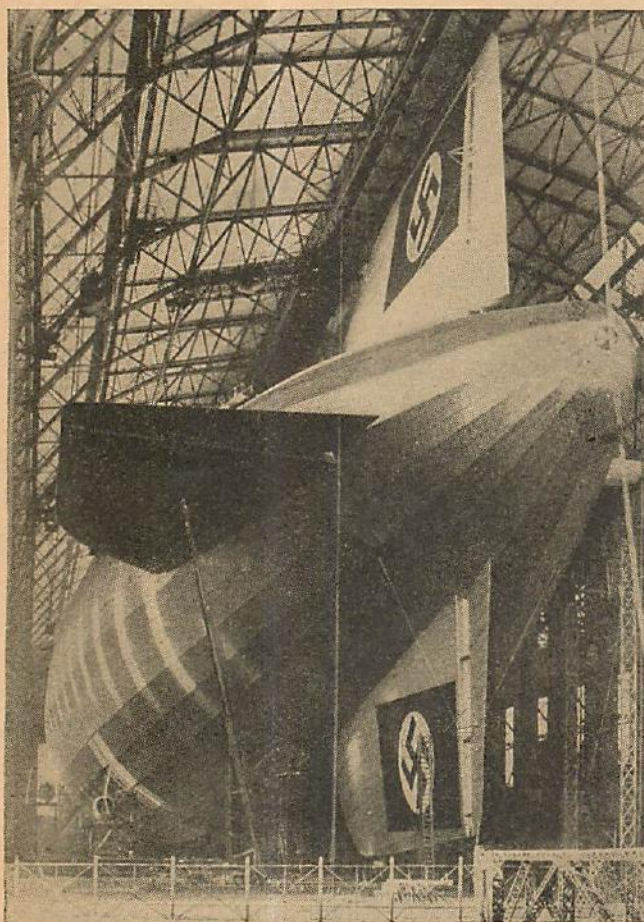
Consideration of the weather is no reflection on the worthiness of the LZ-129's construction. It is simply due to the characteristic caution of Dr. Hugo Eckener, commodore of the *Graf* and the *Hindenburg*. The airship's defenders boast that there has never been a life lost in the commercial operation of lighter-than-air craft.

Despite their size, rudders and elevators are hand-operated. Below, rear entrance in lower fin, above pivoting tail wheel.

Dr. Eckener intends to preserve that record in the course of guarding the costly new ship entrusted to his care.

Four years were devoted to building the LZ-129. In February, 1932, construction was started from the blueprints of designer Ludwig Duerr. On March 4, 1936, the LZ-129 emerged from the shed for its first flight. A good part of the intervening time was spent solely in the experimental development of the new Diesel engines.

The LZ-129, as its number implies, is the hundred and twenty-ninth of the distinguished line of lighter-than-air craft originated at the beginning of the century by Count, or "Graf," Zeppelin, after whom they are named, in German, "*Luftschiff Zeppelin*," or Zeppelin airships. The *Graf Zeppelin* is the LZ-127. The LZ-126 has become our own navy "Los Angeles," acquired from



pleted. With favorable weather reports, the LZ-129 will travel west over Holland and the British Isles, angle northwest for a way in the direction of far-off Greenland, and then follow the general route of the "great circle" across the Atlantic to Newfoundland, Nova Scotia, and on down the coast to Lakehurst, where use of the navy hangar and landing crew has been arranged.

When the weather is threatening, the





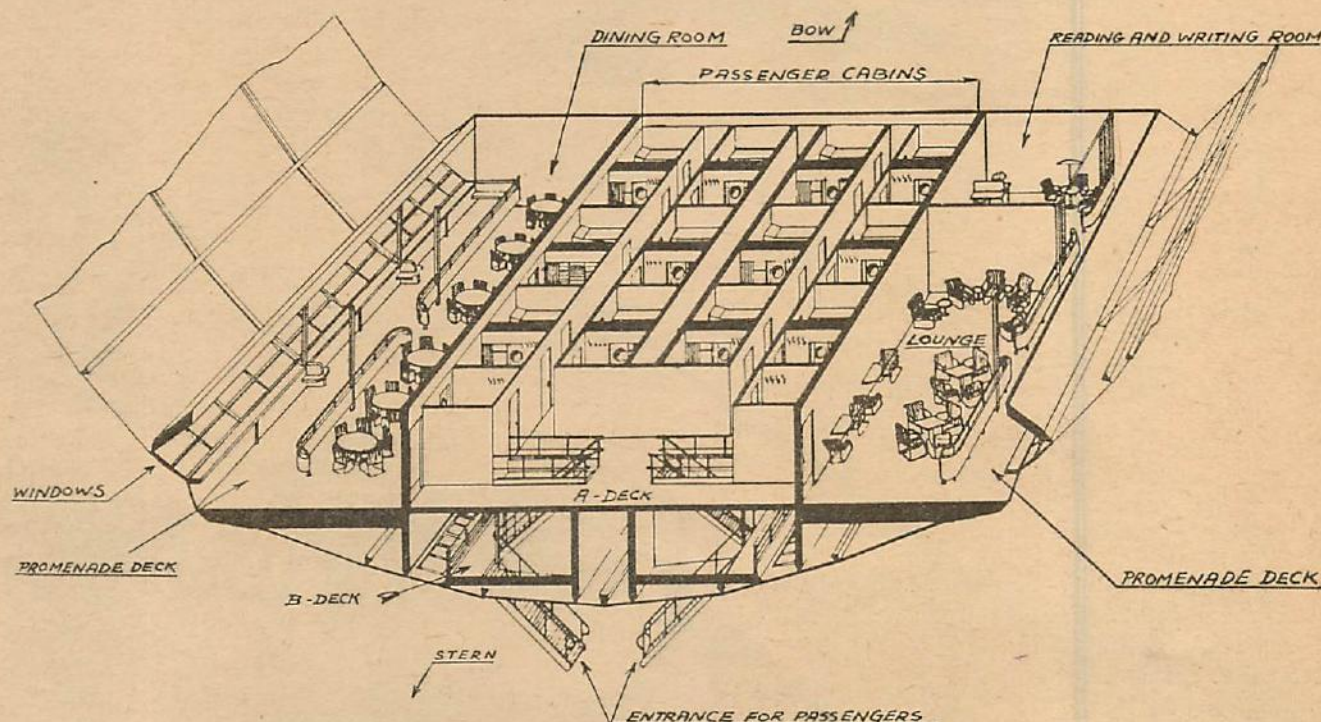


ger and freight bookings have been delegated to the Hamburg-American Line and North German Lloyd steamship offices.

The *Hindenburg* surpasses the *Graf*, of similar construction, in practically every way. It is longer, thicker, faster, heavier, and carries a bigger load.

The specifications listed at the beginning of this article give the more important facts. Let's take a closer look at the LZ-129.

The framework is built up of triangular-trussed aluminum alloy girders, of the highest strength-weight ratio. They are arranged in main rings, intermediate rings, and lengthwise members. The steel-wire-braced main rings number 15 and the auxiliary rings located between them total 32. The rings are polygons with 36 angles, and from



Light weight and comfort are combined in the furnishing of the lounge, shown above opposite, and the reading and writing room, which adjoin the starboard promenade.

Germany in 1924. They are all the direct descendants of the Zeppelins that raided England during the World War. The LZ-128, begun after the *Graf*, was never finished. It gave way to the LZ-129, which is the last word in dirigible construction. And hardly had the LZ-129 moved out when work was started on the LZ-130, scheduled to fly some time next spring.

The LZ-129 was built in Friedrichshafen, home of the Zeppelin works on the shore of Lake Constance, which is part of the Germany-Switzerland border. For some years Friedrichshafen's biggest hangar limited the size of airships that could be constructed. The *Graf Zeppelin* was built there, and maneuvered in and out between flights, with only three feet of room to spare beneath the hangar roof! Finally a larger shed was erected and the LZ-129, lately christened the *Von Hindenburg*, took form. It has been constructed by Luftschiffbau Zeppelin Corporation, the building company which is heavily subsidized by the German government, and is operated along with the *Graf* by a subordinate company, the Deutsche Zeppelin Reederei. The passen-

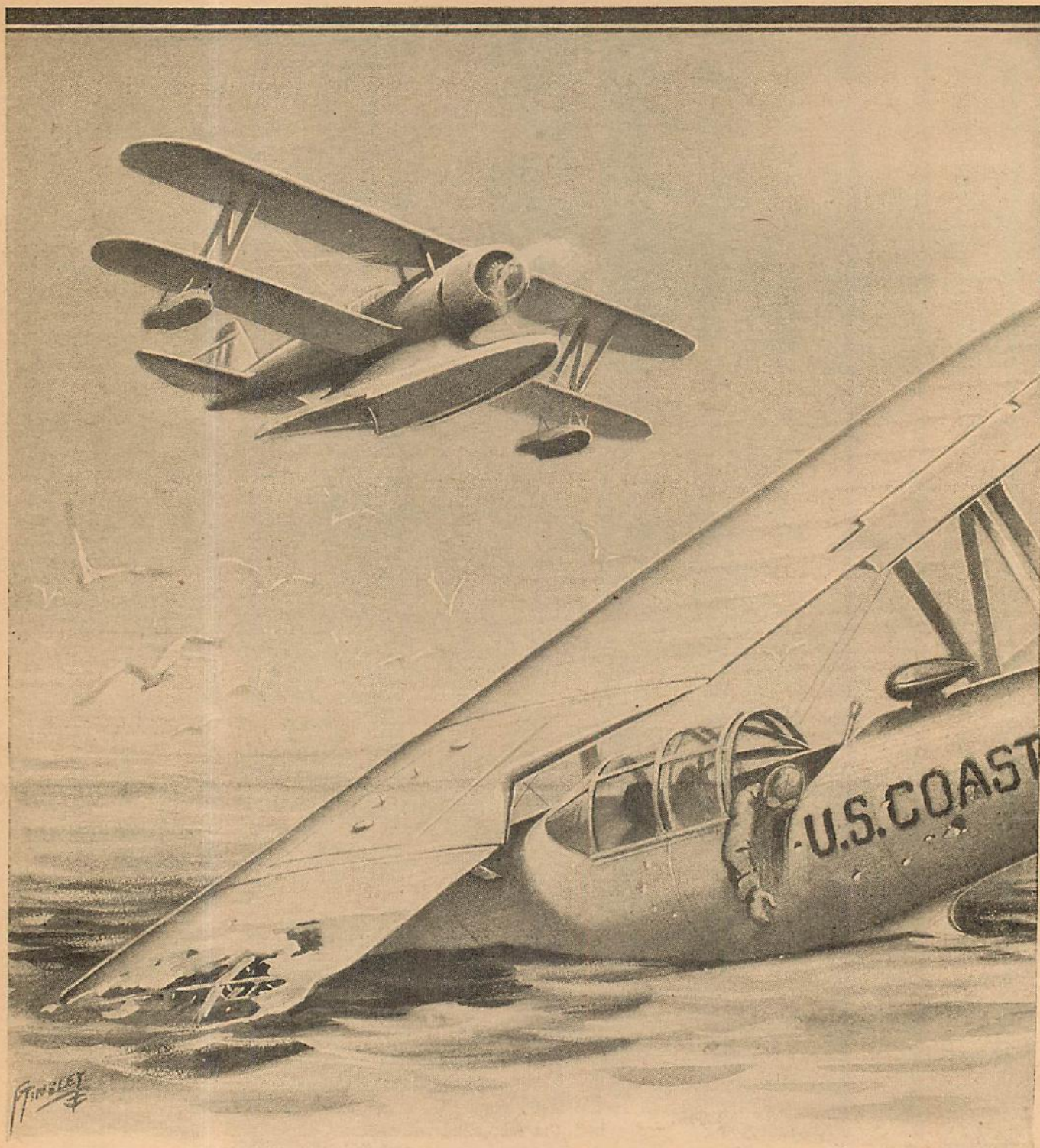
gers run the 36 longitudinal members from bow to stern that give the bag its many-sided appearance.

The main rings divide the bag into 16 separate gas compartments. Made to take hydrogen, they may also be used with helium, the slightly heavier, but non-burning gas. Subdivision of the gelatinoid-film gas cells permits the inflammable hydrogen to be stored in the center, surrounded and protected by helium cells.

The outer cotton-fabric covering of the framework is doped with an aluminum-powder mixture to minimize the sun's heat rays and their expanding effect on the gas cells within. Tautness of the cotton fabric has been achieved by a new process, eliminating most of the small wrinkles and "valleys" that collected as much as 10 tons of water during rainy weather on the immense surface of the older Zeppelins.

The LZ-129 sails along under the thrust of four wooden 4-bladed pusher propellers, 19 feet 9 inches in diameter, that are turned by engines mounted in cars outside the ship. The engines are 16-cylinder water-cooled Diesels of 1,100 h.p. each, (Turn to page 76)





*Death stalked  
the clouds  
for Casey Doyle  
of the Coast Guard  
in a shroud  
of billowing silk.*

THE gob seated at the switchboard tensed. Snatching off his headset, he turned and beckoned to the officer who stood behind him. From the earphones came a throaty roar, the blurred, continuous *brapp-trapp* of a machine gun blotting out the sound of a voice making a report.

Ensign Casey Doyle, youngest pilot of the Aviation Division, United States Coast Guard, listened and nodded. That roar in the receivers would be one of the Thompson guns of the Grumman two-seater "upstairs" on coast patrol, he knew.

The sound meant just one thing.

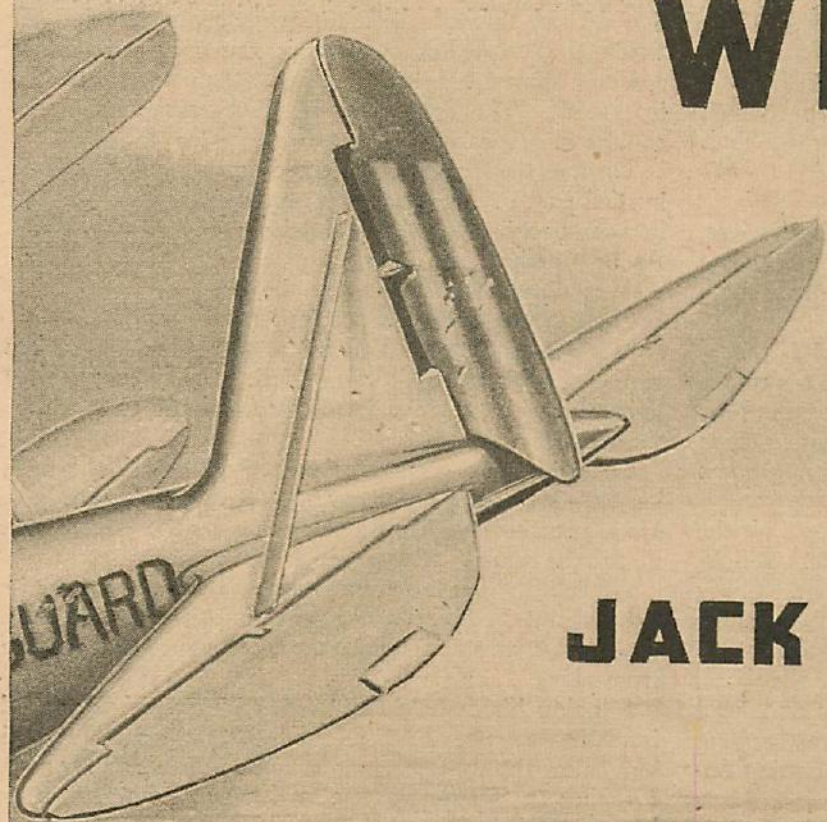
Marks and Cooley, the team that had left Cape May



# SMUGGLER'S WINGS

BY

**JACK STRALEY**



to fly early patrol, were snapping into action. Marks, at the wheel of the amphibian, had been speaking when the call came in. Cooley would be handling the gun, shooting from the mounting behind his partner.

The roar of firing ended with a crash. The gob operator spoke into his transmitter, then listened with set features.

Words in Marks' voice blurted from the phones.

"A gray biplane. Two front guns. No markings—no number. They got Cooley. Now they're diving—"

As he spoke, the faint whining of wires in the receivers rose to a shriek, mingled with the snarling yammer of a machine gun lower in register than the Coast

Guard Tommies. Seeming to vomit sudden death, its rattle shattered the silence of the office.

The gob called again. "Ship 2F25—2F25. Do you hear us?"

There was no answer.

Casey Doyle dashed from the office. Pulling on his flying coat, he rapped out crisp orders to the launching crew. Down the ramp went the reserve Grumman, Casey and his partner settling into their places as it hit the water.

Casey cranked up the wheels; poured juice to the motor.

Pushing the white amphibian through the slow tide, he rocked it onto the step; lifted it into the air. Behind him Chet Wilson, his bronzed, hammer-fisted flying



partner, limbered up the guns. Laying aside the covers which protected the weapons from the salt spray, he made them ready for instant use.

Fifteen hundred feet up and a mile offshore, Casey knew he was near the point from which Marks' last words had reached the station. Around them the air was thick with fog. The Grumman plowed through a glinting mist which spun back from its prop in hoary wisps.

"No visibility there," Casey muttered into the slipstream. "If the gray plane sneaked into that soup, it's a sure getaway."

Easing the amphibian downward in a shallow bank, he gazed below him, searching the surface of the cold black swells for a sign of the stricken ship from which the call had come. His eyes narrowed, and grim lines formed about his mouth.

There it was.

Empennage dragging behind it by the control wires, wings and fuselage rolling limply with the motion of the sea as it wallowed in the trough of a nasty offshore chop, lay the Coast Guard bus.

Casey swore softly to himself.

Shoving the wheel forward, he dropped the Grumman toward the water. As it dove he signaled the Cape May station, giving the location of the battered plane. Then he cut the gun and nosed into the wind, dropping down alee of the other ship.

Spray shivered across the cockpit as the floats bit the waves; then the white hull settled into the tide. Wilson tossed a grapple around a strut of the derelict. Casey drew himself from his cockpit and made his way along the pitching wing until he could see into its office.

Too late for help, Marks was huddled over the wheel like a grotesque, boneless rag doll, his arms and head swaying slightly as the ship rolled. Cooley was hanging on his belt in the riddled rear cockpit, his stiffening fingers still clutching the subgun.

Casey Doyle raised a clenched hand and shook it at the cloudbank which had hidden the killer ship. Into his eyes came a glowering look. Marks had been a station mate, and a good one, but between Doyle and Ben Cooley existed a bond of friendship which went back to the days when together they had stepped from the Coast Guard ranks to take their flying training at Pensacola.

"No markings, no number," Casey gritted. "Like shooting from the dark, the dirty cowards."

He swallowed hard as once more he glanced at the figures in the battered ship. "I'll get them, Ben," he swore softly. "You'd do the same for me."

TURNING abruptly away, he climbed back over the rocking wings and slipped into his cockpit. The service launch would soon be on the scene, he knew, to take care of the two whose work was over.

Jazzing the throttle, he shoved the bus through a spray-flung path and took the air. When he was a few hundred yards up, the ocean had vanished, smothered in the thick blanket of fog.

Cutting the gun, Casey listened for the beat of another motor. Below him, surf pounded on the beach. Sharp salt wind shrilled in his flying wires as the Grumman planed slowly downward.

Again he jazzed the motor and climbed, then again swept down through the thick mist in noiseless banks.

Watching—listening—

Suddenly he started. Through the fog came a soft purring which became the roar of another ship. Twisting in his pit, Casey made sure his partner was ready.

Wilson handed him one of the guns.

As he did so, the whine of the other motor came nearer. Thrusting its cowed radial through the cloudbank above them at a terrific pace came a gray biplane.

Casey lifted the subgun to his shoulder.

But the pilot of the gray bus was on guard. As hot lead stabbed from the Grumman, he rolled out of its line of fire, throwing his unmarked plane through the mist with the speed of a ghost ship vanishing into the fog.

Casey shoved his throttle against the post and banked in pursuit. The gray plane was not going to fight, he could see. Apparently it was making for its base.

Then, as the Grumman rammied down the sky, a figure hurtled past it. A figure that tumbled through the mist in a compact ball, one hand clutching the ring of a 'chute. As he watched, the falling figure pulled the rip. The white umbrella blossomed out above it.

Casey broke open his belt, twisted in his pit.

"I'll get that bird. You follow the ship. Phone the launch to pick me up," he ordered. As Wilson nodded understanding, he dove headlong from the cockpit into the clouds.

Counting as he plunged downward through the mist, he pulled his ring. The descent stopped with a jolt. He loosened his harness so he could clear the 'chute when he hit the water. He peered below him.

Beneath the fog lay a narrow strip of open air. As he fell, he saw the other figure splash into the waves. The white folds of silk flattened and the figure disappeared from view.

Slipping his own 'chute toward the spot, he dropped from the harness. Even as the impact of his fall carried him below the water he was stripping off his flying coat. Fighting to the surface, he struck out for the floating 'chute which had carried the stranger.

As he neared it a head emerged, then an arm, its hand grasping a wicked-looking two-edged knife.

Casey swam closer.

The other was a Chinese, he saw, a swarthy-complexioned fellow with a white scar extending from his right eye up his forehead to his hair. Treading water, he was holding the knife ready, his slant eyes gleaming dangerously.

Keeping just out of range, the Coast Guard pilot sank below the water. Circling as he swam, he drew back both feet and paddled cautiously nearer to the other. Apparently wondering at these tactics, the Chinese contented himself with keeping afloat.

Casey kicked out with all his force, his well-aimed blow striking the other full in the solar plexus. The Chinese gave a gasping "oof" and began to claw wildly at the water which rose above his head.

Before he could recover, Casey's right arm was around the man's neck from behind, and his left hand had doubled the knife arm back in a sharp twist. The weapon shimmered down through the dark water.

Struggling to free himself from the life-saving hold, the Chinese only made matters worse.

Casey glanced shoreward. Now the fog was again settling, blotting out the beach. Through it there came the steady throb of a motor. As he listened, he heard it head toward the spot.

(Turn to page 71)



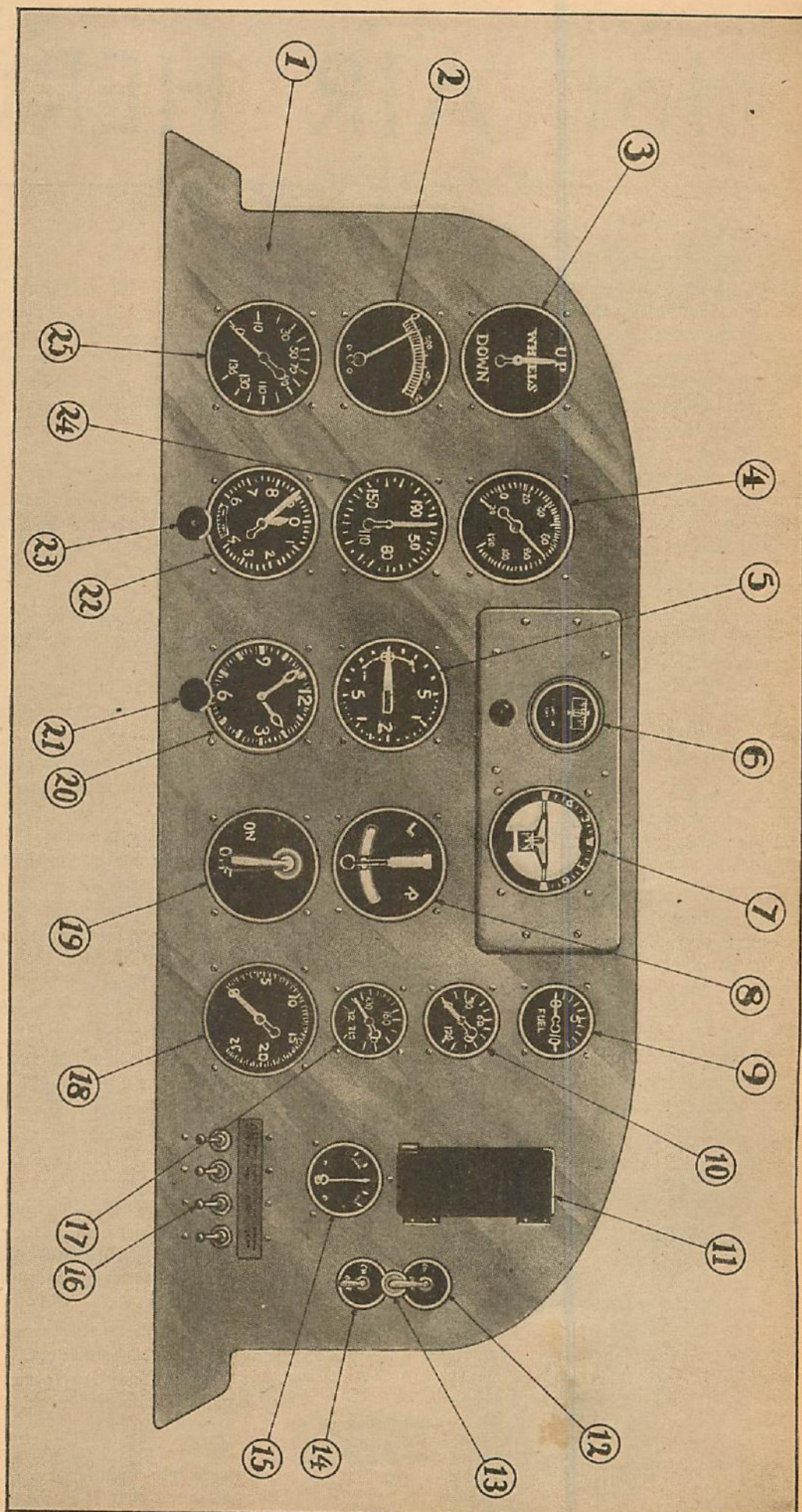
THE FLIER'S  
DICTIONARY

The ninth lesson in the technical terminology of the air.

Save your files!

## INSTRUMENT PANEL

- 1 INSTRUMENT PANEL
- 2 ENGINE THERMOMETER
- 3 WHEEL POSITION INDICATOR
- 4 AIR TEMPERATURE
- 5 RATE OF CLIMB INDICATOR
- 6 DIRECTIONAL GYRO
- 7 SPERRY AUTOMATIC HORIZON
- 8 TURN AND BANK INDICATOR
- 9 OIL SUPPLY INDICATOR
- 10 OIL PRESSURE
- 11 FUSE BOX
- 12 ENGINE PRIMER VALVE
- 13 ENGINE PRIMER PLUNGER
- 14 ENGINE PRIMER INLET VALVE
- 15 AMMETER FOR LIGHT SWITCHES
- 16 VARIOUS LIGHT SWITCHES
- 17 OIL TEMPERATURE
- 18 TACHOMETER (R.P.M.)
- 19 IGNITION SWITCH
- 20 CLOCK
- 21 SETTING KNOB FOR CLOCK
- 22 ALTIMETER
- 23 GROUND ALTITUDE SETTING KNOB
- 24 AIR SPEED INDICATOR
- 25 ENGINE FUEL INDICATOR





# Hot AIR HEROES

by George Swift

PETER C. JONES, or "Prop-wash Pete" as he was to become nationally known, was born in a typical American farmhouse in a typical American small town of typical American parents.

He was a typical American boy.

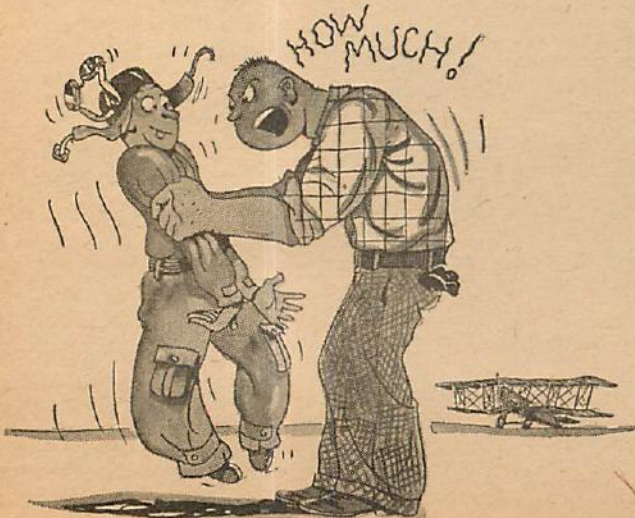
At an early age Pete gave no indication of being destined to attain fame as one of the greatest stick-pushers ever to grace the American scene. He did, however, give proof of possessing muscular strength far above the ordinary. It happened thus.

Busily engaged in schoolroom target practice with a bust of Socrates as the target and textbooks as missiles, Pete was somewhat embarrassed when the teacher, one Percival Snyder, returned unexpectedly. As a result of the episode he was sentenced to be locked in the supplies closet for an hour. The hour passing slowly, Pete determined to hasten his release and proceeded to tear down the wall of the closet. In a short time he had demolished the partition and was enabled to walk forth into the open air. Greeted outside the building by his irate teacher, Pete immediately gave battle, finally picking up the 170-pound Percival and tossing him back into the schoolroom through an unopened window.

GROWN to manhood, Pete turned over in his mind the advisability of becoming a circus strong man. The prospect was pleasant, involving a good salary, light work, travel, etc. He was on the verge of taking up this vocation when something happened that changed the course of his entire life.

It was his first sight of an airplane.

A wandering pilot came to town with an old and shaky Hisso Standard. Pete followed the crowd to the farm field where the "airplane" was taking up passengers,



## No. 1:

### Peter C. Jones (Prop-wash Pete)

and after one look at the dilapidated biplane thundering majestically through the air under the impulse of the asthmatic Hisso he was sold on aviation. Yeah, the flying bug had bitten him and never again would he be fit for any useful work.

"Mister," Pete said to the Standard's pilot at the first opportunity. "I'm going to buy your airplane. What's the price?"

The pilot looked scornfully at our hero and his well-worn clothes.

"The price," he said haughtily, "is one thousand dollars."

Then he turned away, considering the subject closed. Pete put one powerful hand on the pilot's shoulder and spun him around.

"Listen, I've only got two hundred dollars saved up. Can't you let me have the airplane for that?"

The Standard's owner felt tenderly of his shoulder. "The price is one thousand dollars," he snarled.

Pete slowly rolled up his sleeves, disclosing huge muscles.

"What's the price?"

The pilot looked hard at those mighty muscles and swallowed uneasily.

"Eight hundred dollars," he said in a different tone.

Pete walked up close to the other and thrust a granite-like jaw into his face.

"What's the price?"

The pilot looked around for help, saw no sign of any.

"Six hundred dollars."

Pete placed both hands on the flier's shoulders and shook him as a dog might shake a rat.

"What's the price?"

The pilot paled, but did not completely give up the ghost.

"Four hundred dollars."

Pete drew back a sledgehammer fist.

"For the last time, what's the price?" he roared.

The pilot stood helplessly with shaking knees.

"T-t-t-two hundred dollars," he stuttered.

And so Pete bought an airplane. Hurriedly paying over the money, he jumped into the ship, athrill at the prospect of his first flight.

"Hey, tell me how to run this thing," he yelled to the Standard's late owner.

The pilot told him.

Strange to relate and stranger to believe, Pete got away safely and flew nearly a mile before going into a nose dive. On the way down, guessing what would happen when the Standard made contact with the earth,





he braced his feet against the front of the cockpit. When the plane crashed and the motor tried to push its way into the cockpit, Pete's strength saved the day by holding the Hisso at a safe distance.

WITH his ship reduced to more small pieces than a jigsaw puzzle, Pete joined forces with a barnstorming pilot. In return for his services as mechanic, ticket seller, trade-drummer-upper and general man of all work, his partner occasionally gave him some flying instruction. Eventually Pete became adept enough to handle a plane all by his lonesome, or so he thought.

Taking off one morning on his first serious solo flight, he landed the ship with only \$40 worth of damage. In those days such a performance was considered moderately good, so Pete immediately began carrying passengers.

It was at about this point that our hero received the appellation "Prop-wash."

At that time it was the fashion to start airplane engines by the good old hand-pulling method. And a laborious task it was, pulling the prop onto compression, then heaving down to turn it over.

Pete soon devised a better way of starting an engine. Resting his hand against a propeller blade near the hub, he would twirl it around at high speed, producing almost as much prop wash as though the motor were running. Fellow fliers marveled at this exhibition of power and skill and bestowed upon him the distinctive sobriquet (nickname) of Prop-wash Pete.

Now that he could fly, Pete wanted a plane of his own. The problem was solved soon and in an unexpected manner.

Hopping off just after having eaten a bunch of grapes, Prop-wash Pete's partner became inebriated

while in the air. Upon coming down to land, he found the earth twisting and turning in all manner of queer maneuvers. Figuring that an earthquake must be in progress, he went up again to wait till the quake was over.

The gas running out, however, he was forced to descend. Somehow the ship happened to turn over on its back and landed on the top wing, resulting in that structure's complete demolition.

The crash did not increase Pete's partner's enthusiasm for aviation. In fact, after regaining consciousness, he declared openly that he wished he had never seen an aircrate. Furthermore, to prove his contention, he presented Prop-wash Pete with the remains of the airplane, wishing him luck in its ownership.

Repairing the top wing of the plane, Pete flew merrily away. His flying career was now definitely launched.

TO CHRONICLE all the adventures and misadventures that befell him afterward would require cons of time and numberless printed pages. Some of the high spots we will record, however.

Having collected more than a few air hours, Prop-wash Pete was hired on by an air school as instructor. He was a highly successful instructor and stayed at the school for quite a long time. Then suddenly he left the school.

There was one flying rule that Pete continually dinned into students. That was the rule concerning the making of turns after the motor had failed on the take-off. A thousand and one times he warned his studes never to attempt to turn back to the field when the engine quit. If you did, he said, you were almost certain to slip into the ground. No, in such a case you must drive straight ahead, no matter what was ahead to greet you.

One day Pete took off alone. A few hundred feet up the motor sputtered and stopped.

Pete frowned at this turn of affairs. He was headed in the direction of a pond and he did not desire to take a bath. It was not Saturday night, anyway.

Oh, well, the Old Master could surely make a turn in safety. With all carefulness he started to bank his ship around.

In this, he was very nearly successful.

After the crash, he disengaged himself from the wreckage to find all the students standing near and joyfully chanting in unison:

"Why-don't-you-practice-what-you-preach? Why-don't-you-practice-what-you-preach?"

After that the air school saw Pete no more.

GOING back to barnstorming, he lived a prosaic existence for some time, taking up passengers and bringing them down, taking up passengers and bringing them down. It really grew monotonous.

Then came a diversion.

Staying at a flying field for a spell, Pete was drawn into an argument concerning courage and was challenged by one reckless stick-pusher to a test of bravery. The test was to be carried out by Prop-wash Pete and his challenger. (Turn to page 74)





ONE hot afternoon not long after the close of the World War, a brilliant young aeronautical engineer watched tensely as his latest creation glided slowly in toward the runway of a Spanish airdrome with a test pilot at the controls. The plane was fast losing flying speed and had almost reached its stalling point. Suddenly it seemed to pause in mid-air, and even the heat of the blazing Mediterranean sun could not prevent the cold chill that ran down the young engineer's spine. With an involuntary shiver, he watched his brightly colored little brain-child slide backward and crash in a cloud of dust and flying splinters.

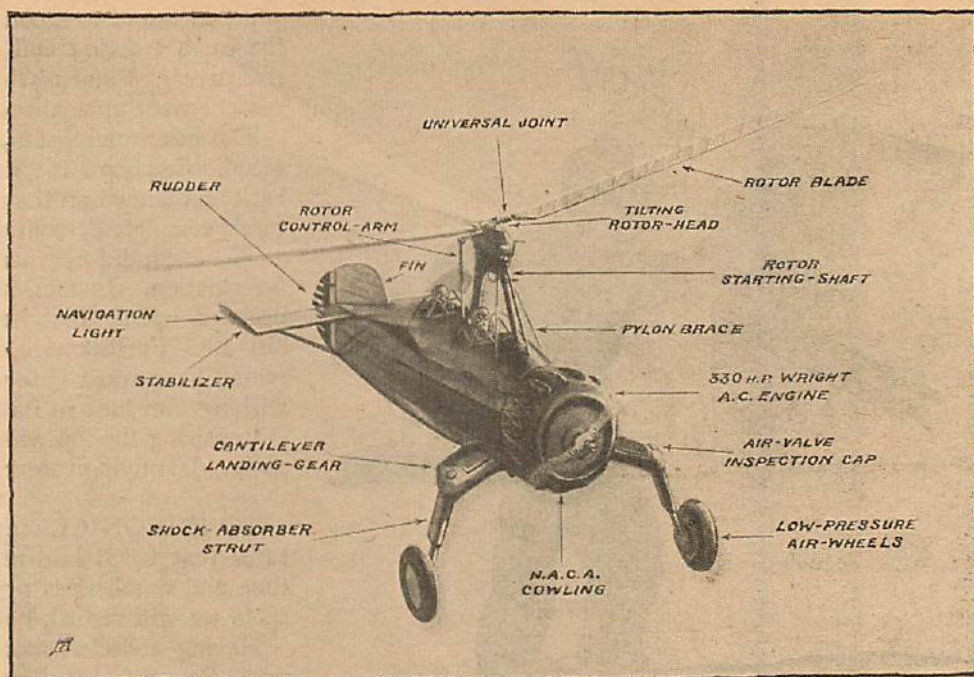
The plane was wrecked; the pilot fortunately escaped without serious injury. During the days that followed, Juan de la Cierva pondered the shortcomings of stallable airplanes. This last one had been the most efficient ship he had designed, and yet there it lay, a sad-looking pile of junk. The young Spaniard finally arrived at a decision that was destined to be the genesis of the only fundamental advance in the science of aeronautics since the Wright brothers first flew at Kitty Hawk. He would forget the fixed-wing airplane, with its unavoidable compromises, and go back to the beginning. He would seek a new principle of flight which would make possible the design of a non-stalling aircraft capable of slow flight.

The result of Cierva's quest was an entirely original principle of sustentation by autorotational force. Careful calculations convinced him of the soundness of his new theory. The construction and flight of an experimental machine proved that autorotational lift was practical. He combined the first half of the title bestowed on the new force with the gyroscopic action of the machine's bladelike wings and named his strange-looking aircraft the autogyro.

While the autogyro by now has become a more or less familiar and accepted sight to the average well-informed American, the actual functioning of rotor suspension for aircraft is still very hazy in the public mind. Flight Commander Carlson and myself, in previous issues of *Bill Barnes-Air Trails*, have discussed the new autogyros. Nevertheless, I have been questioned many times by laymen as to just how the autogyro works and it occurs to me that it might be helpful to some of our readers if I were to review the more puzzling points right here and now.

People usually want to know, first of all, what holds the gyro up.

The latest models of the autogyro are suspended in the air by means of three vanes which rotate like the arms of a windmill about a vertical shaft from which



# The Autogyro Joins the Army

*About "windmill" craft and the ship on the cover.*

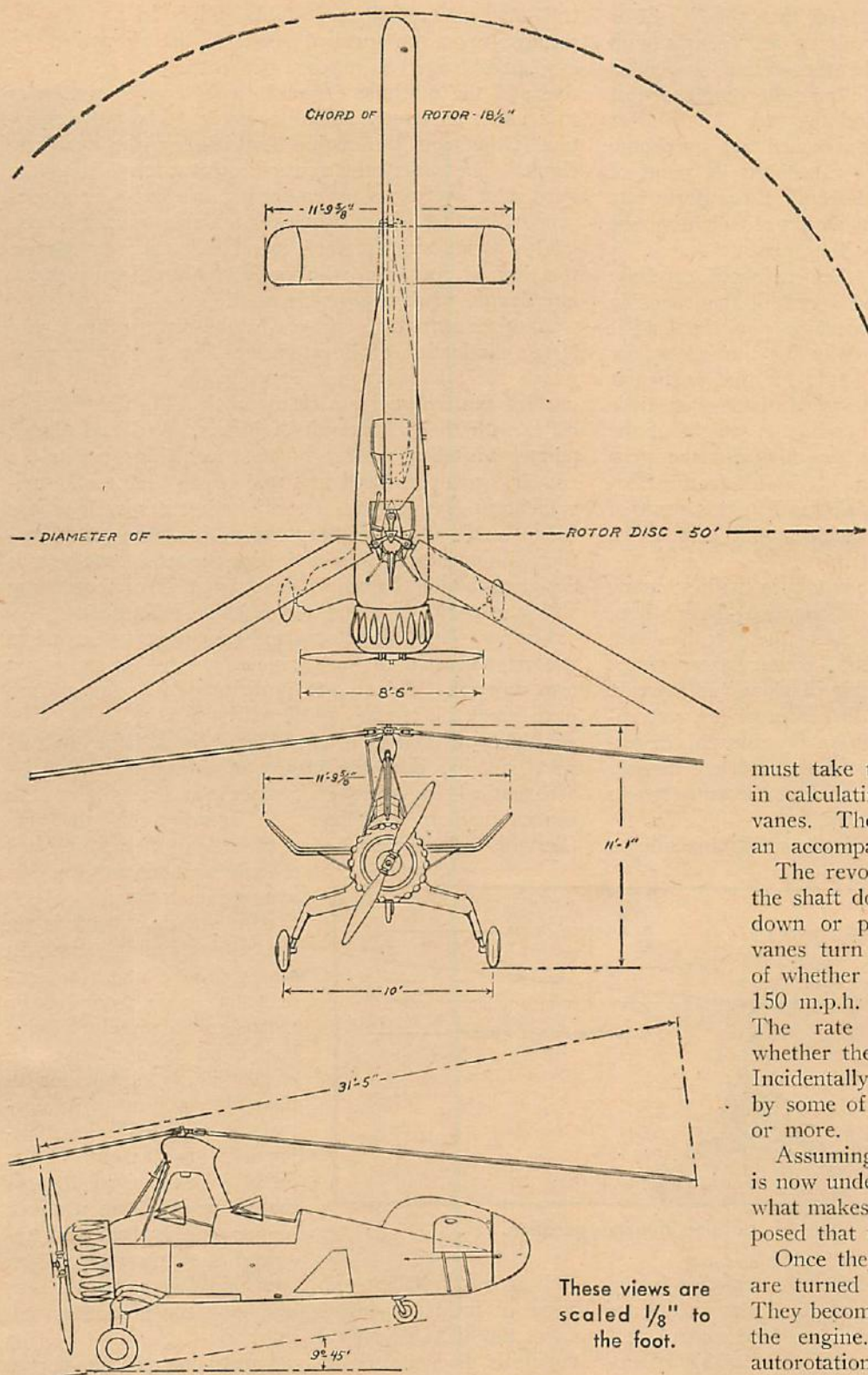
by Frank Tinsley

the body of the aircraft is hung. Each vane is really a miniature airplane wing of the wide-span and narrow-chord, or high aspect ratio type. These wings move through the air at high speed and develop lift just as the wings of the conventional airplane do. The only difference is that the ordinary airplane wings move directly forward in a straight line, while the autogyro wings or vanes revolve in a circle.

As to the advantage of these revolving wings over the ordinary type of fixed ones, there is a very great benefit based on the fundamental difference between the two types of aircraft. The body and wings of the conventional airplane, being part of one rigid structure, must necessarily move in the same direction and at the same speed. Inasmuch as the airplane's supporting surfaces (wings and stabilizer) and controlling surfaces (ailerons, elevators and rudder) depend on the pressure of the air-flow over them, any decrease in the speed of the plane results in a lowering of the pressure and a consequent loss of support and control. If the plane goes below a certain minimum speed (called flying or stalling speed), the flow of air is no longer strong enough to support it and the ship stalls and falls.

In the case of the autogyro, however, the speed and





direction of the supporting surfaces (the vanes) is entirely independent of the speed and direction of the fuselage or body. Regardless of the direction in which the body is being pulled by the propeller, the vanes continue revolving in their own tight little circle which forms a disc of support in the air from which the body hangs.

Sometimes it is believed the vanes are attached rigidly to the hub upon which they revolve. This is not the fact. Each vane is connected to the hub by means of a universal-joint arrangement permitting free movement up and down and back and forth, although the angle

at which the vane engages the air (called angle of incidence or attack) remains the same in all positions. It is this free movement of the vanes which enables them to adjust themselves individually and so smooth out the bumps in the atmosphere, thus making the gyro a far more comfortable ship to ride in rough air than any conventional plane. Moving up and down freely, the vanes might seem likely to fold up in flight like an umbrella that has been blown inside out. But when they are revolving, they are naturally subjected to the outward pull of centrifugal force. As their circular speed increases, this outward pull increases in ratio and tends to flatten out the circle in which they turn.

Of course, the designer must take this element into consideration in calculating the size and speed of his vanes. The forces at work are shown in an accompanying diagram.

The revolving speed of the vanes about the shaft does not vary as the gyro slows down or picks up forward speed. The vanes turn at a uniform rate, regardless of whether the gyro is moving forward at 150 m.p.h. or lazying along at 15 m.p.h. The rate is approximately the same whether the ship is in a climb or a glide. Incidentally, the vane-tip speed maintained by some of the newer gyros is 200 m.p.h. or more.

Assuming that the action of the vanes is now understood, there is the question of what makes them revolve. It is often supposed that they are turned by the engine.

Once they have been started, the vanes are turned entirely by natural air forces. They become completely disconnected from the engine. This natural force (called autorotational force) is derived from the action caused by the weight of the gyro's

body drawing the vanes downward past a column of air whose relative upward movement causes the vanes to revolve.

If you would like to see a demonstration of just how autorotational force works, try the following experiment. Mount a light balsa-wood or cardboard propeller on a pin at one end of a short stick. Hang a weight a little heavier than the prop on the other end. Drop this apparatus off a roof or other high place. When the stick begins to fall, the weighted end swings down and falls first. The current of air passing upward will begin to revolve the propeller. As your little apparatus falls



through space with increasing speed, the propeller turns faster and faster until it is revolving at the maximum speed that can be developed by the weight suspended from it. As the speed of the propeller increases, it develops more and more lift and the rate of fall slows down until the propeller has reached its maximum speed. Your apparatus has now reached its point of balance and from now on will descend at a uniform rate of speed determined by the combination of weight versus propeller size (lift) inherent in the apparatus.

In designing an autogyro, the engineers carefully work out the number, size and speed of the vanes in relation to the weight of the machine plus the load it is intended to carry. In this way they arrive at the most efficient combination of factors for that particular model. Most gyros are so designed that when their forward speed falls below 15 m.p.h., the weight of the machine becomes greater than the lift, and the gyro sinks slowly toward the ground. It is this feature that makes the "spot landing" possible, and in the event of engine failure provides the machine with a positive, automatic, mechanical parachute.

Perhaps you wonder why the autogyro, with so many advantages over the conventional airplane, hasn't been more widely adopted. The neglect of the gyro has been due to several reasons. Natural conservatism causes many flyers to regard the "windmill plane" as a freak. Accustomed to the often beautiful lines of the conventional airplane, they tend to dislike the unusual, insect-like appearance of the gyro. Some airmen, intensely proud of their piloting ability, sneer at the autogyro as an aircraft that "any boob can fly."

Until recently, however, the really valid objection to

trol efficiency remains constant, and is in no way dependent upon the forward speed of the autogyro. At any speed from 150 m.p.h. to zero, the control is positive and the machine responds with a given maneuver to a given movement of the controls. The only exception is that with the engine dead, the gyro is unable to climb. The practical effect of direct control is that a gyro pilot overtaken by engine trouble can pick a convenient landing place, maneuver his ship toward it, and land without any forward speed whatever exactly on the desired spot—all with perfect control and without any danger of damaging his craft.

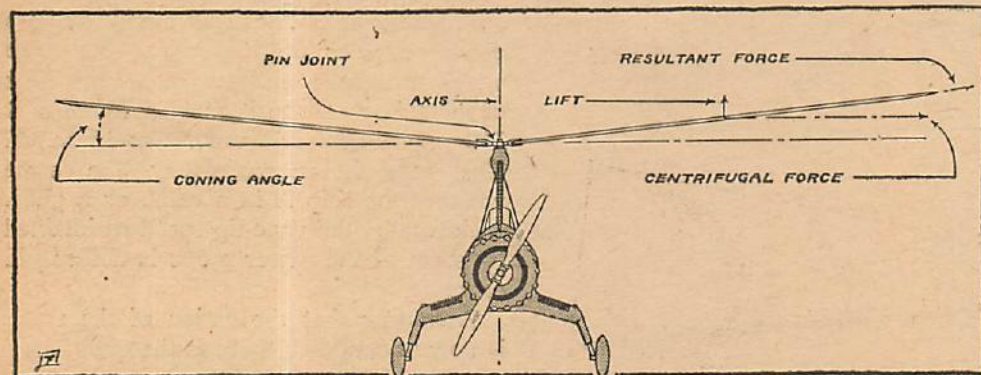
Another advantage enjoyed by the direct-control gyro is the elimination of elevators and the stub wings upon which the ailerons were formerly mounted. This has enabled the designers to clean up the ship aerodynamically, with the twin result of higher speed and almost perfect visibility. Most of the new ships retain the rudder, greatly reduced in size. It has been found convenient in speeding up certain maneuvers such as the "snap turn." For ordinary flying, however, rudder action is unnecessary, as the direct-control autogyro is designed to take the proper degree of turn corresponding with the angle to which the machine is banked.

Having gained direct control, the autogyro has taken still another step forward, or perhaps we should say a leap upward. This is the jump take-off, from a complete standstill, recently perfected by Señor Cierva. The possibility of taking off as the birds do without any forward run has been the subject of constant research by aeronautical engineers ever since the first flight of a heavier-than-air machine. In solving this problem, Cierva has eliminated the last obstacle in the path toward a truly safe aircraft for the average man.

The principle used is an astonishingly simple one. In all gyros, the motor is connected with the rotor hub by means of an auxiliary drive shaft and is used like the starter in an automobile to turn the rotor up to its normal flying speed before taking off. In the case of the direct take-off gyro, the rotor is revolved at a much higher speed than that required for normal flight.

This is greatly facilitated by turning the vanes to a zero angle of incidence—absolutely flat—in which they will exert no lift. When the rotor clutch is released, the engine is disconnected and its full power is transferred to the propeller. The vanes automatically snap back into their normal flight angle and their over-speeding suddenly generates an enormous lift which combines with the forward pull of the propeller to jump the gyro into the air at a very steep angle. The additional energy required to raise the weight of the machine from the ground soon uses up the excess lift, and the rotor gradually slows down to normal flight speed. The gyro then continues its ascent at the normal rate of climb.

In its practical application, the direct take-off permits the pilot to jump his ship from a standstill almost vertically into the air to a height of 50 or 60 feet. This is sufficient to clear the average group (Turn to page 74)



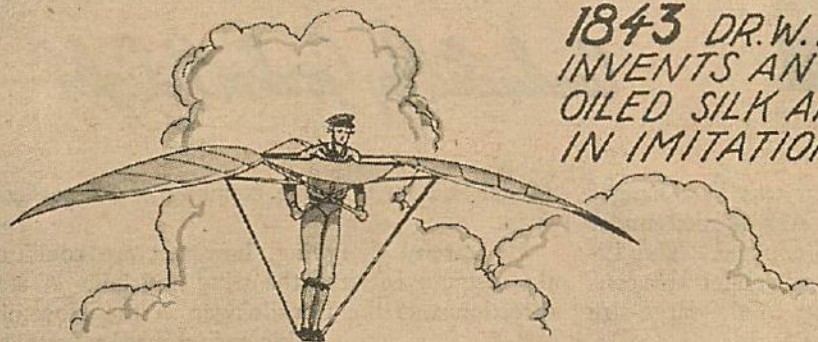
The rotor vanes take this position during operation.

the autogyro was based on an inherent weakness in the design of the early types. This weakness lay in the use of more or less conventional airplane-type control surfaces in an aircraft that was otherwise capable of extremely slow forward speeds. In making slow landings, with little if any air pressure on the control surfaces, the gyro lost "steering way" and in gusty weather often proved unmanageable. A number of the machines were overturned by swirling winds while trying to land, and while the resultant crack-ups almost never caused serious injury to the pilot, they had a sad effect on the pocketbooks of the owners. All this grief has now been eliminated by the discovery of a new system of control known as "direct control."

Direct control is a method of controlling the attitude and direction of the autogyro in flight by tilting the rotor, or set of vanes. It is advantageous because con-

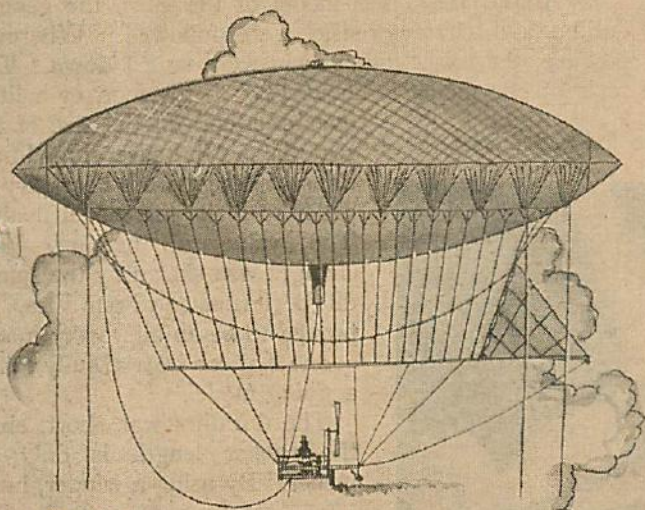
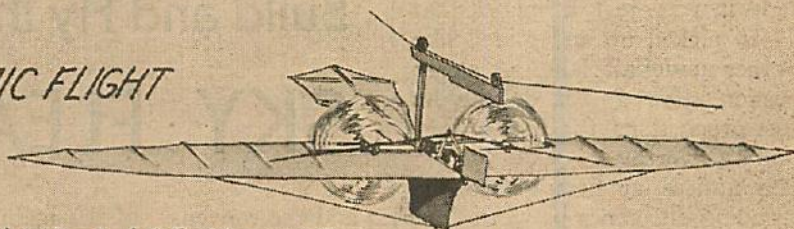


# Pictorial History of Man in the Air



**1843** DR. W. MILLER, OF LONDON, INVENTS AN ORNITHOPTER OF OILED SILK AND HOLLOW TUBES IN IMITATION OF BIRD WINGS

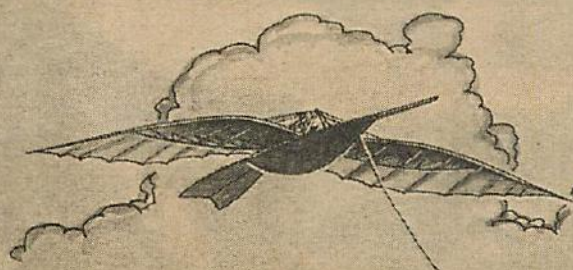
**1848** THE FIRST DYNAMIC FLIGHT IS MADE BY A STEAM DRIVEN MODEL BUILT BY JOHN STRINGFELLOW, AN ENGLISH ENGINEER AND LACE MAKER.



**1852** HENRI GIFFARD BUILDS AND FLYS A STEAM DRIVEN DIRIGIBLE AT THE UNHEARD OF SPEED, FOR AIRCRAFT, OF 6 MPH.

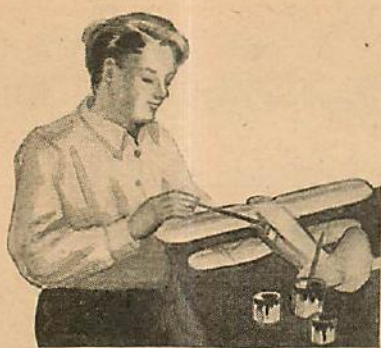


**1859** JOHN WISE SAILS 1,120 MI. FROM ST. LOUIS, MO. TO HENDERSON, N.Y. IN 20 HRS. THIS RECORD STOOD UNBEATEN FOR 41 YEARS



**1857** JEAN-MARIE LE BRIS IS CARRIED ALOFT BY HIS HORSE DRAWN "ARTIFICIAL ALBATROSS"





# The MODEL WORKSHOP

*Conducted by Gordon S. Light*

**M**Y first view of the Flying Flea was in a hangar at Roosevelt Field, where it was nestled under the wing of a neighboring monoplane. The 19-foot wing of the Flea would seem small under any conditions, but such a direct comparison to the large-size airplane made it seem even smaller than it really is. It seemed as though it was just a model that could be picked up and glided like any other model airplane. A closer inspection showed that despite its midget proportions, the Flea is rugged and airworthy.

One notices at first glance the outstanding difference between the Flea and the conventional airplane. It is the use of two large wings instead of the usual tail and wing. This theory of tandem wings is one that every modeler should thoroughly investigate. The Flea startled the aviation world with a successful application of this idea. A successful tandem wing contest model would have the same effect on the model world.

A tandem wing model will have the benefit of a much lighter wing loading and still be eligible for contests. The weight required will be determined by the area of the main wing. In other words, the Flea, according to N.A.A. rules, would be required to weigh only 1.88 ounces, since the area of the front wing is 94 square inches. This is at the official rate of one ounce for every 50 square inches. But the rear wing adds 59 square inches more of lifting area that does not have to carry additional weight. This would give the tandem wing model a distinct advantage.

The tandem wing idea has been partially developed in the theory underlying most of the designs presented in this department. In our contest ships we've always used a lifting tail that ranged about 30 per cent of the main wing area. The elevator area of the Wakefield Winner presented in the April issue of Bill Barnes-AIR TRAILS was 32 per cent of the wing. However, in these models there always was sufficient length between the wing and elevator to provide good stability. In the Flea this distance between wings is short— $6\frac{1}{2}$ "—which is only 27 per cent of the wing span. The Wakefield

Model had an effective coupling of 47 per cent of the span.

By careful designing, however, we could cut down the distance between the wing and tail. A step in this direction was the Sockdolager in the November issue.

This model had a coupling length of 31 per cent of the span and a tail area of 30 per cent of the main wing area. This model was stable under all flight conditions and gave an excellent account of itself in duration flying. But a truly tandem wing model would be one with a rear wing of at least 50 per cent

of the main wing area. Experiments along these lines would be a great deal of aeronautical fun.

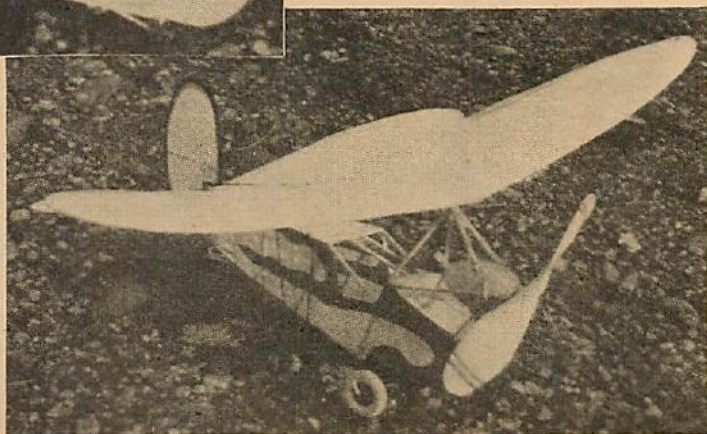
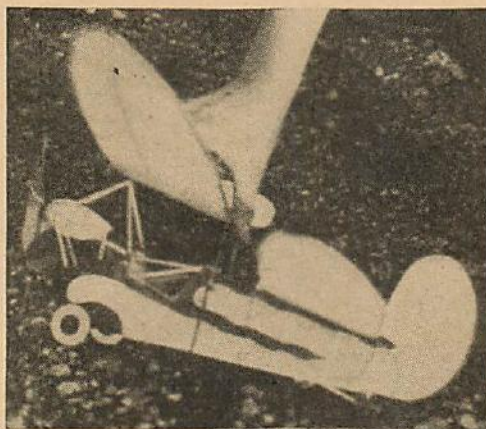
IN BUILDING the model of the Flea, the general outline and characteristics were followed. Wherever possible, the exact dimensions were scaled down. The scale of our model is about  $1\frac{1}{4}$ " to the foot, or a little

over one-tenth of the size of the real plane. But several modifications of design were necessary in order to make the model flyable. The value of making these changes was shown by the splendid performance of our Flea. It proved to be an airworthy model—one that can be truthfully called a flying model.

The duration was short, since the rubber length is only 11 inches. By using a winder, how-

## Build and Fly the SKY FLEA

Two views of the finished model.

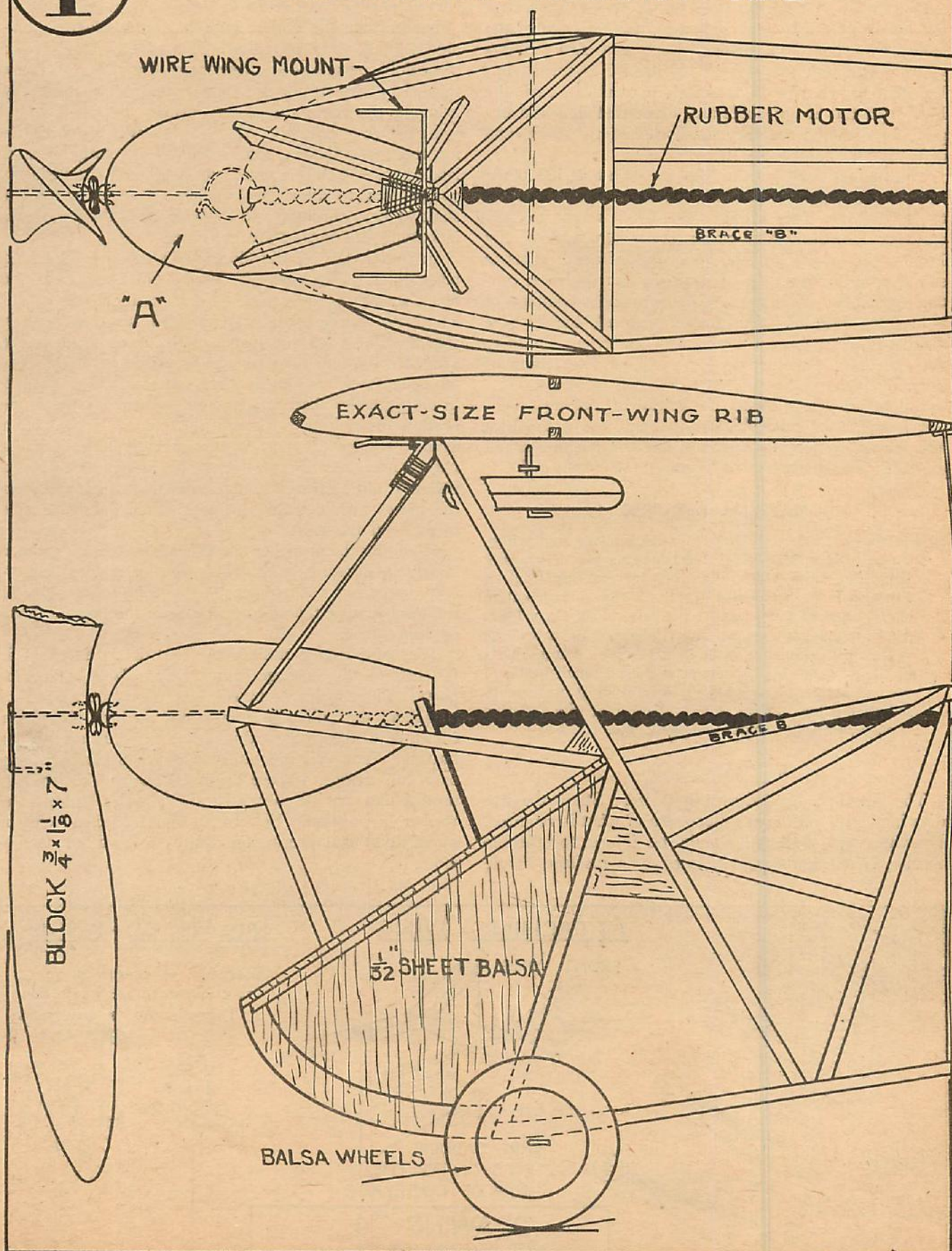




1

JOIN DRAWING #1 &amp; #2

THIS DRAWING IS EXACT SIZE





ever, we managed to store enough turns in the short motor to get 30-second flights. And what flights they were! Steep climb, half a dozen circles at 25 to 30 foot altitudes, and a smooth glide back to earth with a dead motor.

One point of design which has a serious effect on the flying qualities is the upturned trailing edge of the wings. In both rib shapes—front and rear wing—you'll notice that the rear tip of the rib is turned up. By shaping the ribs in this fashion you can save the Flea from the life of stalls and dives that it would experience with the ordinary flat-bottomed rib shape, and make stable flights possible.

The characteristics of the Flea are such that 18/100ths ounces of lead had to be added to the nose of the model to balance it. This brought the total weight to 1.25 ounces. However, this makes the wing loading only 1 ounce for every 123 square inches of area. This is still a light loading. So if someone can design a contest version of the Flea, they'll have the advantage of light wing loading. On the other hand, they'll have trouble in getting a rubber motor of sufficient length to keep the propeller turning for a competitive length of time.

But before we think too far ahead of making a contest model, let's build this original version of the Flea and see what success we have. The construction is not difficult. Little material is required. So let's go!

### MATERIAL REQUIRED

12 pcs. balsa  $3/32 \times 3/32 \times 24"$  for fuselage and wings,  
2 pcs.  $3/32 \times 3/16 \times 24"$  for trailing edges of wings, 2  
pcs. sheet balsa  $1/32 \times 2 \times 24"$  for covering front of  
fuselage, 1 pc. sheet balsa  $1/8 \times 3 \times 2"$  for curved bottom  
of fuselage and tail wheels, 1 pc. balsa block  $1\frac{1}{4} \times 1\frac{1}{4} \times$   
 $2\frac{3}{8}"$  for cutting engine nosing (labeled "A" in drawing  
#1), 1 balsa propeller block  $\frac{3}{4} \times 1\frac{1}{4} \times 7"$ , 2 large sheets  
of tissue, 1 pr.  $1\frac{1}{2}"$  diameter wheels, 1 small bottle of  
cement and 1 of banana oil, several brass washers to  
reduce bearing friction, 2 feet of medium wire for wing  
support, propeller shaft, rear hook, etc.

### CONSTRUCTION

The Flea has been drawn full size. Study the five drawings until you have a clear idea of what is required. Drawings #1 and #2 should be joined together to form a complete fuselage layout. The fuselage should

be built first. Balsa  $3/32 \times 3/32"$  is used throughout. In making the fuselage, you can work directly from the drawing. That is, shape your wood the size it's shown in the full-size drawing.

The bottom front of the fuselage is shaped by two curved portions cut from  $1/8"$  flat balsa.

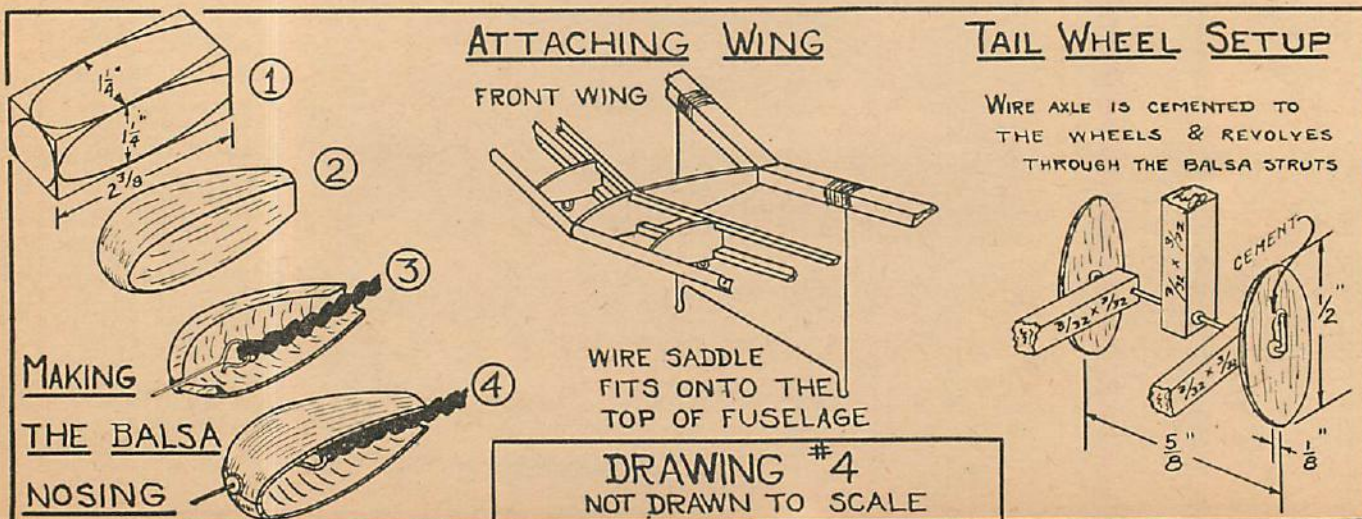
Notice that the entire front of the fuselage is covered with  $1/32"$  sheet balsa. This added weight serves a twofold purpose—it strengthens the fuselage where there is great strain and helps balance the model by bringing the center of gravity nearer the front.

In drawing #1, the balsa nosing which substitutes for the two-cylinder motor used on the large Flea is labeled "A." This is cut from balsa, and the inside is gouged out to allow the rubber motor and propeller shaft to pass through. In drawing #4, the four steps in cutting this nosing are explained.

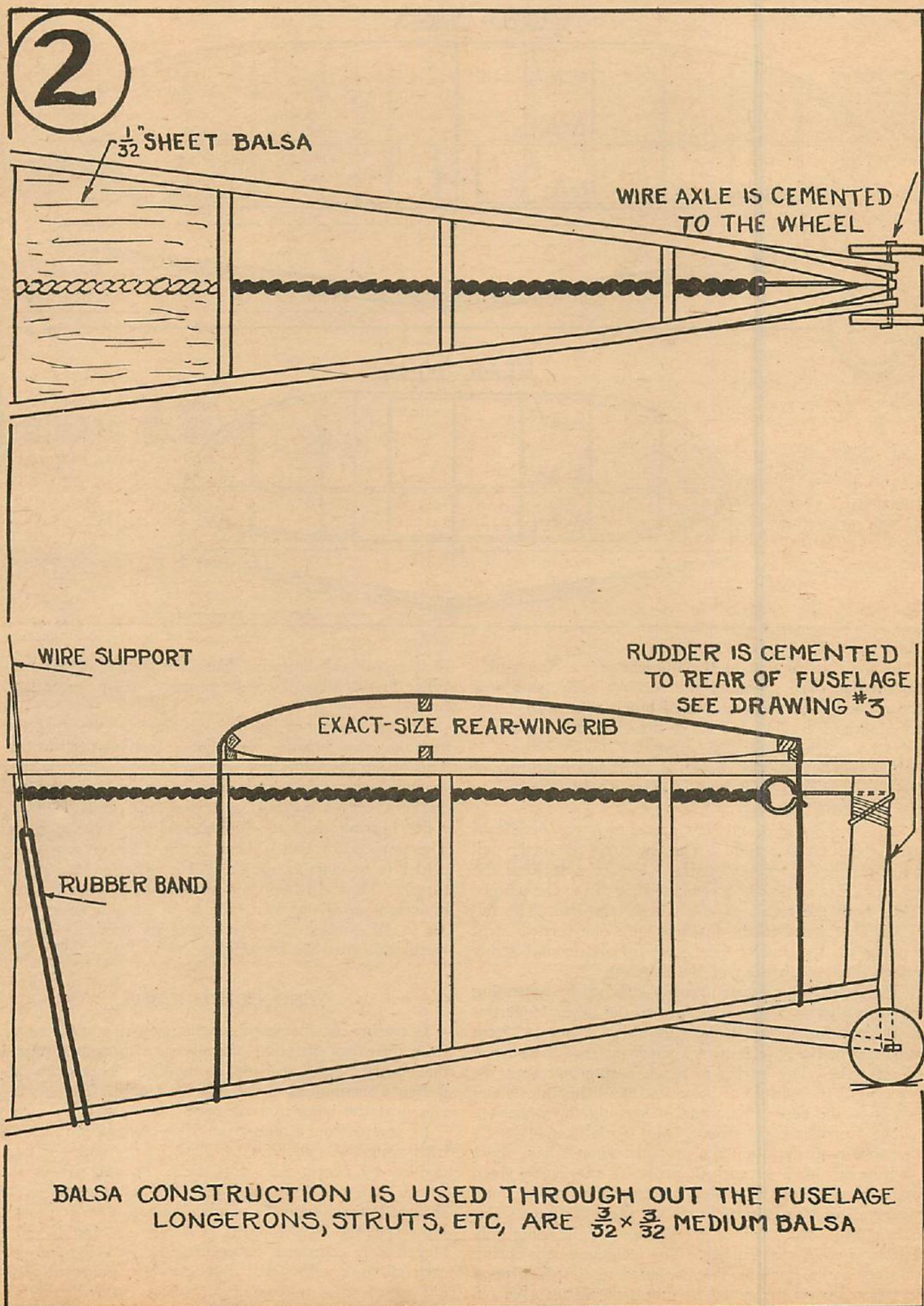
In step 1, lay off the block as indicated by the solid black lines. Cut away the excess balsa and sand the block smooth as in step 2. Next cut the block in half lengthwise through the center. This has been done in step 3. Cut away the inside of the block to allow the propeller shaft to turn freely. The bottom of the nosing is cut open so the rubber motor can be attached to the propeller shaft. After you've cut away the inside portion of each half, cement the pieces back together again. If you're expert with a carving knife, it might not be necessary to cut the nosing in half in order to hollow it out. However, it is an easy method, and after the pieces are cemented together you'll barely be able to pick out the joint.

Mounting the propeller and the rubber motor is shown clearly in drawing #1. The propeller had to be lowered to permit the rubber to run through the top of the fuselage, but this did not handicap the Flea in flying or appearance.

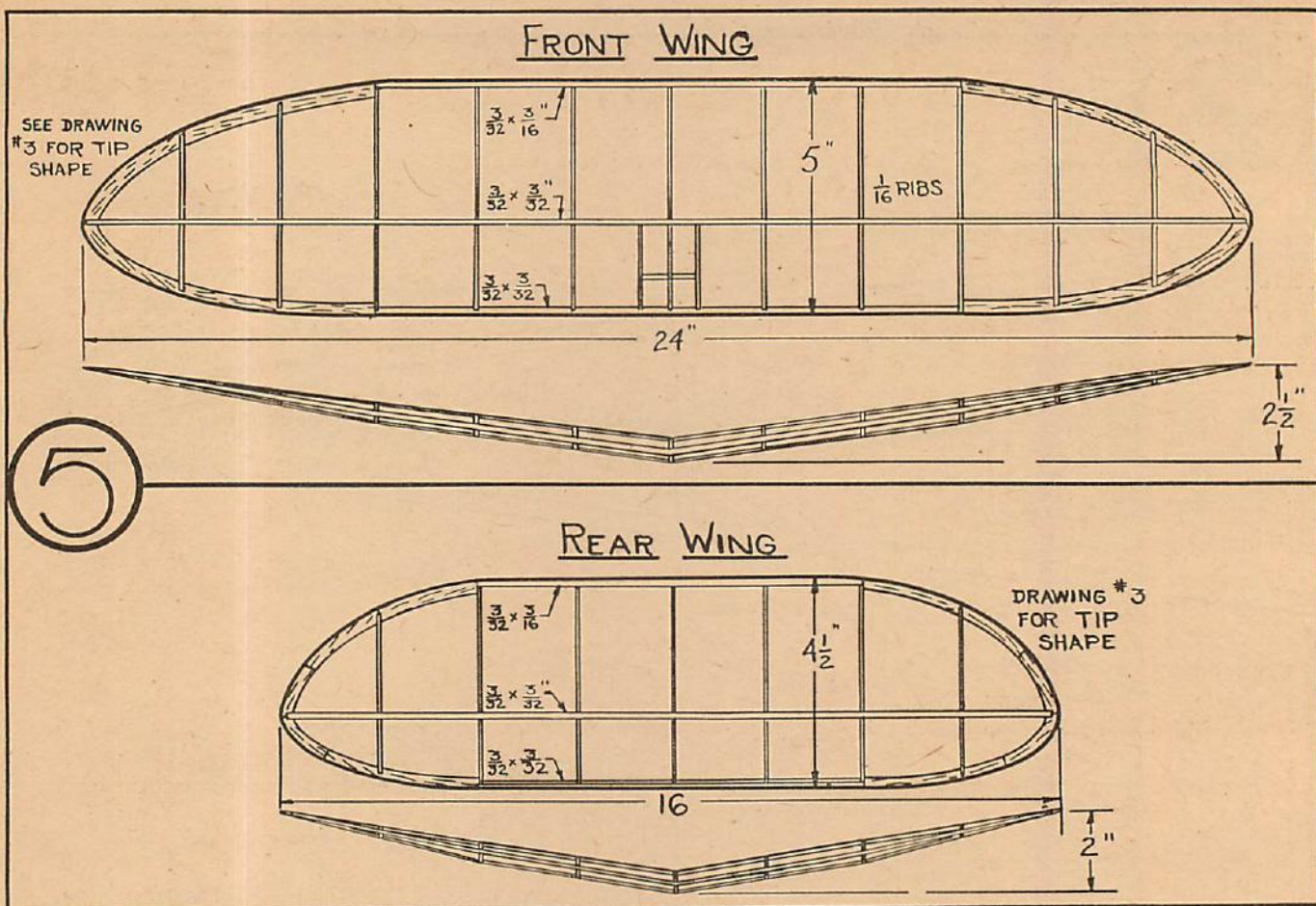
The balsa engine nosing "A" and described above is fastened to the fuselage with  $3/32 \times 3/32$  balsa supports. Three pairs of braces give plenty of rigidity to withstand the pull of a four-strand motor. A washer cemented to the front of this nosing provides a propeller bearing. You can use either a punched clothing snap or a cup-washer. These are available with protruding prongs that can be inserted into the balsa to keep the washer in position. Be sure to add a touch of cement as an additional precaution against the washer coming loose.











In the construction of the fuselage it was impossible to leave an open space for the cockpit. The tension of the rubber made the addition of braces necessary. The two braces identified as "B" in drawing #1 run alongside the rubber motor and strengthen the fuselage.

The rear end of the rubber is attached to the rear of the fuselage by a wire hook cemented and threaded to the rear fuselage post.

In drawings #2 and #4 are shown the details of tail wheel construction. The two  $\frac{1}{2}$ " diameter tail wheels are cut from  $\frac{1}{8}$ " balsa. A wire axle joins the wheels. Notice that it is cemented rigidly to the wheels. Thus both the axle and the wheels revolve. The tail wheel is attached to the fuselage with one vertical strut running to the rudder post and two horizontal struts attached to the bottom of the fuselage.

The front landing gear is easily attached by cementing and threading a 5" piece of wire to the lower longerons in the position shown in drawing #1. About  $\frac{1}{2}$ " from each end of the wire cement a small piece of balsa wood to the axle. This serves as a wheel-stop and fixes the position of the wheel on the axle. Bend the axles about  $\frac{1}{8}$ " from the end as a means of keeping the wheel on.

The propeller is cut from a balsa block  $\frac{3}{4} \times 1\frac{1}{8} \times 7$ ". For maximum duration the propeller should have more blade area, but a seven-inch propeller cannot be given more area without assuming queer proportions. Don't worry about this feature, since the propeller exerts sufficient thrust to turn in a good snappy flight using only 4 strands of  $\frac{1}{8}$ " flat rubber. The technique of propeller carving is the same as that included in the description of other models presented in this department. An old issue of Bill Barnes-AIR TRAILS will show you the

method to be followed. The three views of the propeller in this plan show the proportions of the finished prop.

To cut down bearing friction between the propeller and the nose bearing we used a ball-bearing washer. This fitting resembles two ordinary cup-washers clamped together with small steel balls free to roll inside these washers. This bearing is a miniature version of the roller bearing used to eliminate friction in machinery. The purpose of using them in the Flea or any other model is to convert all the rubber energy into useful thrust. These ball-bearing washers have been reduced in weight until they're available in sizes ranging from .02 to .05 ounces. A smooth-running propeller is well worth this increase in weight.

### WING CONSTRUCTION

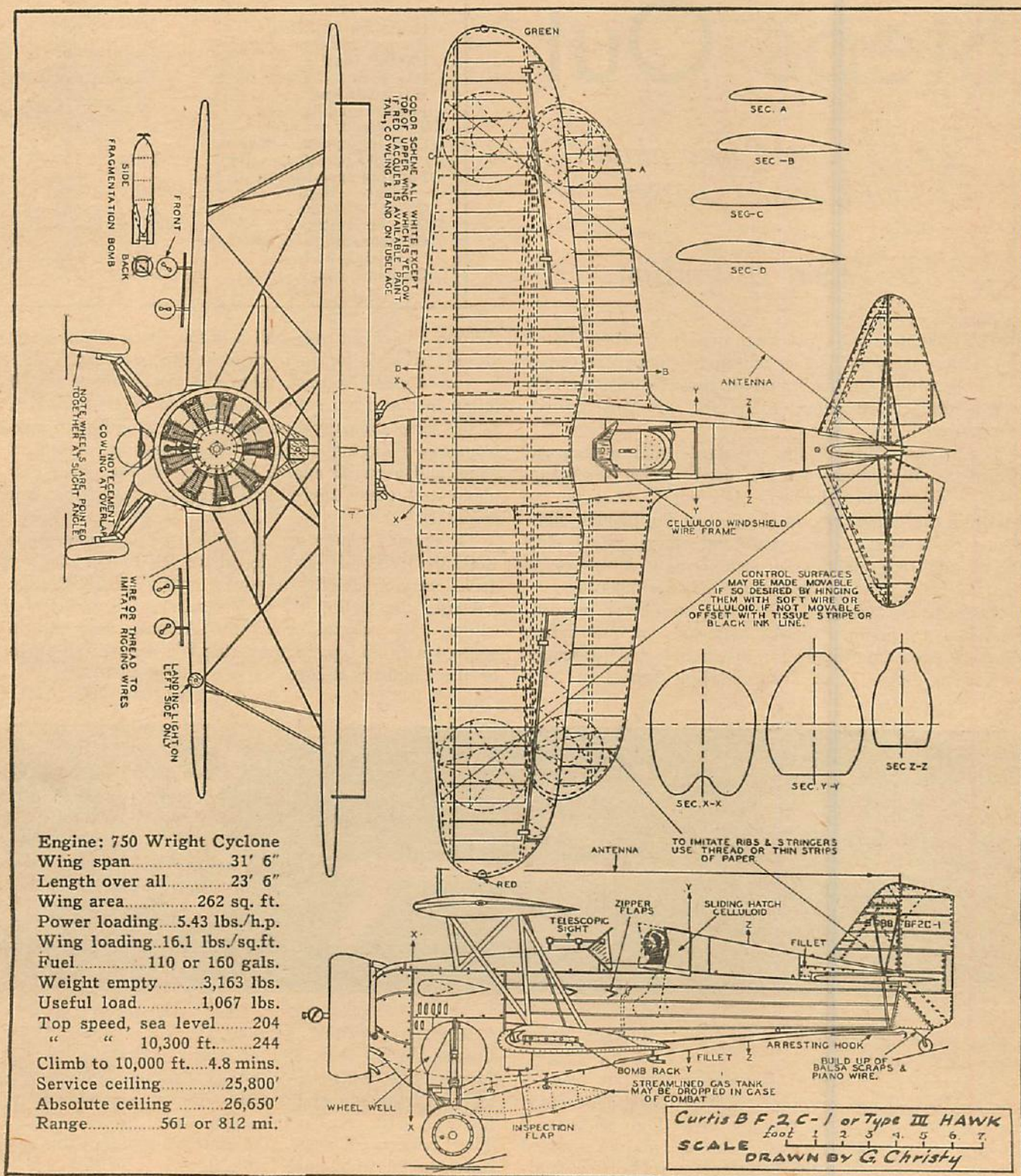
In tracing out the shapes of the main ribs of the wings from drawings #1 and #2, be sure to note carefully the upturn in the rear tip of the rib. This is an important contribution to the model's flights. The smaller ribs near the wing tips are of the same shape.

In comparison to the large Flea, the aspect ratio of both wings was increased. That is, the ratio of span divided by chord was increased. The chords of the wings were cut down to 5 and  $4\frac{1}{2}$ " after experiments showed that the model was unstable with greater chords. However, the model could be flown successfully with bigger wing chords if the upturn in the trailing edge of each rib was increased. But with the upturned trailing edge comes a loss in lift which destroys the advantage of having bigger wing

(Turn to page 77)



# The Navy Curtiss III Hawk



BUILT particularly for high altitude bombing or fighting, the Curtiss Type III Hawk operates from the U.S.S. *Ranger*, most modern of Uncle Sam's floating landing fields, as the BF2C-1. A squadron makes up the single-seat fighter force. Up 2,000 feet in a minute, they reach 244 m.p.h. level top speed at 10,300 feet. Construction: steel tubing in fuselage,

two spruce box spars and built-up truss ribs in wings, metal frame in empennage; fabric covered; wing leading edges of dural sheet. A machine gun in each side of the fuselage runs between engine cylinders. Beneath is an extra gas tank. Wing racks hold five 10 kg. bombs, three 20s, or two 50s. There's a good photo on page 45.



# Aeronca Steps Out

*Announcing a new plane  
and a model contest*

by Albert J. Carlson

|                      |             |
|----------------------|-------------|
| Length over all..... | 22 ft.      |
| Height over all..... | 7 ft.       |
| Span.....            | 36 ft.      |
| Wing area.....       | 150 sq. ft. |
| Gas capacity.....    | 28 gals.    |
| Oil capacity.....    | 2 gals.     |

|   | LA (70 h.p.) | LB (85 h.p.) |
|---|--------------|--------------|
| Gross weight, lbs.....                                      | 1,680        | 1,680        |
| Empty weight.....   | 1,036        | 1,008        |
| Useful load.....  | 644          | 672          |
| Pay load.....   | 291          | 319          |
| Wing loading.....   | 11.2         | 11.2         |
| Power loading.....  | 24           | 19.75        |
| Top speed, sea level.....                                   | 115          | 120          |
| Cruising speed, 1,800 and<br>1,900 r.p.m. respectively..... | 100          | 105          |
| Landing speed (standard job<br>without flap).....           | 48           | 48           |
| Climb, ft./min.....   | 500          | 600          |
| Service ceiling.....  | 13,000       | 13,000       |
| Gas consumption, gals. per<br>cruising hour.....            | 5            | 5            |
| Cruising range, miles.....                                  | 500          | 525          |

SAY "light plane" on any airport in the United States, ask your listener what particular plane comes to his mind at the sound of those words, and I'll wager that more often than not he will answer "Aeronca."

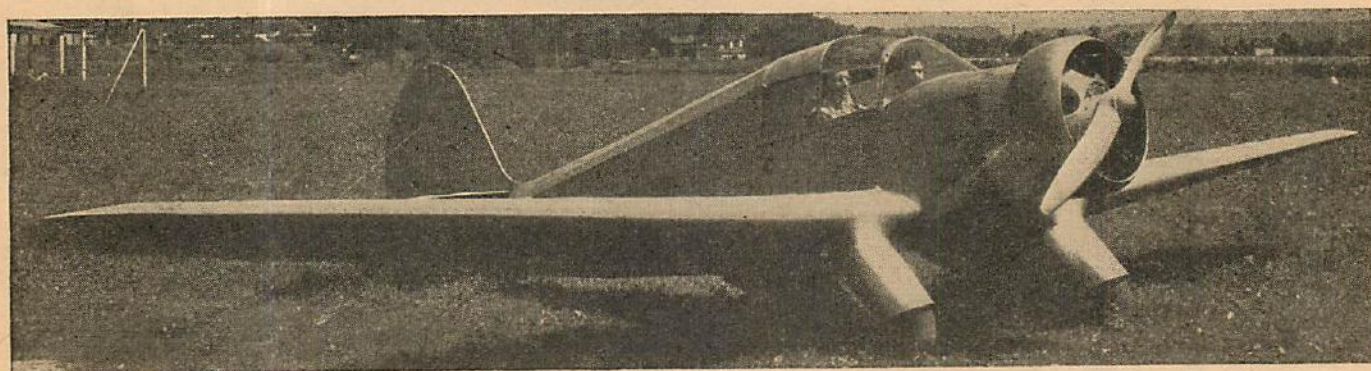
That's a measure of the popularity and widespread use of the little planes manufactured by the Aeronautical Corporation of America. It's not to be taken as belittling the importance of the rest of the popular light planes, such as the Taylor Cub and others. Each ship has its admirers, but the Aeronca seems to have won at least as large a following as any of its competitors.

Aeroncas are everywhere; many are flown abroad, especially in South America. Besides private flying, they are used extensively for instruction and passenger sightseeing hops. The Teaneck High School in New

Jersey have set over half a dozen speed, distance and altitude records for their class in the last year.

Now a new Aeronca takes the air—a plane so different in appearance that it would hardly be recognized as the same company's product. The wing has dropped from top to bottom of the fuselage, bracing wires have gone, and a radial engine is cowled at the nose. The photo and plans reproduced herewith reveal the new model L.

Two power plants are available in the standard job. Both are LeBlond 5-cylinder air-cooled radials of direct drive, varying chiefly in power output. The Aeronca LA uses the LeBlond 70 h.p. and the LB the 85 h.p. engine. On special order, the Aeronca may also be secured with 90 h.p. engines—the Warner Scarab Junior or the Lambert R-266.



Jersey owns an Aeronca for the use of students taking the school's flying course.

Up to now, "Aeronca" has meant just one plane—the model C single or double seater, inclosed or open, with many flying wires running to its high wing from the deep pouter-pigeon-breasted fuselage and an inverted V cabane strut above the wing center supporting landing wires. The engine was 30-36 h.p. 2-cylinder horizontally opposed. Weight empty was a little over 500 pounds. Superlative performance made up for any lack of elegance in looks. Despite its lightness and low power, the high-wing Aeronca cruised for 200 miles at 80 or 85 m.p.h., and could reach 93 top speed. As land planes and float-equipped for seaplane use,

In general outline, the new Aeronca is similar to the Curtiss-Wright 19L Coupé which I described in the March issue, with the difference that the Coupé's wing tapers backward, whereas the Aeronca's tapers mostly forward. In construction, however, they are unlike. The Coupé is all metal; the Aeronca includes the more conventional wood and fabric.

The Aeronca's flat-bottomed fuselage is framed of welded chrome-molybdenum steel tubing. The fin is part of the same structure. Stabilizers are removable and interchangeable. All the tail parts, like the fuselage, are of fabric-covered steel tubing. The control surfaces are not "balanced," but move on piano-type hinges. A tab on the left elevator, adjustable by ca-





ble from the cabin, helps longitudinal control.

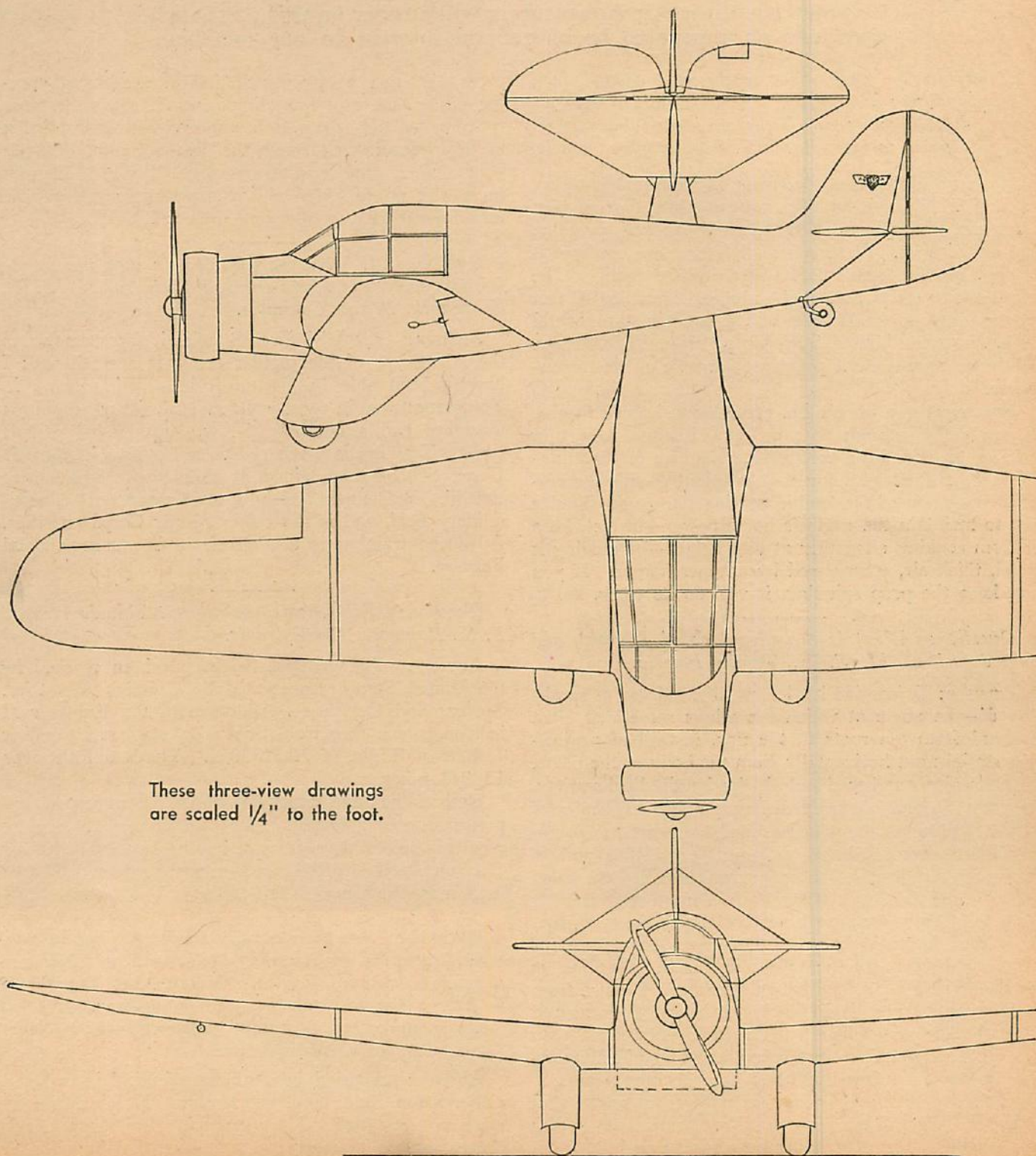
The cantilever wing is built in three sections. The 18-foot center section, which is clamped to the fuselage, is of spruce box spar and truss-type construction with dural metal sheeting forming the leading edge. The 9-foot wing tip sections have solid spruce spars and truss ribs. They are joined to the center section with four tapered bolts. All sections of the wing have inside bracing of double drag wires. The wing shape tapers from N.A.C.A. 2218 airfoil section at the root to N.A.C.A. 2209 at the tips.

Ailerons are built of dural channel-shape sections riveted together, and are attached to the wing by three

piano-type hinges. They are statically balanced in position by a weight extending forward on a short arm. The entire wing and aileron surface is fabric-covered.

Landing gear consists of airwheels held by double oleo sliding struts that give a 4-inch travel sheathed in streamlined metal parts. The full swiveling tail wheel is spring-mounted.

The upholstered cabin, entered from a door on the right, has a single continuous seat for two persons side by side, with room behind for 121 pounds of baggage. Engine noise is reduced to a minimum by soundproof packing around the firewall ahead. Windows are of pyralin, those overhead being colored to shade sun glare. (Turn to page 75)



These three-view drawings  
are scaled  $\frac{1}{4}$ " to the foot.



# What's Your Question?

## By CLYDE PANGBORN

### Wing Commander



As soon as possible after the questions are received, the Wing Commander of the Air Adventurers will answer on this page such questions as appear to be of general interest to our members.

*Question: In planes built to fly up to 80,000 feet, the streamlining is essential. Experts talk of thin air giving no resistance; yet, if the air is so thin, what is the prop going to bite into? W. P., Toronto, Ontario.*

**Answer:** Your first statement is somewhat contrary to facts, I think. I don't know of any intention, present or future, to fly planes at 80,000 feet. Rockets, possibly, but not aircraft. Stratosphere flying, as we speak of it to-day, usually means lower stratosphere flying. The stratosphere starts at a point ranging from 26,000 feet at the poles, to 55,000 feet at the equator, the general height over the United States being around 37,000 feet. What we hope to do is penetrate the edge of the stratosphere.

Even up there the air has enough consistency to give the propeller enough to chew on, although it is thin enough to offer little resistance. Because of that thinness, it's not streamlining that is essential—it's the efficient operation of the engine turning the prop. You've got to maintain the engine's horse power—in fact, keep it from conking altogether at that height—by feeding it good, thick air, compressed by a supercharger. If you can keep the prop spinning, it will do its work.

*Question: What is the advantage of dihedral, and how does it work? S. W., Tampa, Florida.*

**Answer:** I imagine it's lateral dihedral you're speaking of—the angle at which the wings sometimes slant upward from the roots to the tips, instead of projecting straight out horizontally from the body of the plane. There's also another dihedral, the longitudinal variety, but that's usually referred to nowadays as "sweepback"—the slanting of the wings toward the rear.

Lateral dihedral helps to promote stability and to bring the airplane back on an even keel if it gets rolled over to one side by a gust of wind or other cause. It does this because greater lift is created on the wing that has been lowered than on the raised wing. Why? That's a hard point to explain in words. The fact is that the lower wing now extends a longer distance from the fuselage which it is helping to support—measured horizontally from wing tip to fuselage center line—than the other wing. Therefore it has a greater effective lifting power and raises itself back into position again.

Let's say that each wing has a dihedral angle of 3 degrees. We roll the plane until one wing is level with the ground. The other wing now has an angle of 6 de-

grees. As the rising wing tip follows the inward-curving circle that would mark its path if the plane were rolled completely over, it has moved inward toward a vertical line drawn through the plane's center. There's your shorter wing span on one side. Try it in diagram form with pencil, ruler, and compass and you'll get the idea immediately.

*Question: What kinds of ships do they use in the Irish air force, and where are their pilots trained? S. H., Whonnock, British Columbia.*

**Answer:** The Irish Free State's air force, known as the Air Corps of the regular army, is a small one; I haven't been able to get much information about it. The planes now in use consist chiefly of Vickers Vespa machines and a number of Avro trainers of various types. Training is given cadets and officers at the Air Corps Schools maintained at Baldonnel Airport near Dublin. Baldonnel, Ireland's main airport, is a semi-military field, and is the center of Air Corps activities. Advanced training is also given at Gormanstown and Fermoy.

*Question: Who holds the world's altitude record? F. S., Dunmore, Pennsylvania.*

**Answer:** The greatest height has been reached by the United States, represented by Captains Albert W. Stevens and Orville A. Anderson in the Explorer II balloon, which rose from South Dakota last November 11th to a height of 72,395 feet. That's a little over 13 2/3 miles.

Heavier-than-air craft, of course, haven't yet approached such a height. The present world's airplane record is 47,352 feet—less than 9 miles—established for Italy on April 11, 1934, by Commander Renato Donati in a modified Caproni 113 biplane.

*Question: Are there usually many openings in commercial aviation for the young pilot with only his commercial (200-hour) license? If not, then how would he have a chance to obtain more flying—say, the 1,200 hours required to operate a large transport plane? L. M., Star City, Saskatchewan.*

**Answer:** Salaried jobs are not plentiful in commercial aviation right now, and a bare 200 hours doesn't stack up very high. The usual run of pilot work is in charter or air taxi service, freighting, joy-hopping, or



individual and flying-club instruction. There are also jobs as regular pilot for private owners or industrial firms. And in addition, there is specialized work such as photo-flying, crop-dusting, aerial advertising, exhibition flying, testing, and so forth. In many of these and the preceding lines, it's a big help to own your plane. Then you don't have to depend on jobs; your income is up to yourself and your own efforts.

For transport piloting, it's necessary either to build up outside time and experience to at least the 1,200-hour mark, or get a co-pilot's job and rise within the ranks.

Building up time, if you can't get paid for doing it in somebody else's ship, is probably best gotten in government reserve service or membership in a flying club.

*Question: Does the Curtiss army Hawk P6-E have ailerons on both wings, top and bottom, or just the top, and does the black band that holds the insignia "white owl diving" go all around the body? K. K., Minneapolis, Minnesota.*

*Answer:* The P6-E has ailerons on the top wing only. As for the body stripe, that goes clear around, and the white owl insignia, which is the emblem of the 17th Pursuit Squadron, appears on both sides.

*Question: What is decalage? E. L., New York City.*

*Answer:* It's the variation, if any, between the wing-angle settings of the wings of a biplane, a triplane, or other multi-winged plane. That is, it's the difference—in the case of a biplane, for instance—between the incidence or angle of attack of the lower wing and the upper wing. If the front edge of the upper wing is raised 1 degree, and that of the lower wing is raised 3 degrees, the decalage equals 2 degrees.

*Question: Can a Canadian join the U. S. army air corps if he has the necessary requirements? B. W. M., Woodstock, Ontario.*

*Answer:* He cannot join as a flying cadet for training to become a pilot, which is an officer's job, unless he's a United States citizen by birth or naturalization. However, he can join as an enlisted man, which leads to all sorts of non-flying jobs such as plane, engine, or radio mechanic, parachute rigger, etc., as soon as he makes a citizenship application.

*Question: How is the crankshaft arranged on a radial motor? F. R., Keansburg, N. J.*

*Answer:* Like dihedral stability, that's another hard one to make clear without the aid of a diagram, but I'll try. Perhaps the simplest way is to use a wagon wheel as an example.

The spokes of the wheel, as you know, point inward to the center, and are fastened to the wheel hub, through which the axle runs. Now suppose that the axle is bent up at right angles on each side of the hub, and then straightens out, so that the hub grasps the "crank" part of what would be a crankshaft. Then suppose that the spokes, instead of being fastened to a wheel rim, are pistons moving in individual cylinders, and that instead of being stuck rigidly into the hub, they are hinged to it so that each has a little free swinging movement.

There you have the working scheme of the radial motor. The pistons are pushed down one after the other

around the "wheel," and the result is that they push the crank around and turn the crankshaft.

*Questions: How is lateral control obtained in the Waterman Arrowplane? W. F., St. Augustine, Florida. How does the Waterman Arrowplane rise? I do not see any elevators on the plane. S. K., New York City.*

*Answers:* Lateral or side-to-side balance in the Waterman is obtained by raising and lowering the ailerons which are along the outer portion of the wing's trailing edges, just as in an ordinary plane. Yawing or turning control is through the vertical rudders at the wing tips. Incidentally, these rudders can also serve as air brakes for landing when both are swung inward.

As for pitching or longitudinal control, since the Arrowplane has no tail to carry elevators and there is no other part of the plane to which they could conveniently be attached, the ailerons are made to serve this purpose. They can be operated from the cabin as ailerons—one up and one down, for lateral control—or as elevators, both of them raised or lowered at once.

*Question: Can you fly if you are color blind? R. B. B., St. Thomas, Ontario.*

*Answer:* It all depends on the degree of color blindness. Some mild forms would not disqualify, such as being able, perhaps, to recognize colors even if one could not perceive them correctly. In any case, it's up to the medical examiner. If the license applicant fails at one test, the examiner will give him a chance at other different tests. Total color blindness disqualifies, of course, because a pilot has to observe colored navigation and ground lights, read colored maps, and so forth.

*Question: Why are a series of letters and numbers used on various aircraft, such as NC13361 on a Boeing transport, and what do they signify? L. S., Rock Island, Illinois.*

*Answer:* Markings on aircraft serve the same purpose as markings on anything else: identification. Such identification may include information as to nationality, whether officially licensed, the plane's uses, its type, and its individual number. In general, markings can be divided into service (army, navy, etc.) and civilian (non-military).

Service markings usually include, among others, a design or symbol on tail and wings to indicate the country, and letters and numerals indicating the plane's military rôle, type, squadron, and its number.

Civilian markings have practically the same function as auto license plates. As to their arrangement, in most cases one or two letters come first to indicate nationality, if the plane is eligible to fly across borders. These letters have been allotted by international agreement. N means the United States; CF, Canada; G, Great Britain, etc. Following may come other letters to indicate status within the country, such as, in this country, C for commercial use, S for state or government operation, and other special marks. Then comes the plane's own identification as licensed or registered by the government. Some countries use letter combinations; a Canadian ship might bear an individual identification such as AQQO. The United States uses numbers.





## Ceiling Unlimited

**W**ELL, fellow Air Adventurers, the news is out! I mean the news of the bigger, greater AIR TRAILS Magazine told in the announcement on page 3. If you hurried past that announcement to see the good things in this issue, turn back now and read it carefully. It's important.

The new magazine is a reward for work well done. It's a reward for *you*—every one of you. The work you've done can't be measured in ordinary ways, because it's work that lies in things of the mind and the spirit, not in ordinary tasks. Through your ranks that number thousands and thousands of wide-awake, air-minded adventurers scattered clear around the earth to Australia, you've carried the message of modern aviation to doubting elders, to your families, to friends. You've done that by talking aviation, by building and showing models, by displaying the Air Adventurers pin that makes you one of the great group of future airmen of the world.

Your reward comes in the form that we know you'll appreciate most, for it will come to you not just once, but month after month—an even bigger, finer Bill Barnes-AIR TRAILS, chock-full of new things and surprises that we've been saving up. There hasn't been room for them before. Squeeze as we might, we couldn't get them in without leaving out something else. The only way to give them to you was to add a lot more pages. That costs more, but we figured that it was well worth it. And we know that when you see the July issue, you'll agree!

Bill Barnes leads the way with his new Silver Lancer. There's a ship that's going to leave you gasping! It's modern right up to today, to the minute, to the tick of the clock as you read this! The Silver Lancer, shown and described in detail in the next issue, is an aviation education all by itself.

Where Bill goes, we'll follow, and we'll see new wonders of the air spread before us in the pages of a magazine that, like the Silver Lancer, leads 'em all by such a wide margin that the rest are out of sight!

And riding right along will be the Air Adventurers, with Clyde Pangborn and Lieutenant Commander George O. Noville, our Wing Commanders, up in front—a mighty air fleet that darkens the sky with countless wings, racing easily with time, greeting each new development in aviation as it shows above the horizon, keeping abreast of this swift science of ours.

Now is the moment, when we're reaching a new altitude, to double our efforts. Our task grows easier as the bigger Bill Barnes-AIR TRAILS helps us in spreading air-mindedness, but for that very reason we mustn't slacken. And now is the time for new members to take their places in our sky parade. There's always room for them if they can honestly pledge themselves to uphold our seven-point Creed of Self-Reliance, Courage, Initiative, Independence, Loyalty, Integrity and Obedience. For them there's the coupon below, and the certificate and winged pin if their application is approved here at headquarters.

Let's go, Air Adventurers!

Your Flight Commander,

*Albert J. Carlsson*

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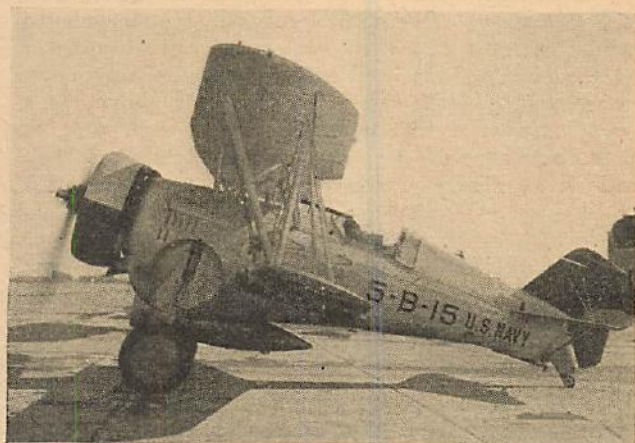


# AIR TRAILS GALLERY

*A Picture Page of Modern Planes for the Collector*



SIKORSKY S-43, largest amphibian, has entered Inter-Island Airways service in Hawaii. Three have been ordered for new Boston-New York run.



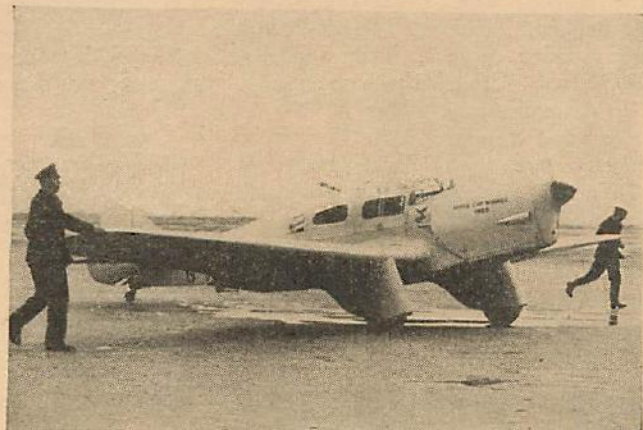
CURTIS BF2C-1 of Fifth Bombing Squadron, U.S.S. "Ranger," illustrates the solid-model plans of this Type III Hawk given on page 39.



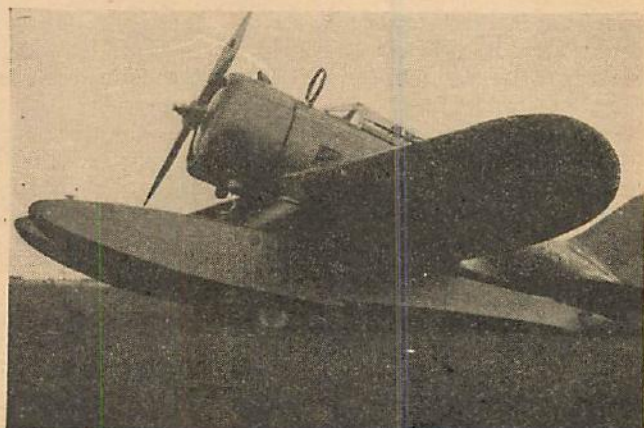
FOKKER D-21, testing in Holland, is single fighter with fixed landing struts. Claimed top is 245 with Pegasus radial, 273 with Hisso V.



B.F.W. Messerschmitt 108 touring type, with metal monocoque fuselage, roomy 4-seat cabin and wheels folding into wings does 183 on 210-225 h.p.



MILES Falcon, King's Cup winner, sets Capetown-London record of 6 days 7 hours, Tommy Rose piloting. Engine is 200 h.p. De Havilland Gypsy 6.



SEVERSKY Sev-3, specially powered with 715 h.p. Wright Cyclone, holds international and American amphibian speed records at 230 m.p.h. average.



# BRETHREN OF DEATH

(Continued from page 18)

filled with a bright-red liquid. It gave off a strong, sweetish odor.

"This is the container, Bill," went on the boy eagerly. "It's a perfect-scale reproduction of a real skull. It shows all the contours of the head so you can massage your scalp in the right places. Also, it's a warning that unless you use this Scalp Awakener—he shot a poisonous look at Shorty—"your own head will be just as hairless as this skull. And, in addition to all that, you get a forty-page booklet of instructions on how—"

"Skip it!" said Bill coldly. "Get back to your machine. You're coming along with me."

The boy flushed, glared truculently, and then said meekly: "Yes, sir." He turned and started back toward the Eaglet, replacing the top on the skull and putting the object back in his pocket.

Bill and Shorty heard his muttered words: "O. K.—O. K. When their hair starts falling out they needn't come to me."

"It's all gone to his head," said Shorty, grinning.

Bill pulled on his helmet. "I'm taking Sandy along to see where I land. Then he'll come back here. Want some one to know where the place is—in case of trouble."

He went to the Stormer and swung up into the front cockpit. The big gull-winged machine was poised on the apron, the morning sun shimmering on its gleaming scarlet lacquer. The engines were throttled down, the two three-bladed propellers ticking over quietly.

Bill adjusted parachute harness, saw that Sandy was in his machine, signaled him to take off, and waited while the little monoplane streaked down the runway and arrowed into the sky. Bill released the brakes, nodded to Shorty and, throwing open the throttle, blasted the Stormer after it. He climbed steeply, came around to head into the northwest and radioed Sandy.

"Going to land on a farm up-State. Come along with me. All I want you to do is to see where the place is and then hike back for home. Understand?"

"Got it," came Sandy's voice. The Eaglet had sprinted around and was flying placidly to the Stormer's right.

Bill plotted his course for Leamington. Ralph Hawthorne had written that the farm lay ten miles north and that the only landable field would be marked with a white cloth. Bill estimated that the flight would take three quarters of an hour, with the Stormer held down to the Eaglet's top speed.

He leaned back in his seat, his eyes

thoughtful as he again reviewed that day five years ago when he had innocently flown Dr. Hawthorne out to Seattle. He remembered vividly the little scientist's bearded face and his shining eyes. His only baggage had been a heavy, trunklike box.

Bill, later, had realized that the extreme weight had been undoubtedly due to heavy lead shielding around the stolen ounce of radium, through which its deadly rays could not penetrate. He thought of how, after five years, the almost forgotten misadventure was being revived. Or was it?

The two planes were well over Long Island Sound when the radio signal blinked and Sandy's shrill voice reached his ears: "Say, Bill. How's for you and me both flying upside down for a little while, huh?"

Bill scowled. "I've no time for fooling, kid. If you haven't anything better to say, sign off."

The tension and worry of recent hours had rubbed his nerves to the raw. But, immediately following his impatient retort, a bleak smile momentarily twirled his lips. The kid was all right. He was a little fool for every passing craze and notion, but when a show-down came he was there with the goods.

He heard nothing more from Sandy and the Eaglet continued to fly along on an even parallel course. Twenty minutes later Bill looked below and realized that he was coming near to his destination. He saw the town of Leamington ahead, passed over it and then spotted a small white X in a field alongside a sprawling farmhouse. He spoke into the microphone.

"I'm landing where that X is, kid. Get the location in your mind and then beat it."

"O. K."

Bill crossed over the marked field, throttled down, and banked. The countryside was heavily wooded, with the farm below the only one within many miles. It stood in a small clearing—the farmhouse, a barn and a small greenhouse. Surrounding it were three irregular-shaped fields—the one marked with the white X the only one large enough in which to land a plane. It paralleled the side of the farmhouse. A narrow, rutted road snaked through the woods to eventually merge with another.

The Stormer swooped lower and Bill, swinging the big amphibian around, closely inspected the marked field. It was covered with stubby grass and looked level enough.

A man suddenly appeared from the front of the house and waved. Bill closed the throttle, came around in a

flat turn and went down for a slow landing.

The Stormer ran smoothly across the field, losing speed. Bill applied the brakes, swung the ship around in a position to take off again and waited. The man he had seen was coming on the run toward the plane. Bill watched him narrowly and the caution that experience had bred in him sent his right hand down to grip the butt of his automatic.

Bill inspected the man closely as he came nearer. He was small, wore thick glasses, and was hatless. As he came up to the fuselage, the pilot saw his face clearly. It was vaguely familiar.

"Mr. Barnes—I'm Howard Hawthorne, Ralph's brother. I met you years ago—during the investigation."

His words suddenly cleared Bill's memory. He recalled the man now. There was no doubt about him being whom he claimed—there was a marked similarity in appearance between him and the missing Dr. Hawthorne.

"Of course," Bill dropped the automatic back into his pocket and shook hands. "Glad to see you again."

He slid from the cockpit and dropped to the ground.

"Ralph's inside—waiting to see you," said Howard Hawthorne. "He's crippled, you know."

They started across the field.

"I just heard about dad. I've been out of town. Dropped in here. Ralph'll give you the low-down."

Bill nodded and shot a quick look back over his shoulder. The Eaglet was heading south and even as he watched he saw the little plane half roll over into an upside-down position. He swore under his breath.

Howard Hawthorne looked at him sharply. "What—"

"Nothing," said Bill.

"That one of your men?"

"That's right."

They angled across the field, reached the side of the house and turned left along it.

"We'll go in the front way," Howard Hawthorne was talking nervously. "After five years—to hear the old man's still alive—it doesn't seem possible."

Bill saw a pale-faced man staring at them from a window to the rear. That would be the crippled Ralph Hawthorne. He wondered vaguely what lay ahead of him. Howard had given him no further information than had been in the letter.

The man beside him went on talking. He held Bill by the left arm as they reached the corner and swung around in front of the house. Overgrown shrubbery skirted the front wall in a tangled



mass. The grass underfoot was long. Trees grew in profusion, their heavy foliage casting the front yard in mottled shadow.

They hadn't gone three yards beyond the corner when Howard stumbled suddenly and fell against Bill. The flier was thrown off balance. He staggered into the shrubbery. In that brief second, it happened.

Bill had a blurred impression of two men leaping from the shrubbery, of an up-ending arm sweeping a blackjack down in his direction. Instinctively, he reached for his automatic, threw himself aside. Something crashed against his head. A scarlet wave drowned his vision. He felt himself falling—tried to shout. Again something smashed into his head. His whole being seemed to explode in a gush of flame. And he knew no more.

#### IV—THE MASQUERADE

GREGORY SLADE crouched in the ditch bordering the farmhouse's driveway and saw it all as if he had been witnessing a play. A heavy tangle of vines and bushes were entwined over his head. Beside him huddled the actor in his ingenious make-up.

"They got him cold," the actor said in a hushed whisper.

"Better get set," Slade said out of the corner of his mouth. He saw that the actor was waiting alertly for the signal from the men who had attacked Bill Barnes.

The expedition had arrived in the vicinity of the farm early that morning in a powerful, curtained touring car. Before they had left The Deck, Laznick had drawn a detailed plan and drilled every man into the part he was to play in the clever scheme until no mistakes could be made.

So far everything had gone as planned. The car had been hidden half a mile away. Ralph Hawthorne's man of all work had been neatly waylaid while on his way to Leamington for supplies. Howard Hawthorne had then gone to the house on a supposedly surprise visit.

Then, at ten thirty, the other members had taken up their allotted positions—the pair of strong-arm men crouched down in the shrubbery in a position to instantly attack Barnes; Slade and the actor hidden in a ditch near the scene of action; and another man, equipped with an automatic rifle, was perched high up in a tree.

Then, at eleven o'clock Slade had heard the familiar thunder of airplane engines and had seen, not just one plane—but two. He had watched anxiously as the Stormer had landed and Howard Hawthorne had gone out to meet it. The presence of the other plane was disconcerting and its action, as it flew away, of rolling over into an inverted position,

wasn't natural. Slade had wondered if it had been a signal to some one—if Barnes had suspected a trap.

Slade had watched every movement after that; had seen the ruthless, silent way in which Laznick's men had black-jacked Barnes. And now, a quick signal came from the man in charge.

The actor leaped from the ditch, sprinted across the yard. By the time he reached the other men, Barnes had been lowered to the ground and his overall flying suit ripped from his limp body. The suit was tossed to the actor and the man jerked it on rapidly, tugged the zipper front closed. He snatched up Barnes' helmet and within two minutes was entering the front door beside Howard Hawthorne.

Again everything was silent. The men had rolled Barnes' body under the bushes and crouched there waiting for the next move. Slade watched as they expertly roped the airman's arms and legs and slapped a wide piece of adhesive over his mouth. Later the car would be driven up, Barnes loaded aboard and taken to the old Hawthorne house in the town of Leamington.

Slade looked nervously at his wrist watch. He had memorized every move that was to be made before he himself could go into action.

It seemed hours—and was five minutes—before the man masquerading as Bill Barnes came out the front door and stood waiting. He was smiling. That meant Ralph had been completely duped by the disguise—that he had given the directions to the actor. There remained but one more move to be made and that would be taking place in the house right at that moment.

With the vital information passed on, Howard Hawthorne was to inject Ralph with a special drug—a drug that would not only render him unconscious for hours but would induce complete amnesia for two days. With Ralph's memory wiped out for forty-eight hours, there was no risk of his talking. And by the time his memory did come back the job would be completed.

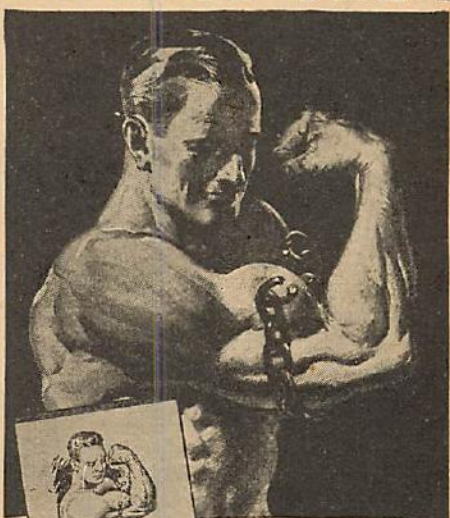
The wait seemed interminable. The pseudo Bill Barnes was standing on the steps, writing on a piece of paper. The front door again opened and Howard Hawthorne came out, a hypodermic syringe in his hand.

"Shoot the works," he said loudly. "The kid's out."

It was as if the starting gun for a race had boomed. The man who had perched in the tree, slid down, and ran for the Stormer. One of the men beside Barnes leaped to his feet and sprinted down the road to get the car. Slade hurried to meet the actor.

"It was swell," the actor said. "Barnes himself couldn't have done better. The punk fell for it and how. Now to work it on his old man. Here're

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the directions." He handed Slade a piece of paper.

Slade read them over rapidly, slipped the paper into his pocket. "Right. Come on."

He started for the Stormer accompanied by the actor. The man was to ride as passenger so that, if necessary, the masquerade could be reacted when they reached the missing Dr. Hawthorne.

By the time they arrived at the famous amphibian, the man who had preceded them, one of Laznick's radio technicians, was already laboring over the radio apparatus, tuning it in on The Deck headquarters. The actor slid into the rear seat in the tiny cabin while Slade climbed into the front.

The Englishman's eyes swept over the packed instrument panel and the controls. His vast experience in handling planes made him confident of his ability to control the ultra-fast Stormer. He twisted around in the seat, shot a look back at the farmhouse.

In a few minutes the touring car would return to carry the unconscious Barnes to the deserted Hawthorne family house. He was to be chloroformed and left there to recover when the stunning effects wore off—many hours hence.

Slade smiled. Even when Barnes did finally win his freedom he would be able to learn absolutely nothing about what had happened until Ralph Hawthorne's memory returned. And that would take forty-eight hours. In that space of time the whole smooth scheme to steal the radium would be successfully culminated.

The radio technician spoke tersely into a microphone, then turned to Slade. "O. K. Got Laznick. Get moving."

The Diesels were throbbing. Slade looked to right and left, released the brakes, threw the throttle wide, and, with a thunderous bellow, the scarlet comet with a stranger at the controls, fled into a hurtling take-off.

Slade slipped the written instructions under the clip on the map case. His destination was the Lake of the Ice, high up in the Rocky Mountains. He clicked over the switch, spoke into the microphone and was connected with the crime headquarters in Third Street. When he heard the voice of Laznick, he repeated the directions and gave a terse account of what had occurred since the Stormer, accompanied by the Eaglet, had appeared over the farm.

The master crook's voice came back, suave and gloating, giving minute instructions. They were to go directly to the lake in the Rockies and land. They were to get the radium as rapidly as possible and bring it back.

The Stormer climbed steeply and headed due west. Slade sat rigidly in his seat, his fingers wrapped tightly around the control column. He moved the throttle wider and watched the air-speed needle climb. A strange feeling

of exultation swept through him. He was again in his own element—the air.

Five minutes later, a wild shout from the actor behind him blasted through the ear phones.

"Look! That damn plane again!"

Slade shot a look to his right and gasped. The Eaglet was plummeting down from above. In that instant it flattened out, rolled over on its back and flew alongside upside down.

The Englishman snapped over the radio switch and spoke in jerky sentences to Laznick. The master crook replied quickly, his voice shrill.

"All right. He thinks you're Barnes. He's probably trying to talk to you by radio. Get him into position and then attack. Cut off his radio communication immediately so he can't get in touch



Dr. Hawthorne.

with his field. Then shoot the little rat down!"

#### V—THE EAGLET

SANDY SANDERS had circled over the farm, watched Bill land the Stormer, and then had whipped the Eaglet around on a wing tip and started southward. The sudden freedom from the famous flier's control caused an almost involuntary reflex. He threw the stick over, kicked the rudder bar and the Eaglet rolled gracefully over on her sleek back.

Sandy held the ship to the inverted position. He realized that Bill would probably see him and he would catch plenty for his disobedience later on—but it was worth it. Bill just didn't, or wouldn't, understand the awful predicament he was in. He was positive that he was losing his hair and that, unless he took great precautions, he would be completely bald by the time he was twenty-one. He visioned himself bereft of his thick mop of tawny hair and a shudder passed through him.

The boy hung heavily from the webbed safety belt and felt the gratifying surge of blood to his head. The blood would revive the hair cells and, if the treatments were kept up, would insure an abundant crop of healthy hair.

Shortly afterward he rolled the Eaglet right side up and then spun her three times in quick succession out of pure ecstasy. He straightened out, shoved the throttle wide open. The engine came booming back at him and the speed increased. The boy lay back against the seat, his eyes dancing, a wide grin on his freckled face.

The morning was perfect. The heavens arched above him, blue and bright with the warm sun. His eyes went over the Eaglet with loving care. His own ship—the ship that Bill had literally built around him. He wondered vaguely how he had ever earned the right for so much happiness over earth-bound fellows of his own age. Being with Bill and the gang was a perfect existence.

Instinctively, he shoved the control column forward, dived the Eaglet precipitously and then, with the wind screaming around him, horsed back on the stick. The cowed nose pointed for the heavens. The Eaglet climbed with a scream, came up and over in a perfect loop.

Sandy straightened out and looked back, suddenly anxious. But he was miles away from where he had left Bill. He looked at the ground swimming under him and realized that it was too nice a day to return right away to the field. There was no hurry. The work on the new machine was being taken care of by the others and there was nothing for him to do.

Hidden concern for the condition and health of his scalp forced him to switch on the automatic pilot. He quickly removed his helmet and leaned forward so that he could inspect his head closely in the rear-view mirror. He pulled his hair straight up with his fingers and looked earnestly at the white scalp underneath.

Henri's warning came back to him: "You are at the dangerous age, monsieur," he had said. "I see with my own eyes thousands of young gentlemen like you get bald as the egg. Ah, what a disaster! What an outrage against the head! And to think, monsieur, that all might have been saved. My magic treatments and the use of my Scalp Awakener would have won a glorious victory if used in time. It is well that you came to me when you did. You are teetering on the very brink of shameful baldness. Only by following my instructions will you have a chance to retain that which every man is given and abuses—the hair."

The words dinned in Sandy's ears and he unbuttoned the flap over his pocket and tugged out the small skull. He rapidly unscrewed the cap and, up-ending the container, shook a stream of odorous liquid over his head. The cold wetness soaked into his hair and he continued his libations until his tawny mop was saturated.



He replaced the top of the skull, returned it to his pocket, and, with both hands, dug his finger tips into his scalp. He rubbed hard until his scalp was tingling. Then, taking a comb from his pocket, he carefully parted and brushed his hair back until it lay in a shimmering, perfect mass on his head. He looked at himself critically in the mirror and sighed. Perhaps, if he were lucky, he'd keep his hair. But Bill and the others—he sighed—were hopeless. They never took anything seriously. Especially Shorty.

He shrugged, disconnected the automatic pilot and, taking the stick in his own hand again, shot a quick look down at the ground below. It was a rolling country, wooded and unfamiliar.

He brought the Eaglet up in a steep, climbing turn, his eyes searching the horizon for landmarks. Far to the west he saw the glimmer of a small lake. His gaze swept on. He looked into the north and perceived an airplane silhouetted against the brightness. Sudden impulse sent his hand to ram the throttle wide open. He straightened out his ship and headed in the direction of the other plane. It might be Bill.

The Eaglet sprinted ahead, racing nearer and nearer. Suddenly Sandy grinned. The idea of creeping up on the other plane and, if it should be Bill, flying along upside down, suddenly appealed to him. His eyes sparkled.

In three minutes he saw the wide-spread gull wing, the bullet-shaped fuselage and the glistening scarlet paint and knew definitely that it was the Stormer. His throttle was crowded to the last notch. He cut across, to save distance. It was his only hope of catching the faster machine. He imagined Bill's complete surprise when he would behold the Eaglet.

A twinge of caution momentarily gripped the boy and instinctively he tugged the stick back, zooming his ship higher. Bill had instructed him to proceed straight back to the field and he had disobeyed orders. Perhaps it would be smarter to forget his sudden plan and to sneak away and hope Bill hadn't seen and wouldn't see him. But, it was too late for that now. The Eaglet's hurtling speed had already carried it almost over the Stormer.

Sandy crowded to the side of the cockpit and looked down. The big amphibian was a thousand feet below and holding to its western course. The Eaglet banked steeply, headed in the same direction and suddenly dived. The boy's eyes locked on the wide-spread wing of the Stormer as he hurtled nearer. And then, he had plummeted to the same altitude. He jerked the control column back, roared the Eaglet alongside almost wing tip to wing tip with the other machine and, with a deft

movement, rolled his ship over on her back.

The boy's eyes went to the radio panel, expecting to see the sudden gleam of a signal light, indicating that Bill wanted to speak to him. But, the glass indicator remained lifeless. Sandy shot a look over at the other machine and felt his jubilation melt away. No word from Bill probably meant that the master pilot was too mad to even talk.

Sandy shivered, clicked over the radio switch and, hanging from his safety belt, called into the microphone: "Hey, Bill. Don't be sore. I was only kidding, see?"

He waited for an answer and when none came he rolled the Eaglet right-side up and peered over at the other machine. When he had first raced alongside, he had had a blurred impression of two men in the Stormer. He now received a clear view of the two men and frowned. The man in the rear seat was Bill, he was positive. He could see his face sharply enough. And in the front, in the pilot's seat, was a total stranger.

But, why would Bill sit in the back and ride as a passenger? Only on the rarest occasions had he done that.

Sandy shot up his left hand and waved. At that moment, he saw the Stormer zoom steeply and hurtle straight up and away from the Eaglet.

The boy didn't follow. He fell back against his seat, bewildered, and watched the climbing plane. Bill apparently didn't want to have anything to do with him.

The Stormer had climbed three hundred feet above him, when the big ship went into a stall turn and in the next second was tearing straight down at the Eaglet below.

Sandy stared at it. His first thought was that Bill was getting playful. It was swept away by another—that Bill was scaring him off.

And then, horror seized the boy as he saw tongues of flame leap from the machine guns in the Stormer's wing stubs and lines of tracers pump out to drill dead on for the Eaglet.

## VI—CRASH

SANDY was caught flat-footed. There wasn't time for anything.

The stream of bullets crashed into the Eaglet's mid-wing section, pumped into the engine and—the whole instrument board disappeared in a blinding eruption before the boy's eyes.

Something smashed across his forehead. His vision vanished. He crumpled over the safety belt, his senses reeling.

A wave of unconsciousness swept over him and receded. He vaguely knew that the Eaglet was falling, that he had been hit. He tried to open his eyes and

failed. Blackness swirled before him. He had no strength, no muscles. And through the whole awful nightmare burned the stunning, unbelievable fact—the Stormer had attacked him! The Stormer had shot him down—and Bill had been in it. He was positive of that. He had seen him.

Sandy's brain was shrieking at him to hurry, to get the Eaglet under control, that there wasn't any time to waste. He was falling, falling like a meteor to his death.

His hands were off the controls and pawing at his face. His vision began to clear. He saw crimson blood on his fingers. He had been blinded by his own blood flowing from a head wound. The mists vanished. He looked ahead and saw the earth tearing up at him—two hundred feet below! The engine was screaming. The wind was tearing around the falling plane like a thousand devils.

Sheer instinct sent one hand streaking for the control stick, the other to the throttle. He yanked the throttle shut; pulled madly at the control column. His fear-distended eyes were riveted on a lake that had suddenly appeared below. The lake he had seen before. He was diving for its glittering waters.

The desperate emergency threw his mind and reflexes into high gear. The amphibian undercarriage was sent down into position. He yanked the stick back and back.

The nose of the Eaglet came up. The plane lunged into level flight—and not a minute too soon. The pontoons skimmed the water.

The boy fought the greatest fight he had ever experienced. He knew that he was going to crash. There was no way of avoiding it. The ship was losing speed, staggering, reeling like a drunken thing. He held her level. The Eaglet was pelting across the lake toward the shore. There wasn't time to turn.

The machine dipped. The pontoons crashed into the water. The Eaglet bounced into the air and smashed down again. It stayed down and raced across the surface of the lake.

The shore with its stony beach was speeding at him. Sandy tried frantically to work the seaplane rudders. The next second, the Eaglet streaked out of the water, hit the beach. There was a piercing shriek as the pontoons smashed into the rocks. The Eaglet came to a violent stop, whipped up on its nose, slewed around, stayed poised for a fleeting second. The fuselage crashed down again, and all was still.

Unconsciousness again threatened to engulf the boy. He forced himself to sit up in his seat. Automatically, he unfastened his safety belt, sent exploring fingers over his body for any broken bones or injuries and found none. His glance passed over the rear-view mirror. He saw his own reflection.



His face was a mask of blood. A deep gash showed over his eyes and the blood was beginning to coagulate. Flying glass had slashed his cheeks. But, somehow, he had escaped further injury.

Then—the vivid memory of the sudden attack came back. The Stormer and Bill attacking him! Something was wrong. He had seen Bill in the rear seat. Had he been a prisoner?

The boy reached for the radio controls. He had to get in touch with the field immediately. But the whole instrument board and the radio had been blasted into a shattered tangle of glass and wood.

He stood up in the cockpit, threw one leg painfully over the coaming. He searched the sky, saw no aircraft, and climbed stiffly down to the rocky beach. The only thing to do was get to a telephone. The alarm had to be issued immediately.

His head was aching viciously. He went down to the lake, bathed his face and washed out his wounds. The cold water cleared his feverish brain. He went hurriedly back to the Eaglet and inspected the damage.

Gaping holes had been torn in the under surface of the pontoons and their bows staved in. The metal propeller had been twisted out of shape. The machine would need plenty of work before it could ever take to the air again.

His right hand brushed against the bulging pocket in his flying suit. The precious hair tonic! Fearfully, he opened the pocket flap and brought out the white skull. Pure relief flooded his eyes. It hadn't been broken, not even cracked. It was the only luck he'd had.

He stuck it back in his pocket, straightened up, and looked around him. The lake was small, its shores heavily wooded. There was no sign of any human habitation within sight. But somewhere there would be a farmhouse and a telephone.

Sandy went past his stricken plane and climbed through the heavy foliage above the rocky beach. There was no time now to lose. He pressed on through tangled vines and matted underbrush, his eyes always probing ahead, striving to catch a glimpse of a road that would lead him to a dwelling.

The blood from the gash began to flow down his face again and his head throbbed dizzily. He felt weak and exhausted and every instinct was urging him to lie down and rest. His jaw tightened and he fought on, frantically now. Time was passing. Bill was in danger, must be.

The country was wild and rolling. He struggled through woods and down steep hills. Too late, he realized that he should have looked at his maps before he started out. The small lake might have been marked and near-by roads indicated. But he had been going

an hour now and his senses were blurred and spinning. Once he turned around, hoping to retrace his steps, but he realized that it was impossible. There was no indication of where he had come. He was lost.

The bright-blue sky had long since been smothered by a ceiling of rolling black clouds. Thunder rumbled in the west and stabs of lightning forked down. The wind increased and with it, abruptly, came rain. Blackness dyed the sky.

Sandy went on, stumbling, falling. He came across a small, grass-grown road and followed it for miles, only to find it ended in a swamp. He retraced his steps, crossed clear country, plunged into another wilderness of wild vegetation.

The rain came down in torrents, beating against his body, soaking him to the skin. The earth was slippery for walking and the gray curtain had shut off visibility.

Dogged determination sent him stumbling on. He had to find some one—find a phone—

The afternoon passed. The darkness of evening blended with the blackness of the storm. The rain continued in a wild, beating torrent.

Panic was beginning to creep over the boy. He had no idea in what direction he was heading or what lay ahead. Twice he was pitched headlong with stunning force, as his lagging feet tripped into snarled creepers. The last time he lay where he had fallen, dazed and frightened. He felt tears sting his eyes and he savagely forced them back and climbed to his feet.

The night was inky. He couldn't see his hand in front of his face. How long the awful ordeal lasted he never knew. Hours must have passed. Yet, a flickering hope burned within him. If he could only see a lighted window—

It might have been minutes—it might have been hours, when he finally did see a light glint through the blackness ahead. He stared wildly at it and then broke into a frenzied run.

It was a small farmhouse. He somehow was at the door, knocking. He swayed there, waiting.

A gaunt-faced man opened the door, flashed a light in the boy's face. Sandy saw a shotgun in his hand.

He gasped out: "A phone—"

The conversation, if any, was a blank in the boy's mind. The next thing he remembered was that he was in the house, a telephone was in his hands. He had asked for long distance—given the field's number—He swayed, almost fell and felt some one lower him into a chair. A voice was coming through the receiver to his ear—a familiar voice—Tony Lamport's!

Sandy summoned up all his strength. The man with the shotgun was stand-

ing behind him, repeating the location of his place. Sandy relayed it into the mouthpiece and then told Tony everything in one furious outburst—about Bill.

He didn't hear Tony's reply.

The owner of the house barely caught the telephone as it slipped from the boy's limp fingers.

## VII—THE CAPTIVE

BILL BARNES had found himself in complete blackness when he had awakened. For ten minutes, he had lain motionless, striving to still the torturous pain that was in his head and that shot like red-hot needles up his bound legs and arms. He waited another five minutes, testing his bonds. The place in which he had been thrown had a concrete floor and had the damp mustiness of a cellar. There was an utter absence of sound, except the faint trickle of water from somewhere near at hand.

He forced himself to sit erect and work at the ropes around his wrists. The piece of adhesive tape over his mouth was painful and his breathing was labored. He worked silently, utilizing all his strength. The ropes gave under the pressure and he managed to get his fingers in a position to claw at the knots.

His head had cleared and as he worked, question after question throbbed into his feverish brain. He remembered the smashing descent of the blackjack and the sweetish taste in his mouth indicated chloroform. But why the attack? Had it been the workings of a subtle plot to gain possession of the Lancer? Or had his unknown assailants acted to keep him from talking to Ralph Hawthorne? The crippled boy had heard from his missing father, probably knew where he was, and where the scientist was—would be the radium.

Fire shot into Bill's eyes. The radium! That was motive enough for everything—two million dollars' worth of motive!

New strength flowed into the pilot's body as knot after knot came loose. One definite course of action seemed clear: he had to win his freedom and somehow get to talk to Ralph Hawthorne. The cripple held the secret to the whole confusing mess.

Bill's body was soaked with perspiration, the flesh of his wrists torn and bleeding when the ropes finally dropped away. He lay back exhausted, painfully moving his arms to restore circulation.

He had no idea where he was. Had they left him at the farm or taken him elsewhere? Bill looked despairingly around, his eyes probing through the blackness. And he saw, for the first time, a rectangle of dim light. A window! The light was visibly strengthen-







lying on his back, his face upturned to the full light of the brightening dawn. It was a small, pinched face, heavily bearded. The eyes were closed.

Bill drew in his breath sharply as instant recognition flared. There could be no mistake. The man was the missing Dr. Benjamin Hawthorne!

### VIII—THE COWLED MEN

THE discovery was stupefying. Bill had come stealthily from below, prepared to find almost any one—but never in his wildest imaginings had he expected to see the man around whom the whole vicious business was apparently centered—Dr. Hawthorne.

It seemed incredible that after being missing for five years Dr. Hawthorne should suddenly materialize here, at the very place where Bill had been held prisoner.

The doctor lay utterly unmoving, like a dead man, his body emaciated, his cheeks sunken, his skin a transparent greenish-white. Bony hands were clasping a round cloth-wrapped package and hugging it tightly to his chest.

Bill's gaze whipped to that package. A strange luminosity seemed to radiate from it, forming an aura of light. The pilot's blood pounded in his ears. That glowing light—it couldn't come from anything else—the radium!

Wildly, Bill's hand snatched at the doorknob. The doctor must have the radium with him—two million dollars' worth of radium! He had brought it back. From where? Why? How? It didn't matter. The package containing the priceless metallic element was out there, held in those clawlike hands. Bill twisted the knob, yanked. The door was unyielding, locked. He didn't take time to look for other exits. Every thought was to get to the doctor, to see if he was dead or alive, to get the radium.

The pilot lowered his shoulder, drew back to hurl his powerful body at the door—and froze.

Three figures had abruptly appeared, running along the veranda toward the prone man. Bill stared aghast, scarcely able to believe his eyes. Each of the strangers was garbed from head to foot in voluminous black garments. Large cowls covered their heads and hid their faces.

They came without noise, came swiftly, raced to the doctor's side, crouched around him like creatures from another world. One seized the round parcel, wrenched it from the doctor's hands.

Bill didn't wait. Who the people were, he didn't know. All that mattered was that they were stealing the radium. He threw caution aside. His shoulder crashed against the door with every

atom of strength he could muster. The door shivered, buckled, and held.

The violent noise caused the hooded figures to whirl around like frightened animals. Bill saw under the cowls—and terror gripped him. He saw not faces of men of flesh and blood staring out from the black recesses of the hoods—but glowing human skulls!

The airman stood paralyzed by the horrifying sight. Suddenly, one of the creatures whipped up an arm. A revolver was gripped in a skeletonlike hand. Only as the gun blasted scarlet flame did Bill throw himself aside. The bullet smashed into a pane of glass where he had been a split second before.

There was just one shot. The crashing thunder was still rolling in Bill's ears when the three things in black turned and raced away out of sight along the veranda. And with them went the package—the radium.

Savagely Bill threw himself at the door. His shoulder battered into it once—twice. With the third frenzied charge the door splintered open and the flier was hurled through.

He stumbled, half fell to his knees, came staggering wildly to his feet. His eyes blazing, he plunged along the wooden boards of the veranda, leaped off the end onto a lawn. There was no sign of the mysterious figures. Ahead was a grove of trees and a hedge. The pilot sprinted across the lawn, vaulted the hedge, searching wildly.

He saw no one—no movement. Beyond the hedge was a sparsely wooded section and, beyond that, nestling far down in a valley, was a small village. Bill continued his frantic search for five minutes, to finally pull to a stop, his eyes burning. The three cowled creatures had vanished without a trace of their going, as if the very air had swallowed them.

The airman stood, wide-legged, breathing hard, his hands knotted into fists, baffled and uncertain. They had gone. His gaze stabbed across the tree-packed landscape and he realized, with a groan, that the three could have taken a half-dozen routes and been safe from detection.

The blistering curse that rose to his lips died unspoken as his thoughts jabbed back to the awful sight of those glowing skulls. Had it been imagination engendered by the chloroform and the long period of unconsciousness? Had it been some obscure trick utilized by the enemy, a disguise? Or had those glowing bones been the real death heads of men?

The only answer—the only answer to everything about the whole mad business was held by Dr. Hawthorne. To continue the search was now almost useless. If the doctor lived, he would be able to explain—to tell who had taken

the radium and how to regain it—to rip away the cloak of mystery.

The pilot turned and headed back toward the house on the run. It was then that he saw the real-estate sign stuck in the ground with a broker's address given as Leamington, New York. *Leamington!* Instantly, Bill guessed the truth. The town in the valley was Leamington. The realization jolted his memory and he recalled that Dr. Hawthorne had once lived on the outskirts of that town. The man would naturally come straight to his old home.

The house back there, then, was Dr. Hawthorne's—the house to which Bill had been brought, unconscious, by his unknown enemies. But why had he been put there, of all places? He saw the answer instantly. His enemies had known that the house was deserted—that it would be the safest place to leave him.

Bill put extra speed into his pumping legs. Everything now depended on whether the doctor was alive. When he reached the front of the house, he found the little man in the same position as he had last seen him. Bill dropped down beside him. For one awful moment he thought that the scientist was dead. And then he saw the slight rise and fall of the sunken chest.

Bill spoke softly, urgently: "Dr. Hawthorne. Dr. Hawthorne."

There was a long wait. The eyelids finally fluttered open, blue eyes stared up, vacant, timid.

"Dr. Hawthorne, I'm Bill Barnes. Quick, tell me what's happened."

The little man's lips moved. A whispery voice sounded. Bill lowered his head to catch the faint words.

"Barnes—yes—I can't last; I'm dying. They kept me a prisoner—the Brethren of Death. I wrote to Ralph—two months ago—to get you—to come for me. You never came—"

His voice faded away. His breathing became more labored. Bill crouched, beads of perspiration on his forehead. He recognized the symptoms of approaching death, had seen it too often to be mistaken. The little doctor was beyond human aid; he only had minutes left.

"Tell me everything. Quick!" Bill said urgently. "Who has the radium?"

Again the voice came, even weaker. The man was talking deliriously: "I stole the radium. I thought I had discovered the elixir of life—radium water. I went where the cult is—the Brethren of Death. The brethren protected me—made me one of their own. I experimented on them—on myself. They worshiped me—made me a high priest—because of the radium and its hellish rays.

"I kept the radium in their sacred relic—on the altar. I didn't realize what I was doing—killing them and me. The



radium water caused necrosis of the human bones—made them glow in the dark. . . . The brethren worship death. They wanted more water—forced me to make it—wanted to be luminous skeletons. I'm dying of radium poisoning. They'll all die. I tried to save life; I brought death."

His voice trailed away. Bill waited in agony. If the little scientist would only last to tell the full story. The three masked figures had been members of the Brethren of Death. They had stolen the radium and would be taking it back to their secret place. And those glowing death heads had been caused by the radium water.

"Where's the cult's headquarters?" Bill said tensely. If he could only get that information he might be able to recover the radium.

The doctor's blue eyes were staring past him. He spoke again without answering the question.

"I knew my experiments had failed. I tried to escape. The brethren stopped me. I wrote a letter—sent it out—to Seattle by a boy. I waited. Ralph and you didn't come. I got away one night six weeks ago—took the sacred relic with the radium in it. I crossed the continent. I don't know how. The brethren came after me—trailed me. I outwitted them. I was dying. I had to get the radium—back to the foundation—to clear my name. Bring Ralph to me—I haven't got any longer—"

"Tell me where the cult is. They've taken the radium—"

The old man interrupted, shrilly now. "They took it—the Brethren of Death. Get it from them. Take it to the foundation. It means death to every one. They are taking it back to—to—"

Fire seemed to leap into the blue eyes. The doctor's hands clawed at his throat. He choked, pulled at the collar of his worn shirt. His figure twisted, writhed and then went limp. The head fell back. The eyes stayed open and unblinking.

Dr. Hawthorne was dead.

## IX—RE-ENFORCEMENTS

BILL stared at him aghast. He feverishly felt for a heartbeat and found none. He worked over the emaciated body, rubbing the cooling hands, strove to rekindle the spark of life. But it was useless. The pilot at last stumbled to his feet, dazed and shaken. The little scientist was gone and with him the secret of where he had spent the last five years—the secret he would never tell.

Bill stood there, his mind teeming with the scraps of information that had come from the dying man's lips. The strange cult that had worshiped the little scientist and his treasure of radium; the horrible results of the experiments;

the doctor's escape; and now—the gruesome Brethren of Death had captured the radium and would be taking it back to their secret place.

Suddenly, Bill straightened up. Dr. Hawthorne had written to his son, Ralph. In that letter would be the location of his place of captivity. Ralph was the one to see!

The pilot whirled, took a quick step toward the distant street and then stopped. His eyes darted back to the doctor's body. If he told the local police about the dead man, he might be held during the ensuing investigation. He turned back, stooped, took the frail body in his arms and carried it through the door and into the house. He laid it down on the floor, seized a drape from a chair. He was in the act of throwing it over the corpse when he stopped, his eyes widening.

A horrible transformation had taken place. In the half light of the dining room the corpse had taken on a frightful aspect. The flesh of the head seemed to have vanished and a horrible skull grinned up at him, the bones aglow.

Bill gazed in horrified fascination. He knew the explanation—had received it from the dying doctor—yet the whole thing was uncanny. The doctor's body had been poisoned from the radium and his bones gleamed. In the light of day the effect had been unnoticeable but in the darkness—

Hastily, Bill threw the cloth over the body, covered it completely, and hurried outdoors. He headed away from the house down a winding sidewalk lined

with trees and overgrown brushes. He came finally to a dirt road with sparsely dotted street lights.

And now to get to Ralph Hawthorne's farm. It lay ten miles to the north. The flier strode down the houseless street. The hour was early and he saw no one. Ahead, in the valley, a few spirals of smoke eddied up from chimneys. How he would get to the farm, he didn't know. He could go into the town, hire a car—but that would cause questions and comment if he should be recognized as Bill Barnes.

His problem was solved for him directly after he had left the vicinity of the house and turned into a paved highway. A market gardener's truck was chugging along the road. Impulsively, Bill hailed it, asked the driver the direction to Ralph Hawthorne's farm and learned that the man was driving out into the country past that very place. He offered Bill a lift and the flier accepted quickly, mentally blessing his good luck.

The truck rumbled ahead, leaving the town behind. In answer to the driver's questions, Bill told a fanciful story of his car having broken down miles back. The man had apparently not recognized him and Bill cared little whether his story was believed or not.

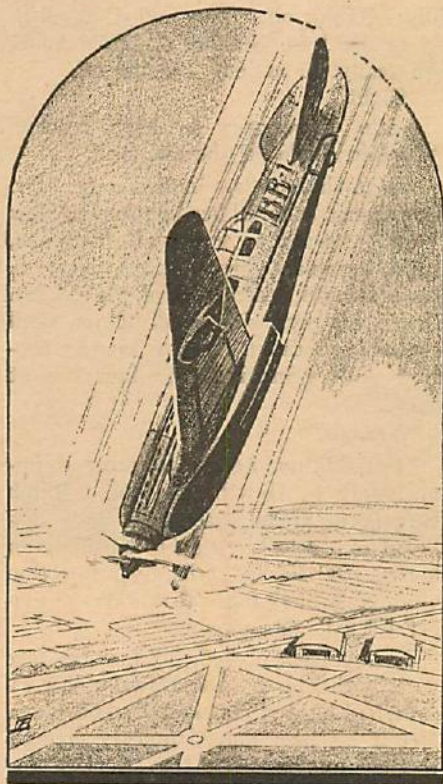
The slow speed of the truck was irksome. The flier sat hunched forward, staring ahead, writhing inwardly. He was beginning to feel badgered. Since the discovery of his desperate financial condition, he had been buffeted by a series of baffling events. And now, everything waited on finding and talking to Ralph Hawthorne. Would he be at the farm? A day and a night had passed since Bill had landed there. And what of his Stormer? He had left it out on the field, unprotected.

Part of the mystery, at least, had been cleared up by the doctor's dying words, but a large portion still remained. The Brethren of Death had trailed the escaping doctor, had finally recovered the radium. But, who had arranged the clever trap into which he, Bill, had fallen the previous day? Certainly not the death cult. Some other force had entered into the struggle for the possession of the ounce of precious stuff.

Bill thought of the man who had greeted him at the field—Howard Hawthorne. He recalled the man's extreme nervousness as he had led him to the house. Had he double-crossed his brother? Had he been part of the treacherous scheme?

They were, at last, within sight of the farmhouse when Bill, hearing a drone of engines, swerved around in his seat and looked up and back. Far away were two planes. And he recognized their silhouettes as—Snorters.

The planes roared nearer, overtook the truck, passed on and circled. Bill



The Lancer was a shaft of light—a mad meteor.



watched as both ships dipped down to disappear from view behind the cloak of the trees. He knew that they had landed. His eyes gleamed. His men had come for him. He felt a surge of confidence. With his loyal gang once more around him, he could face almost any odds.

Minutes later, the truck rounded a turn and Bill caught a glimpse of the farmhouse and the field beside it. He frowned in sudden perplexity. He saw the two Snorters resting on the stubbly grass—but there was no sign of the scarlet Stormer!

The driver pulled his creaking vehicle to a stop before the lane leading to the farmhouse. Bill jumped to the road, shouted his thanks, and then ran pell-mell down the lane.

He saw that three men had debarked from the Snorters and, as he ran nearer, recognized them as Shorty, "Red" Gleason, and Sandy Sanders.

## X—ORDERS

NICHOLAS LAZNICK was aroused from a heavy sleep by the rasp of a buzzer under his pillow. The room was bathed in blackness and the luminous hands of the clock on the side table showed it was five in the morning.

The big man shifted his weight in the bed, reached out, clicked on a light, and spoke into a microphone built into the table beside him.

"What is it?" His voice was angry.

"Captain Slade reporting over short wave, sir." The reply came metallically from an amplifier across the room.

Sleep vanished from the master criminal's eyes. It was about time he heard from Slade. The last report had come through at six o'clock the night before. The Stormer, carrying the actor and Slade, had flown across the continent, had found the Lake of the Ice, far up near the summit of one of the mountains in the Rockies.

They had landed on the calm waters and found the region to be wild and deserted without a sign of humans or human habitations. The last message from the Englishman had been to the effect that he had run the amphibian to the shore line and that he and the actor were about to debark to reconnoiter. Since then, no word had come.

"Switch him on," said Laznick.

"Yes, sir."

There was a crackle of static, a voice saying, "Go ahead, captain," and then Slade's English accent sounded through the amplifier, clear and distinct.

"Slade talking."

"This is Laznick. Why haven't you reported before this?" The master criminal leaned from the bed and spoke directly into the microphone.

"Laznick! Quick, get this. Dr. Haw-

thorne's gone! He's taken the radium with him! It isn't here!"

Laznick's face twisted into a savage scowl. "What! The radium—" His agate eyes blazed. "If this is a trick, Slade—you'll never get away with it you—"

"No—no. He's disappeared. Left six weeks ago. Took the radium with him. He's trying to get back to New York. I swear it's true."

"Tell me everything. Hurry!"

"A cult inhabits this place—the Brethren of Death. They captured us last night. We hadn't a chance. We landed. Everything looked deserted. At the south end of the lake we found a cavern, went inside. That's when they jumped us. They held us prisoners all night. We couldn't get back to the plane and the radio." Slade's voice was excited, his words coming in a hurried jumble.

"They live in caverns in the rock. Dr. Hawthorne was their high priest. He did his experimenting here. Tried it on the cultists. He poisoned them all. The radium's gotten into their bones and they glow in the dark. Terrifying."

"The doctor ran away six weeks ago. Took the radium. It's in a human skull—the cult's sacred relic. They went after him—some are still out trailing him. They're in a frenzy. The skull was that of their leader's son. He died at birth. It's their holy of holies. I promised to help them get it back. That's why they let me go. We're now in the Stormer. Awaiting orders."

Laznick was hunched up in the bed, his eyes gleaming slits. He said rapidly: "Take off. You and Cummings fly to Air Base Number 5. Hold yourself ready for action. Signing off."

"Right."

Again there was a sharp crackle. "Captain Slade off the air, sir."

"Issue these orders immediately. Dr. Hawthorne believed heading east to New York. Agents to cover all highways, train terminals, bus stations, airports. Issue minute description of the doctor. Has in his possession small human skull containing radium. If man located, procure skull, bring it to headquarters at once."

"Yes, sir."

"In addition, agents to proceed immediately to Hawthorne farm. Ralph Hawthorne to be executed. Body disposed of. Agents to go to Leamington house. Bill Barnes to be given injection of amnesia fluid, taken to Air Base Number 1, held. Get moving."

He lay back in bed, his massive face dark with anger. Dr. Hawthorne's escape had blasted his carefully laid plans. Yet if his men moved quickly enough, if they might locate the scientist and seize the radium—the result would be the same. The life of the crippled Ralph Hawthorne had of necessity been for-

feited. His knowledge of the secret place at the Lake of the Ice was too dangerous. He would remember everything when the drug wore off.

Sleep had definitely departed. Laznick arose, dressed quickly, and ate breakfast. Afterward he paced the floor in agitation. If things didn't play directly into his hands, if Bill Barnes had already escaped, he was in for a battle with the famous ace whether he wanted it or not. The prospect wasn't inviting. But if it came to that, he determined that he would strike with devastating force before Barnes could be prepared.

THE SUN was rising to bathe the city in its golden hues when the microphone in the room again broke into action. "Reports from field forces, sir."

Laznick lunged over to the microphone. "Go ahead."

"Agents dispatched to Hawthorne Leamington house report finding of Dr. Hawthorne in house—dead. Skull with radium not found. Bill Barnes has disappeared from cellar."

Laznick rose to his feet, stunned by the news. The doctor had gone to his old home—to the very place where Barnes had been left. The skull with the radium hadn't been found. And Barnes had escaped. That meant—Laznick cursed madly—Barnes must have found the radium and taken it!

The announcing voice droned on. "Two agents sent to Hawthorne farm report considerable activity there. Two Snorters on field. Bill Barnes there, positively identified. Other men—Hass-further, Gleason, and the boy, Sanders. Agents report seeing skull in hands of Sanders. Agents in hiding, so far unobserved by Barnes' force. Awaiting orders."

Laznick's eyes blazed. That cinched it. His whole cunning plot to keep Barnes out of things until the radium should be procured had been shattered. Barnes had the radium, must have. The agents had seen the skull in Sanders' possession. There was only one thing to do: attack!

He thundered into the microphone: "Emergency orders! Two units of ground forces to immediately converge on Hawthorne farm, fully armed. Five pursuit planes from Air Base Number 3 to proceed at top speed to same destination. Air and ground units to attack Barnes' force simultaneously. Objective—to procure radium. Concealed in small human skull. Now in possession of Sanders. Get that radium at all costs. Shoot and shoot to kill!"

## XI—HEAD WOUND

SANDY SANDERS had been awakened at the first glimmer of dawn by the farmer into whose house he had stumbled the night before.



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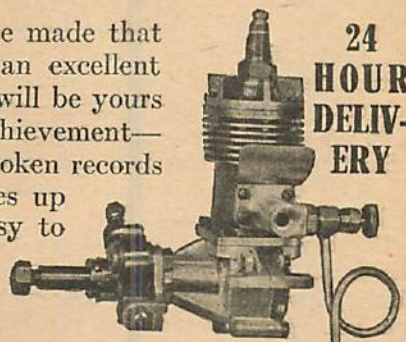
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"Better get up, son. They're comin' for you early," the farmer told him. "I talked to your friends after you collapsed. You feeling better?"

The boy blinked sleep from his eyes. He had slept soundly and new life seemed to have flooded his young, healthy body. "Yeah, I feel O. K." He looked up at the grizzled man standing beside the bed. "You've sure been swell to me, mister."

The farmer grinned. "Pleasure to have you. I fixed up all those scrapes and cuts you had, while you were asleep. Pile into your duds now and get downstairs. Breakfast's waitin'."

Sandy obeyed. He washed hurriedly and then examined himself in the bathroom mirror. His face was decorated with pieces of adhesive tape, a wide band running diagonally across his forehead. He peered closely into the mirror and his eyes widened.

A section of hair the size of a silver dollar, had been shaved from the side of his head where he had been cut by flying glass. His first frantic thought was that his hair had fallen out. And even though he was reassured by the stain of iodine on the scalp, the effect was highly displeasing. He brushed his hair carefully so as to cover the bald spot, and hurried downstairs.

He had barely finished a mammoth

breakfast when he heard the sound of planes and ran out to see two Snorters circling overhead. He signaled with his arms and watched while one of the ships came down for a landing in a small clearing two hundred yards beyond the house.

It was Shorty. Sandy ran over, frantically told the stinky little pilot what had happened.

"Bill was in the Stormer—I'll swear he was, Shorty," he said breathlessly. "But he was in the back seat—and right after that they attacked me. I hadn't a chance. You heard from him yet?"

Shorty shook his head grimly. "No. Sounds bad. Get in. We'll hop over to the farm. You'll have to identify it."

The boy sprinted back, hurriedly thanked the farmer and then vaulted into the rear cockpit of the sleek Snorter amphibian. They took off, climbed and joined the other ship, piloted by Red Gleason.

Sandy instructed Shorty to head for the town of Leamington. The ship swung around on its course and Red's Snorter swung in behind.

Fifteen minutes later, they passed above the town and headed north. The boy, crowded closely to the window of the cockpit, peered down at the wild, rolling country below. Suddenly he pointed.

"There it is, Shorty. Bill landed in that field. Right beside that house. Only the white markings aren't there any more."

Shorty nodded, relayed the information to Red and dived the amphibian down for a smooth landing. There was no sign of life to be seen, with the single exception of a truck moving along the country road.

Red put his Snorter down immediately afterward and taxied alongside. The pilots swung to the ground, cautiously. Each held a gun ready for instant action.

They started across the field to the farmhouse when they saw a familiar figure running wildly down the lane and coming toward them. It was Bill.

The unexpected meeting was joyful. Bill related his experiences in quick, terse sentences and listened gravely as Sandy told of the Stormer's attack and his identification of Bill as being in the rear seat of the amphibian at the time.

"You're mistaken there, kid," said Bill. "Some one else was in the Stormer. It's been stolen. I left it right here on this field." His expression was serious. "If you had obeyed orders you wouldn't have been shot down. Next time, do as I say."

The reproach was mild, yet the boy felt it deeply. His face reddened and he



failed to meet Bill's eye. "I know I did wrong but I tried to make up for it. I tried to get to a phone as soon as I could. Gosh, I banged up the old Eaglet pretty badly——"

Bill had taken immediate charge. "We're up to our ears in trouble, fellows. Whoever got me and stole the Stormer means business. They're after that radium." His eyes glowed. "I'll get that Stormer back if it's the last thing I do. There's no time to lose. I'm going inside to see if Ralph Hawthorne's there. Shorty, come with me. You other two stick by the ships—and be on your toes. Anything can happen!"

Shorty followed him into the farmhouse on the run and Sandy walked back to the Snorters with Red.

The boy was round-eyed from the memory of Bill's story. "Gosh, Red, I didn't know that radium would make your bones glow like that. I'd sure hate to meet up with those Brethren of Death guys."

Red shrugged. "Why should you care, it'd be a hair-raising experience, wouldn't it?" He peered intently at the boy. "Say, a little hair raising wouldn't do you any harm. You're getting bald, pee-wee."

"Bald!" Sandy's hand instinctively went to his head. His fingers encountered the shaved spot and he pulled his hair back across it.

"I was cut there. Heck, no, I won't get bald—not with daily applications of Scalp Awakener." He pulled the small white skull containing the hair tonic from his pocket. "It came right through everything without breaking, Red. Gosh, was I glad. This stuff cost a fortune. Worth every cent of it, too."

Red held his nose. "Scent is right."

The boy poised the skull on the palm of his hand and looked at it critically. The morning sun bathed it in shining whiteness. "I betcha this'll grow the hair back in two weeks. You won't ever——"

Red interrupted. "Here're Bill and Shorty."

Sandy turned, saw the two men coming from the farmhouse carrying some one between them.

"They've found Ralph," the boy said. He started after Red to meet the others.

It was Ralph Hawthorne, Bill assured them of that. The cripple was carried out and laid down on the grass in the shade of Red's Snorter.

"Found him in bed," said Bill. "Something's damn screwy. Either he's pulling a phony or he's off his head. He doesn't remember anything. Not even his own name. I've tried to question him and no soap. If his memory's gone—we're sunk."

Ralph Hawthorne lay on his back, his body twisted, his crippled legs stiff and unbending. He was a small-framed man of twenty-five, pale and thin. A stubble

of bluish-black beard covered a pointed chin and a short upper lip. His eyes looked searchingly at the four fliers grouped above him. He kept repeating in a dazed voice: "I can't remember—I can't remember——"

"No one else inside?" asked Sandy.

"Place deserted." Bill's eyes were thoughtful as he looked at the boy. "You're positive you saw me in the Stormer, Sandy?"

"Cross my heart. Got a good look at your face. It must've been you or your twin."

"Exactly. I think I got it figured out." Bill spoke crisply. "Ralph wanted to see me, to tell me how to get to his dad. Some one else got wise and wanted that information. How would they get it? By having some one impersonate me and fool Ralph. O. K. It works. They get the directions. They don't want Ralph free to do any more talking, so he's drugged. The Stormer's sitting out here. They steal it and chase out to pick up the radium."

Shorty swore softly. "That adds up pretty right."

"But, gosh, Bill," Sandy said. "What if they do fly out there? They won't get the radium. Those skeleton guys stole it just this morning."

"I realize that, kid. That's why we have to snap into it. We still got a chance of blocking their plans—if we can get Ralph to tell us those directions. The Brethren of Death are taking the stuff back to their hang-out. And these other birds, whoever they are, will be parked right there, waiting for them. Our job is to get there before the brethren arrive."

Bill's eyes were thin. He straightened up. "We're taking off immediately for the field. Ralph goes with us in the rear cockpit of Red's plane. Sandy, squeeze in beside him. I'll pilot it. Red, go with Shorty. We'll keep Ralph under guard, have doctors work over him. He'll talk somehow. If he's left here, his life isn't worth a plugged nickel. Get moving!"

The four men galvanized into action. The cripple was lifted into the rear cockpit of the Snorter. Sandy jammed the skull back into his pocket and swung up to slip in beside Ralph. He had one foot over the coaming when he heard Shorty's wild bellow: "Bill! Look!"

The boy followed Shorty's pointing hand. Three cars were speeding along the country road. And even as he saw them, they turned into the lane and came thundering toward the field. His eyes darted to the sky beyond and he gasped. Five biplanes had suddenly materialized in the distance—and they were diving nearer!

Bill leaped for the front cockpit. "Take off! Take off!"

Red and Shorty reached their ship in a wild sprint, threw themselves inside.

The idling engine blasted out thunder as the throttle was thrown wide open. Their amphibian lunged into movement, raced down the field.

Sandy had forced his small body into the cockpit beside Ralph Hawthorne. He saw that the three cars had pulled to a stop beside the farmhouse; that men were spilling from them, machine guns in their hands. The attackers deployed out, came racing across the field, firing. The crashing of the guns sounded above the roar of the engine.

Bill waited until Shorty's plane was clear, then released the brakes. The Snorter plunged into motion. Bullets smashed into the metallic wing covering, into the fuselage. Sandy held his breath.

The other amphibian was angling into the air far down the field as Bill blasted his machine across the turf in close pursuit. The hail of bullets followed the streaking plane. The field blurred past and then the Snorter, with a thunderous bellow from the straining Diesels, arrowed up and away.

## XII—ATTACK

BILL'S FINGERS were wrapped tightly around the stick, his feet rammed hard against the rudder bar. The Snorter under him was zooming wildly away from the withering fire coming from the machine guns below. His face was contorted with a cold fury. They had just escaped in time. His gaze jabbed up to the five on-coming planes he had seen at the same time as Sandy had. Enemy ships! An attack from the ground and the air!

He jerked the microphone to him, belled into it. "Five planes attacking! Fight back if you have to. Object to get to field as fast as possible!"

He clicked over the switch, connected the intercockpit telephone and barked to Sandy: "Man the swivel gun!"

The boy's excited voice came back. "In position."

Bill had the stick back into the pit of his stomach. The enemy planes were holding to their tight formation, the angle of their dive steeper. Bill watched, eyes flaming. He knew that their extreme speed would spoil their aim, would force them past before they could line up their sights.

His fingers slipped down the control column to fasten on the trigger trips. The mysterious enemy had at last come out into the open—come out in force. What had prompted the furious onslaught? Had they learned about the fate of the radium? Were they endeavoring to block the removal of Ralph and seal his lips forever?

The five attacking biplanes were almost within range. They were firing. Streams of flaming tracers plumped from their guns.



Bill held his ship to a climb, its bullet nose aimed at the attackers. He caught a glimpse of the other Snorter duplicating his move.

The enemy ships were within range! Smoky lines laced past the Snorter. Bill instinctively ducked his head, threw the stick forward and dived with the throttle jammed wide. He felt the amphibian quiver as the leaden hail smashed across it. A black-winged thing rocketed past—another and another. And the enemy force were gone—diving furiously.

Abruptly the five biplanes pulled recklessly out of their headlong plunge and were zooming with terrific speed back in a pursuit of the two Snorters. Bill had the heel of his hand rammed against the throttle. He saw that Shorty and Red had come through safely and that their plane was streaking farther ahead.

If they could only outdistance the attackers. But, it wasn't to happen. The biplanes came on like streaks of lightning—overtaking the heavily loaded Snorter. Bill realized that their salvation didn't lie in flight. It was war. He roared into the microphone: "Attack and give 'em hell!"

He jerked the Snorter straight up, whipped it over in a blurring stall turn. The nose came down. In that second a biplane whizzed past his sights. Bill's fingers clamped down on the trips. The machine guns roared, spewed out a murderous stream of lead and tracers down the troughs alongside the engines.

The blasting fire smashed across the biplane's engine, ripped down the fuselage, crashed into the pilot, cut across him under the chin and practically decapitated him in that awful instant.

The Snorter had rocketed past. Bill couldn't tell what had happened. Two other machines were on him. Everything was a blur of action. He heard Sandy firing the swivel gun in furious bursts. The air seemed filled with attacking planes. He crouched over the controls, flying the ship instinctively, whirling it on a wing tip, diving, zooming. He glimpsed the first victim of his guns whirling down in flames. Another biplane was staggering out of the fight, a victory for Shorty and Red.

Bill's fingers seemed forever bearing down on the firing trips. The guns were blazing hot, crashing out a crescendo of death streams, pumping their leaden destruction into the enemy.

His brain was dazed by the furious action. Everything was in split seconds. He felt something tear across his face, ripping his goggles away. A bullet—an inch closer and he would have been finished. Again and again, he missed certain death by deft twists of the controls.

It was all over in three minutes. Bill whipped his ship around on a wing tip, roared it after an enemy plane, brought

his line of fire down the tail section of the fleeing ship. It wasn't until the terrified enemy pilot had leaped clear and allowed his plane to plummet down, that Bill looked around.

The sky was clear of aircraft with the exception of the other Snorter. His eyes widened in amazement. The enemy force had been wiped out. Three parachutes were discernible, falling rapidly below—three of the enemy pilots had preferred caution to death. The other two had been killed outright.

Bill radioed quickly to Shorty and learned that both Red and he had escaped uninjured. Bill instructed them to proceed at the utmost speed for the field. He looked into the rear-view mirror and saw Sandy bending over Ralph Hawthorne.

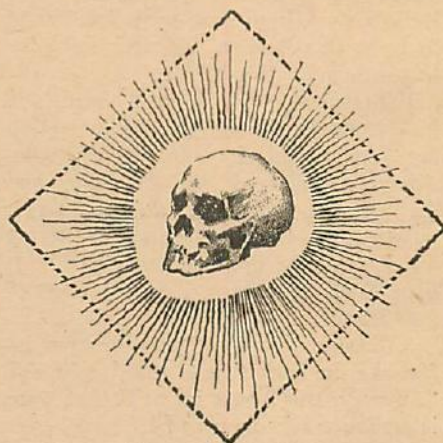
"Kid, you O. K.?"

Sandy's answer sent Bill's heart thudding into his throat.

"I'm all right. But the cripple here—Ralph's been hit badly."

Bill's fingers tightened over the microphone. Ralph was his only hope of getting to the Brethren of Death—of getting the radium. He alone knew the directions. And now if he should die before—

"Do all you can for him, Sandy!"



The sacred skull.

Bill straightened out the Snorter and headed on a wild flight back to the air field.

### XIII—EMERGENCY

FROM THE MINUTE the two Snorters' wheels touched the turf of the Long Island landing field, the entire personnel of the Barnes airport was thrown into high-gear activity. In obedience of Bill's radioed orders, the field doctor, Dr. Fletcher, was waiting with an ambulance on the apron. Directly, the famous ace taxied in the amphibian, Ralph Hawthorne was removed from the rear cockpit, placed in the ambulance, and rushed to the small airport hospital.

Bill hurried to his office in the administration building and immediately issued a stream of orders over the telephone.

Tense excitement charged the very air as men raced to their appointed tasks. A cordon of guards was thrown around the hospital. The chief electrician increased the voltage in the wire fence surrounding the widespread airport. Bev Bates and "Cy" Hawkins pulled on flying togs and took to their stations beside armed and fueled Snorters poised on the apron.

Tony Lamport began an extensive telephone canvass of all ticket offices—train, bus, air—for information concerning the traveling plans of the monk-garbed Brethren of Death. Four mechanics left by car to make repairs on the damaged Eaglet.

Information concerning the theft of the Stormer crackled out over the radio. Technicians and mechanics in the construction hangar worked feverishly to put the finishing touches to the new Lancer.

Bill crouched over his desk, gripping the telephone, barking clipped words into the mouthpiece. His lean face was pale and haggard and his broad shoulders drooped. But, his brain was racing with stimulated acceleration. Every precaution had to be taken. The murderous attack at the farm indicated the enemy were powerful and meant business.

Dr. Fletcher reported by telephone from the hospital. His news was heartening. Ralph Hawthorne had been shot through the left side but the bullet had missed his lung by inches. He was in no particular danger from the wound, unless unforeseen complications developed. Bill received the news, grimaced, and hurried to the hospital. He was closely closeted with the physician for twenty minutes.

At ten thirty, he was back in his office talking to Shorty. His words issued flat and clipped from thin lips. "Ralph's wound's superficial. His mental condition's the puzzle. Doc's examined him thoroughly. Certain he's been drugged. Suggested calling in Dr. Harmon, big-shot New York specialist. I've made arrangements. Harmon's flying here. Arrives at noon. Until we can get Ralph to talk, we're mired down."

"There's still one good chance that we can get the radium in any case. Those three Brethren of Death who took the stuff will be heading back to their hang-out. It's across the continent. Dr. Hawthorne told me that much. They're only a limited number of ways they can travel—on foot, bus, train, car, airliner, or private plane. Their dress makes them conspicuous. Some one is sure to have seen them. Tony's trying to get a lead now. If we locate them, we'll jump 'em and take the radium. But, if they've gone by private plane—we'll be out of luck."

"I've been figuring things out. That attack back at the farm was pretty vicious stuff. The enemy wanted to nail



us cold. Why? So we wouldn't get Ralph out here and make him talk. That's one reason. I've a good hunch there's another. They've probably been out to the secret hide-out and learned about Dr. Hawthorne's escape—but they may not know about the cultists retrieving the radium this morning.

"They may think I got it from Dr. Hawthorne and still have it. That'd give them a good reason for attacking—to blast us down and get the radium. If that's the dope, they'll probably concentrate on us here and ignore the hide-out. A break for us. Gives us more time to get the directions from Ralph—but it'll also make things doubly dangerous here. That's why I've issued emergency orders.

"We have to keep on our toes. Anything can happen. I've just received word from Martin. The Lancer's practically set. They ran her through her ground tests yesterday. The kinks are being ironed out. If everything's set, I'll risk a test flight late this afternoon."

Shorty started. "Hey, you're screwy! You just got through telling me we'd have to be careful. That gang of thugs are liable to jump you up there—or pull something. Better wait."

Bill shook his head. "No. If Ralph snaps out of it and talks, I may have to get out to the hide-out in a big rush. The Stormer's gone. The Lancer's the only answer. Don't worry, I'll take plenty of precautions. If I make that test, every one of you guys will be roaring around up there in Snorters, as escorts. Can't tell you anything definite yet. Have to check over the ship myself first. I'll let you know."

#### XIV—THE LANCER

AT TWELVE THIRTY, the New York specialist, Dr. Harmon, arrived by plane. He was taken directly to the hospital. He remained an hour, examining the patient and conferring with Dr. Fletcher and Bill, and then left.

When Bill returned to his office, he found Shorty waiting, anxious for news.

"Harmon agrees with Fletcher," Bill told him. "Ralph was drugged. He identified the stuff—something with a name a yard long. Produces amnesia. He's prescribed treatments. Can't do much. Ralph won't be entirely out of the influence until forty-eight hours from the time of the injection. That means, roughly, eleven thirty to-morrow morning."

Bill paced nervously across the room. "We'll have to wait until then. Gives me time to test the Lancer. I'm going to look her over now."

As they went down the steps of the administration building they saw Sandy walking glumly along the apron. His

eyes were downcast and he passed without looking up.

Bill said: "Hey, peewee. Come here." The boy looked up startled. "O. K.," he said dully and came back.

Bill told him about Ralph. "We'll probably get going to-morrow morning. I may test the Lancer this afternoon. Stand by. I'll want every one of you in the air when that happens, as a guard."

Sandy said: "O. K.," again, without enthusiasm.

Shorty frowned: "What're you pouting about?"

The boy kicked at the concrete, his eyes lowered. He didn't reply.

"He's probably got indigestion, Bill," said Shorty. "I caught him eating half a pie this morning. Or maybe he's got a touch of amnesia."

A flush colored Sandy's face. "Cut it out, Shorty," he said miserably. His lower lip protruded. "It's the doc. Golly, he didn't have to do that."

"What?" said Bill.

The boy jammed his hands into the pockets of his flying suit. "Aw, he made me go into the hospital to have those cuts and things I got yesterday looked at. And when I was helpless he shaved off more of my hair. Did it on purpose."

He yanked the white helmet from his head. "See? It's an awful mess. After Henri's worked so hard on my hair and to have this happen. Henri's liable to faint when he sees it."

Bill looked at the boy's head and fought to repress a grin. The section the farmer had shaved had been considerably enlarged by Dr. Fletcher. And on the other side, an even larger portion of hair had been cut cleanly away from an iodine-stained gash. It gave Sandy's head a decidedly mottled appearance.

"Those cuts might have become infected if he hadn't done that," said Bill. "Anyway, this'll just prove if that tonic is all it's cracked up to be."

Shorty was laughing. "He thinks we'll fall for that line about those places being shaved. We're wise, kid. You might as well admit that you're getting bald."

Sandy turned on him furiously. "All right, wise guy. You all think it funny about this Scalp Awakener." He tugged the small skull from his pocket and shook it. "I'll prove to you what it'll do. I'll grow so much hair you won't recognize me."

"I can hardly wait," said Shorty.

Bill and he moved on toward the construction hangar, leaving Sandy muttering unheard imprecations. As they entered the hangar, the last trace of the smile that had played over Bill's lips vanished. His face resumed its former grim intensity as his worries came rushing back.

Everything was pointing in, heading toward a smashing show-down. The fol-

lowing day Ralph Hawthorne would recover his memory; the secret would come out; the irking bonds that had held them helpless would be severed. But between then and now one of the major crises of the famous pilot's life had to be faced: the flying test of the new Lancer.

Bill stopped just inside the entrance, his eyes on the shimmering silver plane enthroned in the center of the large building. The blazing daylight arc lights were striking down on its metallic skin, making it a thing of beauty, a glistening, jewellike thing.

He felt his heart beating faster and a dryness was in his throat. Squads of men moved in feverish concentration around the plane. Bill failed to see them. All he saw was the Lancer. He knew every inch of it from the trailing edge of the balanced rudder to the muzzle of the 37-m.m. cannon protruding from the bullet-shaped nose.

He had nurtured its growth from nebulous ideas to firm practicability. He had sweated over the drafting board and his heart's blood had been in every line of the intricate plans. The Stormer had been a wonder ship but now it had been superseded by—the Lancer.

And that afternoon, if everything went well, he would roar that glistening Juggernaut across the turf and blast it into the air. He would bring a mighty monarch to the kingdom of the sky. He would be risking everything—not only his life but the culmination of years of experience, years of hard work. The test would be a crisis. If he won—another milestone in the conquest of space would be passed. If he failed—only death awaited.

The silver Lancer looked alive, out there on the hangar floor, poised like a strange earth-bound bird, its two wings outstretched, as if awaiting the twin propellers in the nose to whirl into life as the 3,000-horse-power Diesels boomed.

On the ground it was a biplane, a low-landing-speed biplane, but once it hurtled into the air a miracle would happen. The whole unit—the amphibian landing gear and lower wing—would fold completely up into recesses in the upper wing and the fuselage. And the Lancer would become instantly a high-speed monoplane—a bulletlike meteor.

Bill heard some one speaking. He tore his hypnotized gaze away from the product of his dreams and realized that Martin, the head mechanic, was standing beside him, talking.

"What's that?" Bill said.

Martin's lean face was flushed and his eyes glowed. "She's ready, sir. Ready." His voice trembled. "We've tested everything. She's ready. She's perfect."

Bill followed him back to the plane. Ready.

For one solid hour, the famous pilot inspected every section, carefully, thor-



oughly, and listened to the smooth thunder of the driving Diesels. He finally slid down from the forward cockpit in the two-place cabin, brushed off big capable hands and said quietly: "Yes, she's ready." He forced harshness into his voice to stifle its tremor. "O. K. Test flight scheduled for three thirty this afternoon!"

He went outside, strangely shaken.

And then, directly afterward, he had received two reports that left him tense with excitement. The first had come over the phone from Dr. Harmon. The New York specialist and his pilot had been forced down, when returning to Manhattan, by four black biplanes. On the ground, they had been thoroughly searched, then allowed to proceed on their way with nothing taken.

The second report had been of a similar nature. The squad of mechanics, dispatched early that morning to make repairs on the Eaglet, had been waylaid, searched, and left bound and gagged on a deserted stretch of road. And again nothing had been taken.

Bill nervously paced the floor of his office, his hands gripped tightly together behind his back. The two incidents came as proof that the enemy was convinced the radium was in his possession. They were watching every move made at the field. They were searching every one who left as a precaution against the precious object being smuggled out. But, would they stop there? Or would they risk a sudden attack?

Bill's worries increased. Ralph Hawthorne wouldn't recover his memory until the next day and, in the meantime, the Lancer had to be put through exhaustive tests.

At three fifteen, as Bill waited beside the shimmering form of the new Lancer, his eyes probed up to the sky overhead and he saw five Snorters swinging in lazy circles high in the heavens. A glow of confidence swept over him. At the controls of those high-speed fighting ships were the pilots of his gang—Red, Cy, Shorty, Bev and Sandy. And behind each rode a gunner.

It was a grim warning to the enemy to stay away.

And the warning was to be taken. The skies were to remain clear of alien craft; no flame-tipped guns were to spew tracer lines of death. Not that afternoon would the master criminal strike—not when Bill Barnes was so watchful, so alert for trouble—but later, much later—

#### XV—TEST

FROM his grand-stand seat high in the heavens, Sandy Sanders saw the Lancer come to life. It was a sight he was not to forget to his dying day.

While the five Snorters had continued their circling tactics, each pilot tensely inspecting the clear-blue sky for the first sign of trouble, the Lancer had streaked

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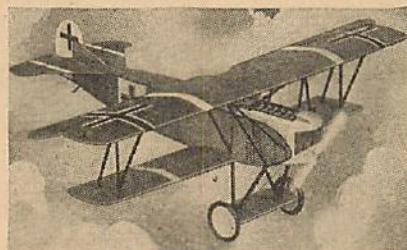
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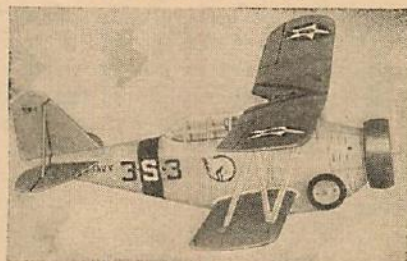
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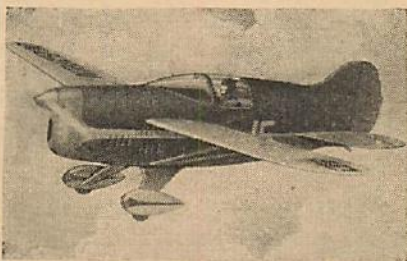
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down the white runway below and angled up into the air.

Sandy flew his ship automatically, trained his binoculars on the field and watched. He saw Bill cautiously guide the Lancer in a shake-down flight. And then had come the speed tests—a hurtling blur of silver past the two pylons marking the measured mile. Following that, the Lancer had been wrenched through the series of snap rolls, barrel rolls and Immelmans, to go finally down in a falling leaf for a dead-stick landing.

Nervously, the boy had swung his ship

away from the field on orders from Bill. He knew what was coming—the most dangerous part: the series of terminal velocity tests with five pull outs to register from three to eleven G's.

The Lancer had then arrowed high up into the sky and come hurtling down with terrific speed to pull out of the dive smoothly. Once, twice, three and four times, Sandy had held his breath as the screaming plane had gone hurtling past. Bill had landed again for inspection, and again the Lancer was in the air, climbing steeply. The boy found his hands shaking at the controls. Here



was the climax of the whole afternoon—the last dive, the dive with the eleven G pull out.

The Lancer had dwindled high overhead, the setting sun burnishing its sleek metal skin. It had disappeared from view, swallowed by the blue vault.

Sandy waited, struggling to force himself not to look, and yet grimly fascinated. He knew the whole test routine. He himself had put the Eaglet through her proving paces. With a shudder, he recalled the terrific force that had slammed him down in his seat as his machine had plummeted in a vertical power dive.

He remembered the ripping, tearing feeling that had been in his stomach, the intense pain, the black cloud that had swept across his vision as total unconsciousness had threatened. He had somehow, then, horsed back on the stick and brought the Eaglet into level flight to find the accelerometer needle standing at nine G's.

The thoughts raced through the boy's feverish brain as he stared up. He couldn't find the Lancer; it was up there somewhere, about to begin the terrific descent to earth.

Then a voice crackled in his ear phones, Bill's clear voice. "At twenty-two thousand, rolling into it. Keep clear."

That was all.

For a second he saw nothing—then a needle point of glistening steel. It grew larger and larger with stunning rapidity—grew tiny wings. And then he saw it plainly, coming at a terrific rate, its nose pointed for the field below. It was pounding down—down—down.

The screaming of its engines rose above the roar of Sandy's Snorter. The Lancer was a shaft of light, a mad meteor. It was diving perpendicularly, pulled by the power of three thousand horses and the terrific drag of gravity. It went past Sandy's altitude, a blast of silver light, faster than the boy had ever seen anything go. He forgot his guarding duty, forgot everything. He leaned far over the side, staring down.

He lived an eternity during that awful second when he was certain that both plane and man were heading to split the earth. It was Bill in that pelted thing of steel, Bill being hurled to death. And yet, when it seemed that all was lost, when there seemed no chance for recovery, the nose of the Lancer came up and the plane whipped into level flight.

Five minutes after the Lancer had gone in for a landing, radio orders came for all planes to return to the field. By the time the Snorters were down and the pilots had tumbled out, Bill was sitting pale and wan in a chair in the administration building. He showed the terrific physical strain he had been under. But the tests had been successful.

The Lancer had come through. She had proved herself to be—the master ship for the master flier.

## XVI—FOG

IT WAS long after dinner, and Sandy had gone to his room. He was standing in front of the mirror, miserably inspecting his mutilated crop of hair when the phone rang. It was Bill ordering him to come immediately to the office.

He went on the run and found Shorty already there and seated beside the desk. Bill was talking over the telephone. He motioned the boy to sit down.

Bill finally pronged the receiver and looked up. "That was Tony. Looks as if he's clicked on a lead. Not that it'll do us any good now. The manager of a small airport near Townsend, New York, reports that three monks contracted with a barnstormer near there to fly them across the continent—early this morning. Said they wore heavy veils over their faces."

Bill's clenched fist thudded on the desk top. "Those are the birds that swiped the radium, I'll bet my hat. The ship that took them was fairly new and fast. They'll be there by now—certain to be. We can't do anything about it except hope that the enemy isn't waiting for them. If they are—we're sunk."

He stared viciously across the room. "We've only one chance now—Ralph Hawthorne. He has to snap out of it and talk. That can't possibly happen before mid-morning to-morrow. But, directly those directions come out—we go into action."

He turned to Sandy. "We may need every available ship. We'll be up against tough opposition. I just got word that your Eaglet is repaired and ready to go. At dawn to-morrow, Shorty's going to fly you over in his Snorter. You'll bring the Eaglet back here."

WHEN Sandy climbed, shivering, out of bed the next morning, it was pitch-black. He hastily dressed, pulled on a clean white overall flying suit. The small white skull containing his precious Scalp Awakener stood on the dresser. He picked it up, unscrewed the top and poured a small quantity of the tonic over his head. The liquid bit into his

wounds and he winced. Gingerly he combed his hair, vainly endeavoring to lick it flat across the shaved sections.

The sudden thunder of a gunned Diesel came to his ears from the direction of the apron, and he hastily screwed the top on the skull, jammed it into his pocket, picked up a helmet, and raced out the door.

Shorty was seated in the front cockpit of the Snorter, jazzing the engine impatiently, when he sprinted up. The boy climbed hastily into the rear seat. Immediately the brakes were released and the powerful amphibian raced down a light-bathed runway into a fast take-off. The first flush of dawn was showing in the east.

The flight across Long Island Sound and the New York State territory was rapid and uneventful. And by the time the vicinity of the small lake was reached, dawn had come. A swirling ground mist eddied up from below and visibility was poor. Minutes later, the Snorter was circling preparatory for a landing, as the fog-mantled lake swept under them. The Eaglet was floating on the water, dim and indistinct.

A group of mechanics stood waiting on the shore as the Snorter swished down. Shorty taxied the ship within two yards of the beach, swung around and bellowed: "O. K., kid. Hop out. Don't waste any time getting away."

Sandy climbed over the side, dropped into the water and waded hastily to the Eaglet. One of the mechanics had started the engine and he slipped from the single cockpit as Sandy climbed up on one of the pontoons.

"Everything set, sir," the mechanic said.

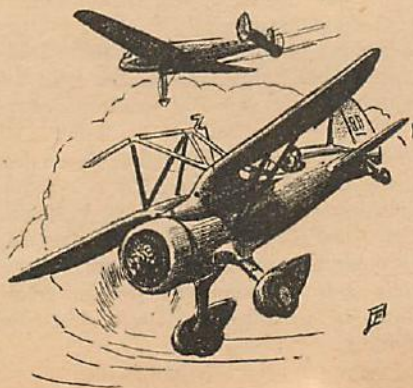
Sandy said: "Swell," and lowered himself into the seat. He saw that only temporary repairs had been done on the instrument board and that the radio was still out of commission. Aside from that, the little machine had been made completely air-worthy.

At Shorty's signal, Sandy opened the throttle, moved the trim little ship out into the deep water, slung it around to head into the wind, and roared across the surface and into the air.

The ground mist swirled up to lessen visibility, and the Snorter was a ghost ship as Sandy banked around to watch Shorty take off. The Snorter came roaring up alongside, and Shorty gestured to drive for home.

The two ships pointed up to five thousand feet and then leveled off on a course for the Long Island airport. The fog was getting worse and worse, its grayish streamers at times obliterating the Snorter from Sandy's view. The sun showed through, a fuzzy ball of orange.

The boy leaned back in his seat and gave himself over to grave meditation. He finally pulled off his helmet and





peered into the rear-view mirror at his own reflection. The sight shook him to the core. His hair was in a frightful condition, and he realized with a tinge of alarm that the injuries he had received might possibly do something to the hair roots, and those spots that had been shaved might remain bald.

Something had to be done. He sent a quick look to the right and saw that the Snorter was flying ahead and to the right. The foggy curtain had thickened in between and he could see the amphibian only vaguely. Gradually, the boy nudged his pulsing ship to the left, taking it farther and farther away. He watched the Snorter grow more indistinct and then utterly vanish. Immediately Sandy spun the Eaglet over on her back. But the sudden rush of blood to his head made his wounds throb, and he hastily whirled the ship right side up again.

He sat perplexed, his brows knitted. Everything had been denied him. His only hope had been to continue his thrice-daily practice of flying upside down and now even that was out of the question. Something decidedly had to be done—something drastic.

Suddenly he stiffened as an idea flashed across his mind. He was, he realized, right at that moment flying near New York City. New York City—and Henri, the *coiffeur*!

Could he dare risk slipping away and going to New York? Henri should be allowed to inspect the awful damage that had been done to his hair. And the sooner, the better. Perhaps if it were neglected any longer—utter baldness would result.

He looked hastily around. There was no sign of the Snorter in the heavy fog. Shorty would never miss him. And with the radio out of commission there was no way of communication.

Sandy's eyes sparkled. It wouldn't take long. He would slip down for a landing at the seaplane base on the East River at Thirty-first Street. Then by cab to Fifth Avenue and Henri's—

But what would Bill say? The boy wet his lips nervously. He would have to chance Bill's wrath. If he made it fast, he'd be able to get back to the field not too long after Shorty arrived. And anyway, it was early. Bill had himself said that Ralph Hawthorne wouldn't be out of the drug influence until mid-morning or later. If he got back before then—it would be O. K.

Abruptly he swung the Eaglet round on a wing tip and headed south, the cowed nose pointing down in a gradual dive. At two thousand feet the visibility had improved and he realized that he was heading away from the fog belt. He eased the plane lower, flattening out at one thousand as he recognized landmarks below.

Five minutes later, as he identified the

city sweeping under him as Tarrytown, he looked up suddenly to catch a glimpse of another ship thundering past high overhead to disappear into the mists. In almost the next second, the same plane reappeared to race back on its former course. And again it vanished.

He looked after it, suddenly suspicious, suddenly mindful of what had happened to Dr. Harmon and the party of mechanics. Could it have been an enemy plane trailing him? But, such a procedure would have been utterly impossible in the fog. And the ships that had participated in the attack the previous morning had been biplanes—while this one had been a high-winged monoplane.

He uneasily inspected the skies again, but the monoplane had disappeared as abruptly as it had come.

Fifteen minutes later, the Eaglet was spanking its sleek pontoons on the choppy water of the East River as it taxied in to the seaplane base.

## XVII—HENRI'S

SANDY had left the Eaglet to the care of the seaplane attendants and promptly boarded a taxi. It was early, and the business streets were singularly deserted. The boy caught a glimpse of a clock and was worried. Generally Henri was in his shop long before business hours. But would he be there this morning?

He wasn't. Sandy learned the dismaying truth after he alighted from the cab and crossed the sidewalk to the shop. The door was locked. And inside, no lights burned.

Sandy stood in the entrance recess and thoughtfully regarded the striking display Henri had arranged in his window. A row of white skulls, duplicates of the one Sandy possessed, were arrayed in a single line on heavy black velvet. To one side was a small, neatly lettered card proclaiming the merits of Scalp Awakener.

The boy scarcely saw the display. What should he do? There was no telling when Henri would arrive, anytime between now and nine o'clock. And he couldn't remain away from the field too long.

Reflected in the glass of the window he caught a glimpse of a taxicab pulling to a stop at the curb farther down the street. He saw two men alight and leisurely walk north. He paid little attention to them. They were talking earnestly to each other as they came abreast of the *coiffeur* shop's entrance. Suddenly, they swerved and were jamming in beside him before he could realize what had happened.

A gun had appeared in the shorter man's hands. He jammed it into Sandy's middle and said: "Keep quiet!"

Sandy was caught completely by sur-

prise. He half fell back against the locked door. The two strangers crowded in closely, masking him from the infrequent early-morning pedestrians.

The shorter man growled: "You got it?"

Sandy gasped. "W-w-what—"

"The skull."

"The skull! Why—why—yes—"

"Frisk him!"

The tall man's hands raced over the boy's flying clothes, felt the bulging side pocket and jerked out the small white skull. His voice was a stunned, hushed whisper: "We got it! The radium!"

His companion gaped at the skull. Suddenly his gaze whipped up and he stiffened. "Look—them skulls in the window." He pointed at Henri's display. "They're the same as—!" A lurid curse broke from his lips. He lashed out and knocked the object containing Sandy's Scalp Awakener from the tall man's grip.

The skull fell to the concrete with a crash. A wave of strong-smelling liquid gushed out as the container broke into a million pieces.

The tall man was bewildered, gaping from the wreckage at his feet to the window display.

"Hair tonic!" said the short man. "We've been chasing hair tonic." And without a trace of warning he hauled off and pasted Sandy with a savage uppercut.

The boy was blasted back. His head smashed against the door and a million stars leaped before his eyes. He dropped groggily to the pavement, hazily heard a harsh voice saying: "Barnes never had the radium. It was that damn skull that fooled us. We gotta get to the boss fast."

Sandy fought to get to his feet. The two men had sprinted across the sidewalk, darted into the awaiting cab. The taxi lunged forward up the avenue.

The boy staggered away from the doorway and across the sidewalk. The block was virtually deserted and apparently no one had witnessed the assault. Another taxi was leisurely cruising a half block away. Sandy signaled to it, waited impatiently until it screamed to a stop in front of him. He threw himself inside, yelling at the driver: "Follow that blue cab ahead!"

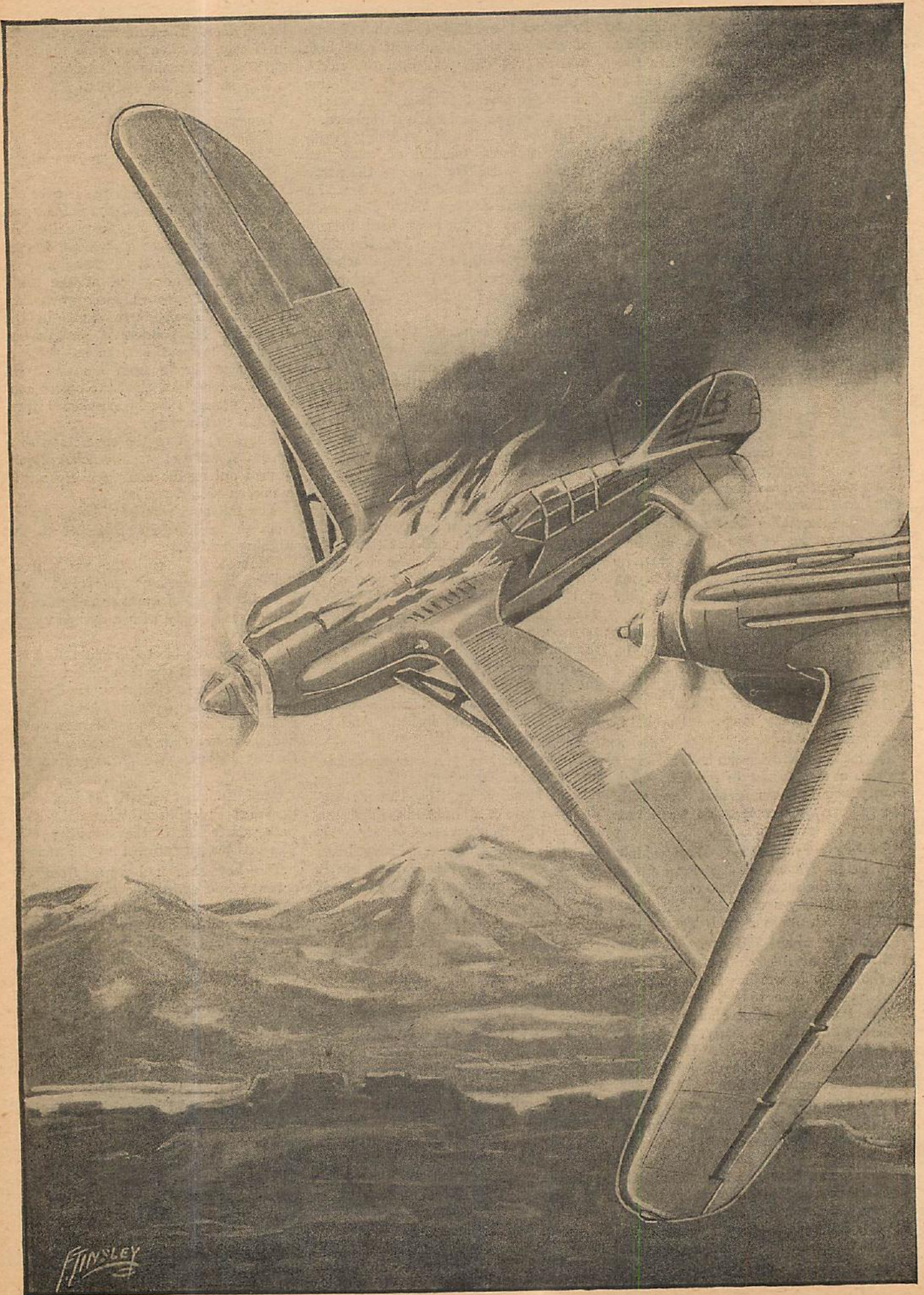
The driver hesitated: "What's it worth?"

"Ten bucks! Get going!"

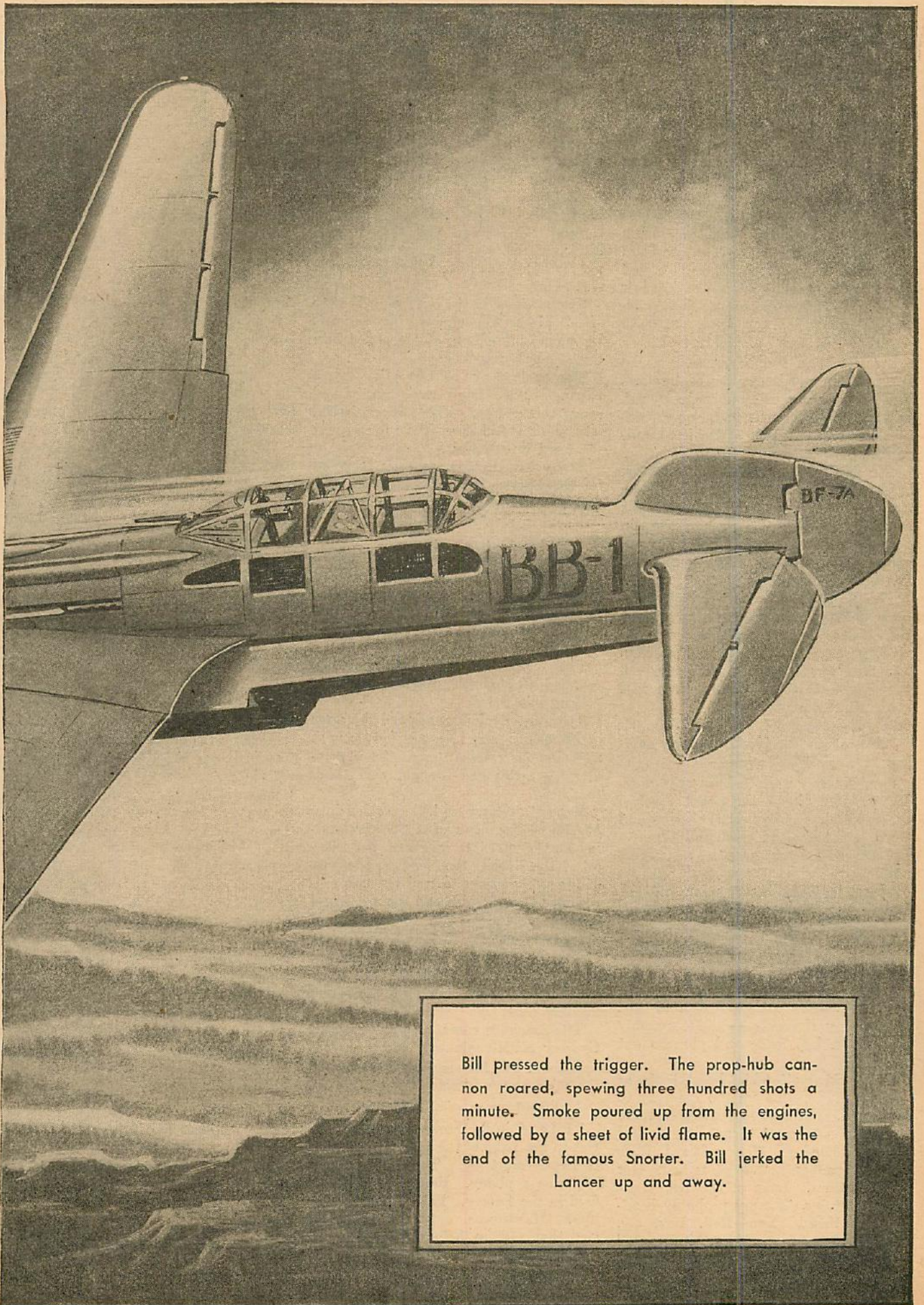
The man roared his cab into motion, raced to the next block. The blue car was now far up the avenue. It spun into a side street and vanished. By the time the boy's taxi whirled into the same street there was no sign of the blue one. Nor did they ever see it again.

Sandy was frantic. Those men had been the enemy. They had thought he had the radium in the skull. And now









Bill pressed the trigger. The prop-hub cannon roared, spewing three hundred shots a minute. Smoke poured up from the engines, followed by a sheet of livid flame. It was the end of the famous Snorter. Bill jerked the Lancer up and away.



they had discovered their mistake. He bellowed at the driver: "The Thirty-first seaplane base in a hurry!"

### XVIII—DIRECTIONS

WITHIN TEN MINUTES, Sandy was roaring his Eaglet over Long Island City after a feverish take-off from the East River. The boy crouched down in the cockpit, his hand jamming the throttle wide open. Anguished eyes stared from his pale face. He had to get back to the field—had to tell Bill what had happened. The radium! The enemy had thought the radium had been in the skull containing the hair tonic. They had discovered their mistake. Would they now guess the truth—that the Brethren of Death had it?

Every minute seemed an hour as he raced nearer and nearer his destination. The lack of radio communication which he had earlier thought to be an advantage had now become a decided disadvantage.

The field finally swirled into view far ahead. Sandy closed the throttle, threw the stick forward and dived. He wrenched the sleek little plane down in a breakneck landing, gunned it for the apron. He saw four Snorters and the Lancer lined up, engines roaring.

The Eaglet sputtered up on the concrete, braked to a stop. Sandy threw himself over the side. He heard a shout, saw Red Gleason bearing down on him. The man was shouting, "Where in hell you been? Shorty's been here a half hour. Bill's sore as—"

"I gotta see Bill!"

"He's at the hospital. Ralph's talking. We're set to leave—"

Sandy didn't wait to hear any more. He sprinted down the road, reached the hospital, plunged up the steps and through the door to crash full tilt into Bill as the famous pilot was hurrying out.

"Sandy! What in the name of—" Bill grabbed the stumbling boy.

Sandy didn't wait. His words poured in a frantic outburst as he related what had happened.

Bill's body tensed. "The radium's in a small skull. Ralph just told me. The enemy thought—" He roughly shoved the boy aside and plunged out the door.

Sandy went after him breathlessly as the tall pilot pelted up the roadway to the apron. Red and Bev had seen them coming, ran to meet them with Cy and Shorty following. Sandy heard Bill's shouted commands: "Ralph talked! Got the directions! Lake of the Ice. Purple Mountains. Enemy probably heading out there! You—Red, Bev, Cy, Shorty—to your machines. Take off!"

The pilots scattered. Bill reached the Lancer, swung up into the front cockpit. Sandy stood beside the sleek fuse-

lage. "Bill! What about me. Do I go?"

Bill twisted around, his eyes angry. "You've done enough damage. The enemy would still think the radium here if you hadn't tipped them off. No time to get the Eaglet ready, anyway. You're grounded!"

Sandy's arms dropped limply to his sides. He stared incredulously, stunned. They were going without him. Of all the pilots, he alone was being left behind. His eyes suddenly stung. Then, through the strange mist that blurred his vision he saw Bill look down and say, hurriedly, gruffly: "Get in the rear seat here!"

Sandy gasped. "You mean I'm to—" He never completed the sentence. He pulled himself up and dropped into the Lancer's rear cockpit.

The engines of the five planes were roaring. Bill's hand came up, waved away the chocks. The Lancer jerked into motion, fled down the runway and screamed into the air.

Sandy looked back as they rocketed for the heavens and saw that the four Snorters were already streaking across the field in a mass take-off.

AS the mighty Barnes fleet put thunder into the Long Island skies, Nicholas Laznick sat crouched at his desk in his secret office at The Deck and thundered into the microphone: "Get me Captain Slade—fast!"

The voice of his radio operator sounded through the room's amplifier: "Right away, sir."

The master criminal gripped the arms of his chair. His face was purple with rage and his eyes glittered. The early-morning hours had brought everything to a head.

Report after report had crackled into his office—the news of a Snorter landing at the up-State lake and the take-off of the Eaglet; the effort on the part of his flying agents to trail the two fog-wrapped Barnes ships and the accidental sighting of the Eaglet; the trailing of Sanders into New York and the finding of the bogus skull. And now on top of everything had come the report of the Barnes force leaving the field and heading west.

The amplifier came to life: "Captain Gregory Slade contacted."

Laznick put his snarling lips close to the microphone. "Slade?"

A distant voice said: "Right."

"Take off in the Stormer immediately. Get to the Lake of the Ice. The radium is there—must be. The skull Barnes had was a phony. Barnes has left his field in the Lancer. Four Snorters with him. Hawthorne must have talked. Get that radium before Barnes!"

"Very good."

The announcer's voice cut in. "Captain Slade off the air."

Laznick was on his feet, clutching the microphone. A crisis was at hand. No chances could be taken. The only one of his men that Barnes could identify was Howard Hawthorne, the dissolute son of the dead doctor.

He rapped into the microphone: "Agents H and N proceed to Room 41. Kill Howard Hawthorne. Dispose of body! General orders. Contact Air Fields 3, 4 and 7. All machines take off. Stop Barnes and fleet, heading to Lake of the Ice. Blast them down!"

### XIX—EN ROUTE

BILL took the Lancer in a hurtling climb to twenty-five thousand feet and leveled off. The superchargers had been switched on and the cabin sealed. Sandy had started the inflow of oxygen. The silver monoplane pelted ahead on its western course, the Diesels pulsing back smooth thunder, the two propellers slashing into the rarefied air.

The bronze-faced pilot leaned forward, working intently. Maps and charts were spread open, closely inspected, while he guided the streaking plane almost by instinct. No mistakes could be made, no time lost.

The Snorters had long since dropped out of sight. Under the pelting silver amphibian rolled a continuous layer of fluffy clouds. The sun beat down, shimmering along the widespread wing and the upper surfaces of the fuselage, striking into the cabin on the two tense figures.

The needle of the air-speed indicator fluttered past two hundred and fifty miles an hour and climbed higher. Bill feverishly plotted his course in minute detail, checked and rechecked it and then, satisfied, steadily moved the throttle wider. The furious speed increased. Three hundred miles an hour—three fifty—four hundred—four fifty—

Everything now depended upon getting to the abode of the Brethren of Death in the least possible time. Bill leaned forward, his eyes sweeping the instrument board, scanning the skies. Ralph Hawthorne had come out of the influence sooner than Bill had expected. Dr. Fletcher's phone call had sent Bill rushing to the hospital to hear the cripple muttering incoherent words.

Finally he had seemed to understand Bill's fervent questions, had stared at him in bewilderment and said: "You're Bill Barnes. I told you about it before. I remember now. I told you where to go for dad."

Bill hadn't tried to explain about the enemy's masquerading trick, had said desperately: "Tell me the directions again."

Ralph had lain back on the pillow and said weakly: "Father's in the power of the Brethren of Death. Dying. Radium is concealed in small human skull



—cult's sacred altar piece. Go to the Lake of the Ice, high up in the Purple Mountains—"

Bill hadn't waited after that. No more information had been necessary. And then had come Sandy's stunning news. The skull! The clue to the whole confusing mystery. The enemy had thought the hair- tonic skull had been the one. But, now they knew differently and pure deduction would surely send them heading out to the Lake of the Ice. They had to be beaten. The Lancer had to get there first.

Bill held the control column in a steely hand. The speed was moving up and up. The needle quivered at five hundred miles an hour.

Radio reports came jabbing to his ears from the Snorters, flying at top speed far behind. Shorty's hoarse voice told of an attempt by a squadron of black biplanes to intercept their hurtling flight. But the Snorters had outdistanced them with ease.

Bill's eyes were slitted. The enemy's desperate attempt to stop the Snorters proved conclusively that they now knew where the radium was to be found. All the mystery had been stripped away. The whole tangled nightmare of the last two days had resolved itself into a race—a race to the Lake of the Ice—a race for the glittering two-million-dollar stake.

On and on—Bill found himself straining forward, clammy perspiration on his face. It had lacked a few minutes of nine o'clock in the morning when they had taken off. A full hour had already passed and the minutes of the second hour were swirling away.

There was no sign of the earth below. He calculated his position. The whole continent was sweeping away unseen under them. New York State had already flung to the rear. The tip of Ontario had been passed. The Lancer was now pelting high above Michigan. And the speed had increased to five hundred and twenty-five miles an hour.

Again Bill contacted the Snorters. Their formation was still intact, despite another attack by more enemy planes. The skirmish had been short, with the Snorters screaming on their way undamaged.

The clock on the instrument board read ten thirty, Eastern Standard Time. The cloud blanket below had dissolved and Bill had seen the remote earth. Lake Michigan had been passed. Wisconsin was blurring by, far below. And still the furious speed continued.

Bill talked briefly to Sandy in the rear cockpit and caught fleeting glimpses of the boy in the rear-view mirror. There was no time, no need for conversation. Everything was now crystal-clear. The radium had to be taken. And after that—Bill's face was grim. After that, he had an account to settle. The enemy, whoever they were, had stolen his Stormer. The ship had to be retrieved. It was too valuable to fall into criminal hands.

Eleven o'clock—eleven thirty—Minnesota—into South Dakota.

Twelve o'clock—the Lancer was annihilating time and space. The States swept past in hurried confusion. They were over Montana—racing nearer and nearer to the Purple Mountains—and the Lake of the Ice.

One o'clock—one thirty—across northern Idaho—

Bill, his face a mask of tense concentration, peered at his charts and gradually pulled back the throttle. They were almost there. The country below was rugged, mountainous.

The Lancer's speed dropped and the pointed nose sank slightly downward. Bill's fingers bit into the control column. Had they won the terrific race? Had the enemy beaten them? His eyes were burning. The strain of guiding the hurtling monster had sapped his strength. He felt suddenly exhausted and his head throbbed.

The needle of the altimeter was sinking round the dial as the Lancer eased downward. At two o'clock, the State of Washington lay beneath them with its picturesque, mountainous country. The speed had dwindled to four hundred miles an hour—to three—

At eighteen thousand feet, Bill leaned over the side, looked down. A mountain range snaked across the country below—the Purple Mountains!

The Lancer probed lower, came around in a careful bank. Bill heard

Sandy's sharp voice come suddenly over the ear phones. "Are we there?"

Bill pulled the microphone to him. "Over the territory. Keep your eyes peeled for a small lake high up in the mountains."

The amphibian circled down and down. Then, at fourteen thousand feet, as Bill swung his eyes from the map to the mountains below, a shout burst from his lips. There it was to the west, nestling in between two mountain peaks—the Lake of the Ice.

The Lake of the Ice—the abode of the Brethren of Death—the place of the radium!

## XX—LANDING

THE Lake of the Ice was a small, oval-shaped body of water, a mile across and a mile and a half long. Surrounding and towering above it on all sides was mountainous, rocky formation. The lake resembled the water-filled crater of an extinct volcano.

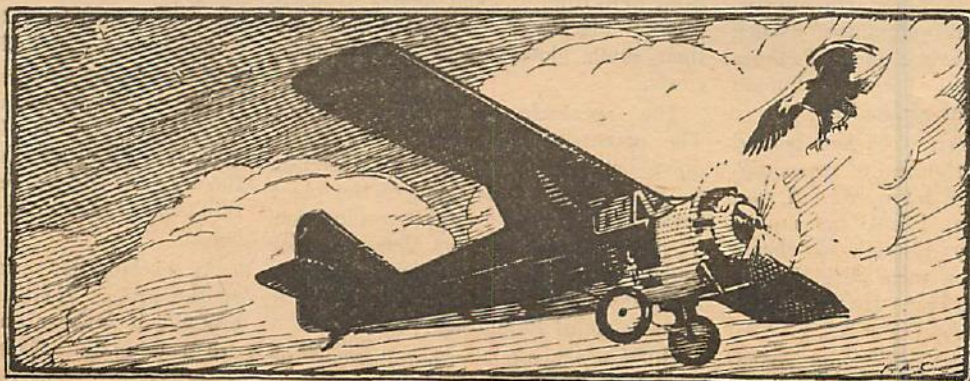
Bill inspected it closely as he swung his Lancer overhead. His eyes were bright with excitement. The water of the lake was a deep, crystal-clear blue and—no aircraft floated on the calm surface. Had he won the race? Or had the enemy come and gone?

The throttle was closed. The single middle float with its lower wing sank from its retracted position and locked into place—and the Lancer became a biplane. The speed was cut down. Bill banked carefully and went in for a slow landing.

The maneuver was fraught with danger. With consummate skill the tense airman guided his swishing machine inside the barrier of encircling, jagged rocks, straightened out—and the pontoons swooshed into the water. The Lancer was down and racing across the unrippled surface of the lake.

Bill's eyes searched the shores and saw nothing but jagged rocks. There was no sign of any living person or human habitation. The Lancer was drifting toward the western shore of the lake. Bill stood up in the cockpit, shaded his eyes and narrowly scanned the surrounding district.

Sandy was leaning over the cockpit.





"Golly, there's no one here, Bill. You sure this is the right place?"

"The right place, all right." Bill frowned. "I'm going ashore and look around."

He lowered himself down into his seat and guided the Lancer to within a safe distance of the rocky shore. He twisted back and said to the boy: "You stay here, kid. Keep the ship away from these rocks. I'll look around."

Bill climbed over the side and slipped into the water. It came to his armpits and was icy-cold. He rapidly waded to the shore, stamped his shoes free of water and stood, undecided. A horrible suspicion began to creep through his brain. Had Ralph given him the right directions? Or had the drug twisted the cripple's memory?

The only thing to do was carefully inspect the shore on all sides. He turned toward the south end of the lake and began a tortuous struggle among the jumble of rocks. He shot a look back at the Lancer and saw that Sandy had ruddered it away from the shore.

Bill went on, slipping and stumbling over the knifelike rocks. As he neared the south end he scrambled down behind a large boulder that screened the Lancer from his view. Suddenly he stopped short, eyes narrowed. He saw a half circle of blackness in the rocky cliff at the south end of the lake. A cavern. He was sure of it. It hadn't been discernible from farther back.

Excitement welled through him. Was that the entrance to the abode of the Brethren of Death? The best plan was to return to the Lancer and taxi the ship down for a close inspection. He turned around—and went rigid. A horde of black-garbed figures had appeared from between the rocks as if by magic—were rushing at him!

He hadn't a chance. Five of the figures crashed into him, blasted him back. He fell, landed heavily on his back. His head banged against a rock with stunning force. His senses whirled. He tried to get to his feet, to fight. But his efforts were weak and futile.

Dimly he saw the frightful picture. There were twenty or more creatures hovering over him. They were dressed identically as those three men who had stolen the radium from Dr. Hawthorne. They wore cowls and voluminous cloaks, and from under every one of those headpieces grinned a luminous human skull. The Brethren of Death!

His arms had been wrenched behind his back. He felt the bite of ropes digging into the flesh of his wrists. A wad of cloth was rammed into his mouth and jerked tightly around his head. Two of the skeleton men were holding revolvers trained on him. He was pulled roughly to his feet.

A hollow voice said: "Come peacefully, else we kill."

Bill looked at the speaker, saw the glowing jawbone moving as the man talked. The flier shuddered.

"Bring him carefully," came the hollow voice again.

The others surrounded Bill, forced him to walk ahead. He felt the pressure of guns thrust against his side. He was being led along a path between the rocks. No one spoke. Bill tried desperately to look back in the direction of the Lancer. If he could only let Sandy know what had happened. But when he did manage to half turn, he saw that the path snaked behind a solid screen of boulders.

What lay ahead? He cursed himself for his stupidity in so easily falling prey to the Brethren of Death. Yet he had had no chance. They had attacked with cunning surprise. Their very numbers had overwhelmed him.

The garbed figures marched silently, their cowls concealing the horrible death heads underneath. The trail led straight into the black opening of the cavern. The lake extended inside, forming the floor. The path became a narrow ledge hewn from the rocky wall. Bill went inside, into the deep shadows. He looked down and gasped. Well back from the entrance, riding easily on extended pontoons was—the scarlet Stormer.

## XXI—THE CHAMBER OF DEATH

THE STORMER—here!

Bill stared incredulously. His stolen ship! Then the enemy had beaten him after all. But where was the man who had piloted the Stormer?

The weird procession turned sharply to the left, went through a cleft in the rock. It was inky-black and a distinct glow emanated from each of his strange captors.

The narrow passageway widened out. They made another turn and then came abruptly into a large cave. Bill heard a strange, dismal chanting. Gradually his eyes became accustomed to the faint lighting. And he saw a never-to-be-forgotten sight.

The floor of the cave was rough rock. A smoky lantern was hanging down from above. Lining the walls on two sides were rows of silent figures in black robes. They were facing inward and their skulls glowed from beneath their cowls.

The spectacle was blood-curdling. The procession passed into the room, down between the two rows of leering, shining skulls. At the end of the place toward which they were proceeding was a black-draped altar. Two candles burned on it. And between the candles reposed a small human skull. From it came a weird luminosity.

Bill knew instantly what it was—the sacred skull with the radium!

Standing on a raised platform in front of the altar were two of the Brethren of Death. And at their feet lay a wooden cross. Lashed to that cross was the figure of a man in pilot's garb.

Bill started. The man must be the enemy pilot—the one who had flown the Stormer. He was a prisoner!

Bill was halted in front of the group at the altar. The gag was removed from his mouth and his guards filed away to right and left, taking their places in the side lines. The famous pilot stared down at the man on the cross. The fellow's arms and legs were stretched rigidly out. His face was contorted with pain. His eyes met Bill's pleadingly.

The absolute quiet of the tomb had pervaded the whole cavern, except for the shuffling of feet. And even that had stopped when the man on the cross spoke. His voice seemed to boom across the room. "Barnes. Save me! Save me! They're going to crucify me."

The two brethren at the altar made no move. One was holding a long braided whip in a skeleton hand. He turned his horrible luminous skull toward Bill and said: "Ye may talk but a little."

Bill took an impulsive step toward the bound man. "Who are you?"

"Gregory Slade. I helped steal your Stormer. I came here on orders to get the radium. They're going to kill me. For Heaven's sake do something."

Bill's fingers were already clawing at the knotted rope around his wrists. The blackness of the room masked his efforts.

"Who sent you? Whom are you working for?" Bill demanded.

The man with the whip raised and cracked it with the sharp report of a fired gun. "Ye talk no more. Ye are both sentenced to death. Ye have both come into our midst. Ye have seen things that no ordinary humans must see. Ye must therefore expire on the cross. We worship death. It is a beautiful thing, so be not afraid. It is a part of life; the culmination of life. To evade death ye cannot be said to have fully lived."

Bill was working furiously at the knots and felt them loosening. It all seemed a grotesque nightmare. These living men with their glowing bones—the human sacrifices they were planning to make—And there on the altar was the skull with its precious contents.

Slade's eyes were staring at Bill, never leaving his face. His lips moved. "Forgive me for working against you, Barnes," he said brokenly. "I'll do anything you say—only get me out of here."

An exclamation came from the man at the altar. He raised his whip and brought it lashing down across Slade's prostrate body. Slade screamed.

Bill winced and dug his fingers into



the ropes with greater vigor. The cultists hadn't disarmed him. His automatic was still in his side pocket. If he didn't get free almost instantly, it would be too late.

He thought then of Sandy. He had brought the boy with him, had left him to guard the Lancer. What would happen to him if he, Bill, should die? Would the boy suffer the same awful fate? He knew that he had to stall for time.

He looked at the man who had slashed out with the whip and said: "I talked to Dr. Hawthorne, your high priest, before he died. He sent me out here to procure a certain substance that is in the skull on the altar. That is all I want. Give me it and keep your sacred skull. Then let this man and me go free. We will never return. We will never reveal what we have seen here."

If he could make an escape, Bill knew that he would have to see that Slade went also. No matter what he had done, or what he was, he couldn't be left to suffer the tortures at the hands of the fanatical Brethren of Death.

The man at the altar spoke: "Ye must both die. It has been ordered—a lingering death on the cross. And as death comes slowly to ye, our prayers and our chants will hearten ye."

The ropes on his wrists had loosened and Bill realized that with one quick jerk he could get his hands free. A sudden plan came to his mind. He forced calm into his voice. "If I must die, allow me to die before this fellow, so that my example may strengthen him to bear the suffering."

There was a hushed silence. The two cowed men before the altar conferred in low tones. Then the man Bill had addressed straightened up: "The proposal ye make is a good one. The brave go to death willingly. Ye will be made a Brother of Death as ye suffer on the cross. Unbind this man and hold him." He pointed a bony hand at Slade.

Black-garbed men came to do his bidding. Bill watched. He had to judge his time. His eyes went to the creatures bending over Slade and he saw the butt of a revolver peeping from the garments of one of them.

Slade's arms and legs were released. He was on his feet. Then Bill acted!

With a mighty wrench he tore loose the rope that had bound his wrists. As it dropped to the ground he plunged at the men around Slade. His sudden action caught them by surprise. He seized the man on whose person he had seen the revolver. His hand slashed out, grabbed the butt of the gun and wrenched it free. He bellowed at Slade.

"Take this gun!"

He jerked his own automatic from his pocket and fired twice into the air. Slade had wrenched himself away from

the men who had held him. He reached Bill's side, took the extended revolver.

"Make for the door!" Bill shouted.

The cave was in an uproar. The members of the Brethren of Death were closing in. Bill started for the altar, intent on getting the precious skull. Three cultists threw themselves at him. The famous pilot shot once, twice, aiming at their legs. The attackers fell away, shrieking. Bill whirled, saw that Slade was already at the altar, had snatched the skull and was plunging through the throng for the exit.

Bill caught up with him, raced beside him. The very fury of their actions had stunned the mass of cultists. Before the brethren realized what had happened the two airmen had raced almost the full length of the room. But now they were coming on, shouting.

Slade turned around, poured his gun into the mass of skeleton men. The place echoed and reechoed with cries of anguish.

The two men were at the entrance. Bill yelled at Slade. "We're away. Give me the skull. Hurry!"

Slade swung around. His lips came back in a snarl. "I'll give you this, you poor fool!"

His gun swung up—blazed!

## XXII—PURSUIT

BILL felt something white-hot sear across his left side. He stumbled, fell.

Slade, the man whose life he had saved, had turned on him—had shot him down!

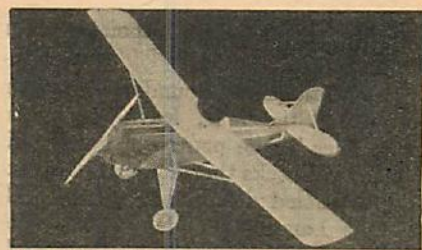
Bitter rage coursed through Bill. The wild emotion sent him back on his feet, forced him through the entrance. Slade had disappeared. The noise of his pounding feet sounded as he raced madly down the winding passageway to the cavern. The Stormer lay on the placid water there. Slade was making a get-away—with the radium.

The Brethren of Death were charging in on Bill. His side was numb from pain and he ran crouched over. The skeleton men were right on his heels, shrieking. Bill stopped, whipped around and poured the rest of the clip into their ranks in a furious burst of fire. The ones in the front rank fell, the others stumbling over them. The pursuit was temporarily checked.

Bill ran madly on. From ahead came the sudden booming thunder of engines. The Stormer's! Slade had reached the ship. The sound spurred Bill into a furious sprint. As he pelted through the cleft in the rocks he saw the Stormer racing out through the cavern entrance to the lake beyond.

The treacherous Slade was getting away!

Bill didn't slacken his speed. He went down the narrow ledge in the wall of the cavern, out into the open. He



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clumsily reloaded his automatic as he went.

The Stormer was pounding across the surface of the lake, leaving churning white lines in the pontoons' wake. Bill climbed the rocks that bordered the path and scrambled down to the shore. He saw the Lancer then, far up the lake. Its propellers were whirling. If he could only make Sandy see him—get the kid to bring the Lancer racing down to pick him up.

He leveled his gun at the sky and pulled the trigger three times. The crashing reports were lost in the roaring of the gunned Stormer's engines. Slade was guiding the Stormer across the lake to the left of the Lancer. And then its pontoons came away from the water and the stolen machine roared into the sky.

Bill's eyes were riveted on the Lancer. He saw the big ship swing around, its nose pointed in his direction. Bill gestured wildly, praying that Sandy had his glasses out, trained in his direction.

And then, as if in answer to his prayers, Bill heard the sudden distant booming of the Lancer's Diesels. The ship was heading across the lake in his direction. Sandy had seen him, was coming!

The Stormer was zooming madly into the heavens. Bill caught one fleeting glimpse of it and then whirled around as a swarm of skeleton men came charging out of the cavern. They saw him and came on shouting. Three of them started shooting.

Bullets whistled past Bill, ricocheting crazily off the rocks. The flier threw himself flat behind a boulder, raised his automatic and tugged the trigger rapidly. The weapon stuttered out a blasting roar of flame. Three of the brethren staggered and fell. Bill emptied his gun and slipped his last clip of bullets into the slide.

The numbness in his side had extended down to his left leg. His teeth sank into his lower lip. He fired carefully, picking out the men in the lead. The roaring of the approaching Lancer was swelling in volume. He risked a quick look over his shoulder and saw that the amphibian was within two hundred yards of the southern shore.

Bill leveled his automatic again and blasted out the whole clipful at the running cultists. He didn't wait to see if he had stopped them. He turned and, ducking low, plunged into the water. Its coldness revived him. As his head came up, he saw the Lancer now almost on him. The flier swam furiously. Bullets were plunking into the water all around him.

Somehow he reached the big amphibian, climbed up on the single float. Sandy was in the front cockpit, working the plane's stationary machine guns. The withering barrage of bullets pan-

icked the horde of black-garbed men. They broke and ran for cover.

Bill swung himself up, gestured for Sandy to get back. The boy climbed into the rear cockpit as the famous flier dropped into the front.

Bill's breath was coming in sobbing gasps. His feet rammed against the rudder bar, his fingers fastened on the control column. With reckless expertness, he slung the Lancer around to head north and threw the throttle wide open.

The Diesels bellowed. The ship moved forward—raced. Bill crouched tensely in the cockpit, his eyes stabbing upward to the skies ahead. The Stormer with the criminal Slade at the controls had to be found and overtaken. But minutes had elapsed since the other plane had taken off.

The Lancer hurtled across the placid water. The stick came back and the ship rocketed into the air steeply to avoid the rocky mountain peaks ahead. Bill held it to a steep zoom. His eyes searched the skies in agony. If the Stormer had gone out of sight—Then he saw it—a mere speck of shimmering scarlet high in the eastern sky. A shout broke from his lips. The Stormer!

### XXIII—THE DEATH RACE

BILL aimed his machine at the fleeing plane. Slade had to be caught and forced down. He had the radium. Bill's face was contorted as a renewed wave of anger swept him. He had saved Slade's life—only to be rewarded with murderous treachery. He had been a fool to have trusted the man—yet Slade had pleaded for his life, had promised coöperation.

The air-speed indicator was swinging up and up as the Lancer's terrific momentum increased. Everything now had resolved into a race between Bill's old ship and his new. It was a super test for the Lancer.

Bill clicked on the radio, sent out a call to the Snorters. Almost instantly he contacted them, clipped out a terse order: "All planes return to base. Situation in hand!" That was all.

Like a crazed rocket the Lancer hurtled on. The landing gear with its lower wing had long since toiled up into a retracted position and the mighty ship was a silver blur across the heavens, its pointed nose aimed directly on the scarlet thing ahead.

The Stormer was growing larger as the intervening distance dwindled. Bill sat rigidly in the seat of his charging projectile and waited. The speed had increased to five hundred miles an hour and was going higher. Five twenty—five twenty-five—

The mountainous country was left behind as the mad East-bound race continued. Bill's eyes gleamed down the

gun sights framing the distant image of the Stormer. He wasn't conscious of time or space. All he knew was that the Lancer was steadily gaining—that the Stormer was growing larger and larger, had sprouted a tiny gull wing and a fuselage.

The Lancer's throttle was rammed to the last notch. The speed indicator moved to five hundred and thirty miles an hour.

Nearer and nearer the two ships came. The Lancer was gaining. It was only a matter of time now.

The Stormer suddenly headed downward recklessly. Bill duplicated the move, cut across and followed. He was almost up on the enemy now—almost within range. He could see every detail of his faithful old ship and his fingers slid down the control column to the firing trips.

The Stormer was diving headlong. Then at five thousand feet again leveled off and, without warning, swept around in a vertical bank to come charging at the Lancer. Slade handled the plane with the deftness of an expert. He must have realized that his only chance lay, not in flight, but in a wild assault.

And he was almost successful. The move was unexpected. Bill's terrific speed removed all possibility of instant maneuvering. The Stormer's nose was aimed for the Lancer's cabin. Lines of bullets drilled from the enemy's stationary guns. The hail of lead swept smashing down the length of the Lancer's fuselage as the plane arrowed past.

Bill ducked, pulled the throttle back, fighting to check the Lancer's speed. He tugged his machine around in a flat turn, saw that the Stormer was again diving headlong for the earth. Bill followed, his eyes flaming slits. No mercy could be shown.

He bellowed through the microphone at Sandy. "You O. K., kid?"

The answer was slow. "O. K."

The Lancer streaked after the plunging Stormer, again was in range. Bill's fingers locked around the trigger that controlled the firing of the 37-m.m. cannon that had been built into the Lancer. His eyes were on the Stormer. The sights were lined up. He had Slade completely at his mercy.

With the knowledge that he might have to fight the Stormer, he had loaded the cannon magazine with special ammunition before he left Long Island. Alternating with explosive shells were incendiary shells containing phosphorus—the sole chance of setting the Stormer's sluggish crude-oil fuel afire.

He waited, torn by sudden emotion. Fate was forcing him to open fire on his own plane—the scarlet Stormer. He had to shoot it down, destroy it. The Stormer—the plane that he had practically built with his own hands; the plane that had gained him world fame



and acclaim in winning the round-the-world race; the plane that had alone saved his life time and time again. It was there now, framed in his sights, with an enemy at its controls, with the precious radium aboard. The Stormer was doomed.

Even as he waited, agony on his face, the earth had raced up and the Stormer came suddenly out of its dive to hurtle into straight flight two hundred feet above the level country below. Bill moved the controls of his ship like an automaton as he followed. The Stormer was dead across his sights—and he pressed the trigger.

The 37-m.m. cannon roared. Shells spewed down the hollow engine shaft, streaked out through the nose, blurred across the air and crashed into the Stormer's forward section, ripping and tearing—three hundred shots a minute.

The Stormer staggered, yawed wildly. Smoke was pouring up from its engines, welling back in a sooty cloud. A sheet of crimson flames followed.

Bill jerked the Lancer up and away. He looked down, saw a human form leap over the side of the Stormer's cockpit and fall free. And in the next second the structure of the Stormer disappeared in a livid sheet of fire.

Watching, Bill saw Slade's falling figure, saw the parachute whip open. The great silk umbrella had barely unfolded when a section of flaming debris from the blazing Stormer fell on it. Instantly the white circle was aflame and streaked for the ground, taking its helpless victim with it.

Slade fell like a millstone. Bill, aghast, saw the man's body smash into the ground!

The Lancer went quickly down for a landing on a level stretch near by. Bill left Sandy in the plane and ran over to where Slade lay. He lay horribly dead and around his body was an aura of light. The radium!

Bill searched the dead man's clothes and quickly found the skull. Somehow it had escaped damage. He held it in his hand and stood up.

The radium! At last he had it. Victory had been won.

He went slowly back to the Lancer, talked briefly to Sandy and then took off. He headed the thundering plane on a course for the home field.

The radium had been recovered. But the identity of the enemy who had so viciously fought him still remained obscure. And it was to remain so for many months. Then, and only then, would he come to grips once again with the supercriminal of modern times—Nicholas Laznick.

## XXIV—HOME

IT WAS seven o'clock that evening when the Lancer's wheels spun across

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| 1/4x2, 1 for 4c...3 for 9c     |  | 1/4x1/4 .....30 for 5c   |  |
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| 3/4x1/4x8, 1 for 2c...3 for 5c |  | 1x2, 1 for .....16c      |  |
| 1/2x1/2x8, 1 for 2c...2 for 5c |  | 2x3, 1 for .....20c      |  |
| 1x1/2x12, 1 for 2c...2 for 11c |  | 2x6, 1 for .....35c      |  |
| 1x1/2x15, 1 for 2c...1 for 7c  |  |                          |  |

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| 1/16x16x15, 5 for 5c |  | 12x16 .....15c  |  | Wood Veneer         |  |
| Shredded .40, 5c     |  | Clear Dope      |  | 20x30", 1 for 9c    |  |
| Japanese Tissue      |  | 1/2 pt .....25c |  | 2 for .....17c      |  |
| All colors           |  | Colored Dope    |  | Reed                |  |
| Thinner Best         |  | 1 oz .....5c    |  | 1/32, 1/16, 1/8     |  |
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the turf of the Long Island landing field after a fast flight back across the continent. Bill taxied the plane up on the apron where a squad of mechanics awaited. The Snorters were still in the air heading homeward.

Bill climbed wearily down from the cockpit, tightly gripping the skull with its precious content. He said over his shoulder: "Come on, Sandy, let's eat."

The boy didn't reply. Bill looked around and saw the youngster awkwardly crawling over the coaming. He frowned. Sandy had been strangely quiet all the way back. Had something happened to him?

The boy lowered himself to the concrete, turned, took one staggering step toward Bill and fell headlong.

"Sandy!"

Bill leaped to his side, saw that blood was oozing down his face from under his helmet. "Get the doc! The ambulance!"

A faint whisper came from the boy. "I got hit, Bill—in the fight—with the—Stormer. I didn't want to tell you. I've been—too much trouble—already and—"

His eyes closed and he lost consciousness.

Bill tugged off the boy's helmet. Sandy's head was soaked in blood.

Dr. Fletcher came racing up with stretcher bearers. The boy was placed on the litter, hurriedly carried to the ambulance and rushed to the hospital.

Bill went quickly to his secret office in the administration building, placed the skull with its radium in the safe and then rushed to the hospital.

A nurse met him in the anteroom, asked him to wait, told him that the doctor would be right out. Bill paced the floor anxiously. Sandy's muttered words came back to him: "I didn't want

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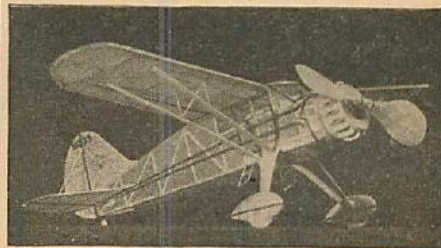


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to tell you. I've been too much trouble already——"

The famous flier swore softly. Trouble! If the kid hadn't been in the Lancer out at the Lake of the Ice and acted as he had, the radium would never have been recovered and the chances were that he, Bill, would have been killed. Trouble!

A telephone on a side table caught Bill's gaze. Impulsively he went to it, called an official of the Hudson Founda-

tion and reported the recovery of the radium. The man was incredulous, then profuse in his praises and thanks. They would send out an armored car right away. And a check for the full amount of the reward would follow.

As Bill pronged the receiver Dr. Fletcher came out the dispensary door and closed it behind him.

"Is the kid all right?" Bill asked frantically.

The doctor smiled. "He's O. K. A

scalp wound is all. He'll be right as rain to-morrow."

A blood-curdling screech came from the room the doctor had just left. Bill's heart thudded into his throat. "What's that? The kid?"

Dr. Fletcher smiled. "That's Sandy, all right. The nurse has just handed him a mirror. You see, while he was unconscious I found it necessary to shave off all the hair on his head. He's just seen himself—completely bald!"

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# The Lancer Strikes



# SMUGGLER'S WINGS

(Continued from page 26)

Thrusting through the mist came the prow of a seaworn motor-sailer. Peering from it were three more Chinese, rifles in hand, who chattered and gesticulated ominously as they drew alongside. One of the crew produced a boathook with which he fished the water-logged yellow man aboard, then extended it to Casey while the others covered the American with their guns.

For a moment he considered his chances of escape. Even without these Chinese potting at him with their rifles, it would be a long, hard swim to shore. And with the fog closed down, it was only a gamble in what direction the beach lay. Shrugging his shoulders, he grasped the pole and was hoisted over-side.

Two armed members of the crew thrust him into the small cabin.

Casey felt the sailer get under way. For a few minutes it plowed steadily through the fog, then slowed. He felt it bump to a stop. One of the guards beckoned him on deck.

He saw that they lay alongside what looked like an ordinary tramp steamer. But her lines made for speed, he could tell. Most of the rusty, battered equipment she carried was only camouflage.

Prodded to a ladder hanging from the stern, he climbed up the swaying rungs to the freighter's deck. Amidships he saw the gray biplane, its pontoons still dripping. Apparently it had been lifted to its take-off cradle by a hoist near by. Glancing keenly at the plane, Casey noted that it was designed to be hurled from the runway by a compressed air starter.

The guards pushed him on. Near the bow, a huge automatic dangling carelessly from his right hand, a beetle-browed white man dressed in a tattered captain's uniform sat upon a chest marked for delivery from Shanghai. By the attitude of the others, Casey could tell that this fellow's word was more than law upon the strange craft.

The guards spoke at some length in a dialect which Casey could not understand, the white man answering in the same singsong. Then the Chinese left and the skipper of the tramp looked searchingly at his prisoner.

"Pretty smart, aren't you?" he sneered, finally.

Casey faced him boldly. This might be the fellow who had shot down Marks and Ben Cooley, the thought ran through his mind.

"I'm Ensign Casey Doyle, U. S. Coast Guard," he said evenly. "Further than that, I have nothing to tell you."

The skipper reached down beside him and grasped a tall glass from which he took a deep draft with evident enjoy-

ment, meanwhile keeping the automatic leveled at Casey's chest. "If you hadn't been so damn anxious to capture Fong Lee," he said, "you might have had a quick finish—as your two friends did this morning."

Casey bit his lip. Inwardly he was forcing himself to remain cool, to hold himself in check. But no sign showed upon his masklike features.

"When he jumped, Fong Lee carried with him any evidence you might have gotten," the skipper taunted. "Even if your clumsy partner had captured our ship, it would have told you nothing."

He paused, and a deep chuckle rattled in his throat.

"The loss of our goods would be enough reason to kill you," he went on. "But because it is hard to find amusement for my crew, I'll turn you over to them. Have you heard of the Death of a Thousand Deaths?"

In spite of himself, Casey started. Chinese and their torture methods he knew well. And the Death of a Thousand Deaths—

The skipper whistled sharply. Feet pattered across the deck. With armed guards beside and behind him, Casey was hustled below and thrust into an empty cabin beneath the cradle which held the gray biplane.

The stout oaken door slammed and the lock clicked. He looked about the cabin. A porthole gave light and air, but was far too small to admit the passage of a man. The walls seemed solid.

Unarmed, Casey sank to a seat upon a bare wooden bunk set into the wall. Above him he heard the shuffle of feet as the crew carried out their orders. As he listened, the engines of the tramp began to throb. A steady quivering of the ship, punctuated by an even pitching, told him that she was under way.

ELBOWS on his knees, he reviewed the events which had led up to his capture, piecing together what he had heard and seen. Evidently the gray plane had been trying to land contraband of some kind, he decided. And if because of the fog it had missed its rendezvous, that would account for its quick return, and for Fong Lee jumping into the sea. The Chinese must have figured that he and whatever he carried would be promptly picked up by the motor-sailer.

Casey nodded. The picture fitted together. But who was the case-hardened white skipper of the tramp, and who had piloted the gray biplane?

A key rattled in the lock and the door opened to admit a Chinese. In one hand he bore a large tin pan. The other grasped a knife like the one Fong Lee had carried.

"Cap'n Hanson say eat," he told the prisoner in a low, toneless voice.

Casey nodded that he understood. Another piece had been added to the puzzle in his mind. Hanson, he knew, was a notorious smuggler, wanted for a dozen different crimes. "Slug" Hanson, they called him, because of his favorite pastime of tossing enemies overboard from his ship and promising them freedom if they could swim away before he sank them with the slugs from the huge automatic he never went without. But, rumor said, no swimmer had ever evaded his aim.

Carefully facing Casey, the Chinese leaned forward to place the pan upon the floor. As he did so the American's muscles tensed, his brain working swiftly as he reflected that there was a chance—just a chance—

The pan of food rattled upon the solid wooden flooring. At the same instant Casey Doyle's body uncoiled like a steel spring. Hurling from the wall in a headlong lunge, he struck the man squarely across the shoulders.

Flattened by the impact, the fellow fought gamely as one of Casey's hands gripped his knife wrist and the other closed like a vise upon his throat. For a few seconds they thrashed frantically upon the floor, then the yellow man's face purpled and his tongue protruded.

Casey drew back his right—crashed it against the button. As the fellow went limp, he seized the knife.

Quickly he shed his uniform. He donned the coveralls and rough cap the other had worn. From his own clothes he cut bands with which he tied and gagged the inert figure.

He hunched over in an imitation of the other's shuffling walk. He opened the door and stepped outside. Locking it behind him, he made his way toward the ladder which led topside.

When he reached the deck, he saw that the crew were scattered about, busy with their duties as they made the tramp ready for the open sea. The fog still clung, but here and there it was breaking as sunlight showed through.

Casey cautiously moved toward the gray biplane.

Glancing about him, he could see that the Chinese paid little attention as he shuffled across the deck. Now, if he could only figure out how the compressed air launcher worked—find the proper lever—

Beside the plane, he rapidly scanned the cradle on which it balanced. A lever below it extended from the deck almost to the cockpit. That must be the releasing gear, he decided. As two of the Chinese came toward him he turned his back and busied himself



about the plane as if about to make some repair.

As he did so, a bull-like roar sounded from the cabin he had left. The bark of a gun cracked below decks, followed by a string of curses and the patter of running feet.

Casey forked the cockpit edge of the gray plane. Evidently his escape had been discovered. But if he was right about the mechanism which would shoot the gray bus forward in a take-off—

The head and shoulders of Slug Hanson showed above the deck at the ladder Casey had just climbed. In the skipper's hand was his automatic, and on his face a malignant look in which rage struggled with surprise. Before Casey could reach the release lever, Hanson had bounded across the deck and thrust the muzzle of his gun against the side of the gray plane.

"Stick 'em up, sailor!" he snarled, peering across the cockpit rim at the Coast Guard flier.

Casey's hands rose slowly into the air. He had lost.

Half a dozen of the crew ran toward the spot. At Hanson's orders they dragged the American roughly from the plane. It was only a matter of moments before he was tied securely, the captain meanwhile chuckling to himself.

Almost unable to move, Casey was thrown to the deck. He lay as he fell, half stunned. The skipper leaned above him, hefting the automatic, a look of black triumph on his face.

Evidently he was struck by some idea amusing to him, for his expression changed to one of sly humor and he nodded his huge head as if for some reason he felt pleased with himself.

Finally: "A good swimmer, are you?" he asked.

Except to return his contemptuous stare, Casey Doyle made no reply.

A vicious kick, and again the same question.

Casey's eyes narrowed. "Good swimmer or not," he said slowly, "it won't make any difference to you a few hours from now. As soon as the station finds out I'm missing, it'll be too—"

Hanson leaned forward and slapped him across the face with his left hand. "I might have given you a chance to swim for it," he snarled as he drew back and surveyed the pilot through eyes glinting with rage. "Now—"

His jaw shut determinedly. Then he turned to the Chinese who had been standing by, interested if silent spectators. At a curt order, they crossed the deck to the gray biplane, each man taking his position beside it with the precision of a trained ground crew.

Hanson turned to Casey.

"You're sure the Coast Guard will find you, are you?" he taunted, his face twisted in sardonic humor. When he spoke again, his voice rasped with a chuckle that was more like a snarl.

"You're right! They will find you. In fact, I'm going to take you back there myself."

Surprise showed on his face, Casey knew, before he could control his features. What could this brute mean, and why should he take him back to the Cape May station?

"I'm going to take you back there," Hanson jeered mockingly, "and dump you out of the plane from a thousand feet."

Casey called on all of his self control to avoid showing the horror that began to seep through his mind. Death in the air he faced daily without fear, as did every Coast Guard pilot. But helpless, at the mercy of this treacherous, fiendish—

Hanson rapped out sharp orders in the strange dialect. The Chinese seized Casey and dragged him across the deck. Lifting him like an inanimate sack of grain, they dumped him into the rear cockpit of the gray biplane.

The rope that pinned his arms behind him extended down only to his wrists. His hands were free to move a little. Twisting in the seat, he strove instinctively to grasp its sides or back, anything that might give him something to hold to.

Hanson strode alongside, and again cuffed him across the face.

"Hang on if you can!" he jeered. "When we turn over, I'll make it slow enough to give you plenty of time to try out your grip."

He climbed into the front cockpit and settled at the controls. Casey could see him fasten his parachute harness and tighten his belt. Reaching forward, he brought out a helmet and goggles, and donned them. Then the starter whirled, and Hanson turned and nodded to one of the Chinese who seemed to act as head of the launching crew.

The motor burst into life. The others stepped aside, while the one who had been signaled, stepped forward and pulled the lever beside the plane.

The gray ship shot forward. Casey was conscious of a swoop downward, then a roaring zoom as the wings gathered flying speed. The water seemed to drop away beneath them.

Prisoner that he was, and with only a few moments at most before the overturning of the gray plane above the Coast Guard station would make good Hanson's awful threat, Casey could not help noting the speed and power of the ship and the skill with which the skipper handled the controls. Zooming sharply upward through the fog until the plane seemed to hang upon its prop, he left the steamer far below.

Then he leveled out. Twisting in his pit, he regarded Casey with a malicious leer as the ship banked in a sharp vertical.

His legs tightly bound together, and

with his arms fastened behind him, Casey was hurled against the side of the cockpit. His head struck the cowl with a jolt, but as it did so he felt his hands rub across the edge of the metal which formed the seat.

In an instant he was pressing down on the ropes which bound his arms, rubbing with all his force against the metal. The rough cordage cut into his wrists, pulling tighter and tighter at his efforts.

Hanson reversed; dropped the other wing. The gray ship pointed an aileron toward the sea. Casey was flung across the pit; felt himself falling. Straightening his body, he sank his shoulders against the cowl of the office, his feet under the disengaged rudder pedals. For an instant it seemed that gravity had won, then the tension of his body held.

As the plane leveled he sank back upon the seat. Cold sweat was beading on his forehead.

Again he worked at his bonds, rubbing the ropes upon the metal edge.

Hanson leaned back toward him, rapping on the fuselage and gesturing to indicate that he should look below.

Casey peered downward as the ship again tilted. Beneath him, barely discernible through the fog, lay the Coast Guard station.

Hanson rapped again, gesturing with his hand to indicate that he was about to loop. As he did so his demoniacal chuckle swept back in the slipstream.

Casey sawed desperately at the ropes. Once the gray biplane turned over, it would be no use to press against the sides of the pit. In a quick loop he might be able to stick with it, but with a slow one—

The nose of the ship came up sharply. As his head went back, Casey felt his bonds give, then snap. Pulling his arms free, he turned over and hugged the seat, gripping frantically as the plane hung inverted in the sky.

With a quick snap Hanson half rolled, bringing the bus into level flying position. Turning in his cockpit, the skipper leaned back to assure himself that the prisoner had met his fate.

Casey had faced about. Still clinging to the seat, he held his arms behind him as a sudden thought flashed through his mind. If Hanson believed he was still tied—

Perplexed rage showed upon the features of the skipper. He fumbled, then brought up his automatic. Holding it by the barrel, he leaned back toward where Casey sat watching his every move. But he was too far away to use the butt of the gun in clubbing his victim. He paused to loosen his safety belt. Then, reaching into the rear cockpit, he aimed a vicious blow at the Coast Guard pilot.

Casey Doyle's arms came up.



The skipper was jerked out into the open air—and the Coast Guard pilot followed!

One of his hands snatched away the automatic, hurling it upside. His other arm Casey stretched forward, thrusting it inside the canvas straps of the parachute harness that Hanson wore.

Dragging himself to his feet, Casey gripped the canvas firmly and pulled himself out upon the fuselage between the two cockpits. Hanson, struggling back, cocked his right fist for a blow. He rose to his feet as he did so.

Keeping one arm hooked in the 'chute harness, Casey struck out savagely. Hanson fell back, his body jamming against the joystick in the front pit. The gray biplane tilted into a bank that grew steadily steeper.

Hanson crouched; made as if to right the ship.

Bracing himself upon the fuselage, Casey pulled him up. Then, as the plane stood vertical, he jerked the skipper's body out into the empty air. His own arms twisted in the 'chute harness, the Coast Guard pilot followed.

ON THE GROUND below, officers and men of the Cape May station heard the swishing roar of an unchecked power dive. Through the fog that hovered above the grounds a gray biplane came plunging earthward.

Captain Boyd, commandant of the station, barked out a terse order for a crash crew and started toward the spot where it seemed the strange plane must hit.

Chet Wilson seized his arm.

"Look!" Wilson exclaimed, pointing into the mist above them. "They've bailed out—two of them!"

Both men ran toward the falling 'chute, which hit in a flurry of sand a hundred yards up the beach. One of the figures which rose seemed familiar, in spite of the strange clothes it wore. The other was a stranger.

"Casey Doyle!" the C. O. yelled as the young ensign rose to his feet and signaled to the gobs who had come up to take the other fellow into custody.

"Where have you been?" Wilson beamed. He clapped Casey on the back. "You ape! When the launch found your 'chute but couldn't locate you, we figured we'd have to post you as missing."

"So did I," Casey smiled grimly, "but when I told this fellow you'd be sure to find out what happened to me, he offered me a ride back to the station."

"Who is he?" asked the commandant.

Casey Doyle's eyes narrowed and the smile vanished from his features as he nodded toward the prisoner.

"That," he answered, "is the fellow who murdered Cooley and Marks."





# HOT AIR HEROES

(Continued from page 29)

climbing to a fair altitude, both riding in the same plane. Then the plane would be put into a dive and the one who first lost his nerve and pulled it out of the dive would be the loser.

On a fine, sunshiny day the Great Event came off. A small crowd watched the ship carrying Pete and the other pilot climb into the sky, level off, then plunge downward.

Down—down—down it came, nearer and nearer to the earth. It hit the ground with a loud thud. Neither pilot had weakened sufficiently to stop the dive.

One man stepped out of the wrecked plane. The other stayed behind. The man who emerged was Prop-wash Pete. Foreseeing the outcome of the dive, he had made it a point to ride in the rear cockpit. Thus, when the front end of the ship, including the front cockpit, was demolished, Pete in the rear cockpit escaped injury.

This was not the only instance in which Prop-wash Pete showed that he possessed brains as well as brawn. Bringing his ship into a fairgrounds on one occasion with the intention of hopping sight-seers, he found that an air circus of seven planes, "The Daredevil Seven," was already on the scene. The Daredevil Seven promptly informed him that they and they alone were going to hop passengers at that fair and to make

certain of the fact, removed the propeller from Pete's ship.

How could Prop-wash Pete stand by calmly and see this happen? Well, of course, he might have pitched into the Seven Daredevils and perhaps vanquished them, despite the long odds, but he had a better plan.

On the opening day of the fair the Daredevil Seven received a rush telegram offering them a tempting sum to appear at another fair in the next State. Forthwith they hastened to fly away to the greater opportunity, even forgetting in their hurry to return Pete's propeller.

Procuring a new stick for his motor, Prop-wash Pete did a land-office business joy-hopping sight-seers. This was only natural, as he had no competition. When the fair ended he flew away with a bankroll fatter than ever before.

A few days after his departure seven airplanes came streaking out of the sky buzzing like angry hornets, and piloted by Seven Daredevils who were mad as hornets. It seemed that the rush telegram they had received was a fake. And nursing a deep suspicion, they thirsted for the blood of one Prop-wash Pete. But that gentleman was far, far away.

PETE'S aviation career went on apace and his fame spread far and wide. He made long-distance flights, piloted

racing planes, flew mountain ranges during blizzards, and so on, continually. In the aviation world he was noted chiefly, however, for his ability to crack up planes and live. Time after time he walked away from crashes so completely crashed that junkmen refused to bid on them. It was the unanimous opinion of the flying fraternity that he would never meet his end in an airplane.

But they were wrong.

Prop-wash Pete, that peerless birdman, veteran of the air, passed out of the picture while sitting in an airplane cockpit, albeit the airplane was resting on the ground and the motor was silent.

Pete had been carrying dynamite by air. It being deemed too dangerous to transport the substance over the road, some one decided it should go by airplane.

Six trips Prop-wash Pete had made in safety with loads of the high-powered stuff. Ready for his seventh trip, he sat in his ship, lighting a cigarette. He tossed the lighted match away.

It fell into an open gasoline tank. The high-test gas exploded. The dynamite exploded. Pete, plane, and all departed skyward.

The excavation in the ground dug by that blast is still to be seen. Carefully fenced in and guarded, it is venerated as the spot where one of America's greatest pilots took to the air for the last time.

## THE AUTOGYRO JOINS THE ARMY

(Continued from page 32)

of buildings, grove of trees, or other obstacles. It means that the gyro pilot can now take off as well as land in the proverbial pocket. This is impossible in any other type of heavier-than-air craft.

Finally, there is roadability, now being developed. This is the application of power to the landing wheels, so that the autogyro can travel along the ground.

The effect of all these features on the practical performance of the new gyros means that in a machine of the latest type, one will be able to "jump off" from a space no bigger than the average backyard, fly at high speed toward one's goal, slow down without loss of control, and after landing on a spot a little larger than the circumference of the machine's rotor, fold back the vanes, shift gears and continue on to one's destination by motor road in an aircraft about the size of the average automobile. No special clothing need be worn, as the gyro passenger can ride in an inclosed cabin.

No parachutes are needed, as the machine is constantly suspended from its own automatically operated mechanical chute. That deadly old bugaboo of flying, "engine failure," becomes merely a minor annoyance.

The new autogyro frees the private pilot of the necessity of keeping his ship at an airport. No more long trips to an outlying flying field. No more changing from auto to plane and back again. No more hangar rent. No more frequent and expensive overhauls of a motor that is vitally necessary to keep the conventional airplane from crashing. The gyro pilot can land in any handy back lot, drive home and park the ship in his own garage. Truly, the new autogyro is the answer to the average man's prayer for a safe, convenient aircraft.

The military importance of the gyro's manifold advantages is becoming increasingly apparent. Army and navy authorities both here and abroad have been keeping a weather eye on its rapid development. Many well-informed of-

ficers are becoming convinced that the autogyro will eventually supplant the kite balloon for use in artillery aiming. Tables of organization have been prepared that demonstrate great savings through the elimination of unnecessary personnel, balloon and gas-carrying vehicles, etc. The superiority of the gyro over the balloon in flexibility of use is obvious.

Medical officers have urged the replacement of horse-drawn and motor ambulances with specially marked autogyros. They contend that seriously wounded casualties can be moved back from advanced collecting stations much more rapidly and comfortably in the windmill machines and at the same time eliminate part of the road traffic that congests battle areas.

The unusual take-off and landing characteristics of the autogyro, together with its hovering ability, are particularly well adapted to the requirements of observation and scouting squadrons normally based on rough, makeshift ad-



vanced flying fields. The employment of gyros in conjunction with modern "cavalry" equipped with fast armored cars may result in much more rapid reconnaissance and outpost communications, thus permitting the return of some troops to their primary function of fighting.

The liberal use of the autogyro by headquarters of large units would enable the commander and his staff to supervise more efficiently the execution of his orders. As it is generally conceded that improper execution of orders and breakdown of communications are the two greatest contributions to defeat in war, the importance of this new aid to staff efficiency is easily understood.

In summation, it would seem that in its new form, the autogyro is far better adapted to the requirements of army cooperation work than the fixed-wing airplane. I feel that the war department is to be congratulated on its recent decision to test thoroughly the capabilities of the windmill machine.

The army has bought Pitcairn and Kellett autogyros for testing. The painting on the cover of this issue shows one of the new military machines. It is the Pitcairn model PA-34 two-seater observation ship of the direct-control type, bearing the army designation YG-2. Its Wright Whirlwind R-975-E motor develops 330 h.p. and is inclosed in a cowling of the latest N.A.C.A. type. The propeller is a Hamilton Standard. The fuel capacity of the new craft is 66 gallons, carried in a single tank beneath the observer's seat. Carrying a normal load, the YG-2 has a range of between 400 and 425 miles, with a duration of 3½ hours. The rate of fuel consumption at three-quarter throttle is 25 gallons per hour.

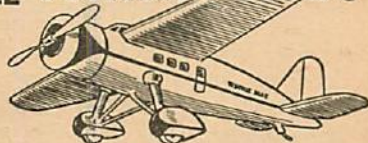
The military gyro differs from former models in its new, simplified landing gear of the cantilever type. The re-

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# Winnie Mae



## DU PONT DUCO Household CEMENT

placement of the old strut-and-wire-braced gear and the elimination of wings permits a sleek streamlining of the fuselage that materially adds to the ship's performance.

The YG-2 is claimed to have a maximum speed of 148 m.p.h., cruising at 125 at three-quarters throttle, and beginning to settle at speeds below 20 m.p.h. Her sea-level rate of climb is 1,100 feet per minute, reaching an altitude of 8,000 feet in 10 minutes. The service ceiling is 16,000 feet. She scales 2,340 pounds empty and carries a useful load of 960 pounds.

In the scene portrayed on the cover, one of the new gyros has been jumped by a flight of Boeing pursuit planes during a test combat exercise. The gyro pilot is playing a game of aerial hide-and-seek in an effort to lose his assailants among the low-lying cloud banks. His observer, meanwhile, takes pot-shots with a synchronized camera gun at the lone P26 which has managed to hang on his tail.

This and many other tests will decide, beyond all further argument, whether the theoretical advantages possessed by the military autogyro will work out in practical service. Personally, I'm not worrying much about the result. I'm predicting that the queer-looking windmill craft will whirl across the finish line well ahead of her fixed-wing opponents.

## AERONCA STEPS OUT

(Continued from page 41)

Dual control sticks and adjustable rudder pedal systems operate independently through two sets of cables to the control surfaces. The pedals also serve as wheel brakes when a hand lever in the cockpit floor is pulled back. The hand lever itself provides a parking brake.

Optional equipment on the standard job is an air-brake flap under the fuselage for steepening glide and slowing landing speed. It is indicated on the plans by the dotted lines. It is operated by another hand lever next to the parking brake.

The instrument board, in black crackle finish, carries the usual primary gauges and power controls, with ample room

for others if the owner wishes to add more.

Unless otherwise ordered, the plane comes from the factory painted yellow with black trim.

Model builders will want to tackle the low-wing Aeronca for two reasons. First, it's an attractive 1936 airplane that you'll see more and more at the airports. Second, the Aeronca people, to spread the news of their ship, are conducting a scale model contest that you shouldn't miss.

The contest has a senior division for those 16 years of age and older, and a junior division for builders under 16. First prize in the senior division is a six weeks' amateur flying course of 35 hours

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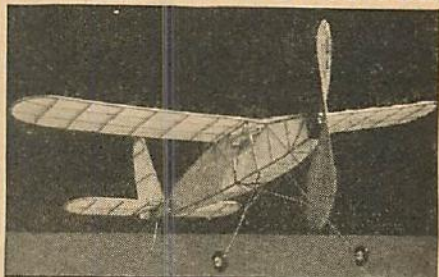
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in the Aeronca LB, complete with room and board at Cincinnati, where training will be given at Lunken Airport, the Aeronca's home grounds. There are nine more cash prizes of \$10 to \$100. In the junior division, ten prizes range from \$100 down.

The closing date is July 6th, so you still have a month and a half. You

can build from your own plans, or from plans or a complete kit sold by the contest headquarters. Your local model store may have entry blanks for this contest. If not, write to the Aeronca National Model Contest, P.O. Box 80, Cincinnati, Ohio. Mention Bill Barnes-Air Trails Magazine. Better not delay, because a month and a half isn't

too long to spend in working up a really crackajack model that'll be worth the judges' nod.

And if you click with one of those twenty prizes, and even if you don't, send us a good, clear close-up snapshot or two of your handiwork and of yourself. We'll try to publish them for the interest of model builders everywhere.

## THE WORLD'S BIGGEST AIRCRAFT

(Continued from page 23)

made by Mercedes-Benz. They are the result of long experimentation for lightness combined with strength and dependability. Fuel is supplied to all from inside the ship through a single distributing system, although each engine operates independently. Unlike recent usage in the United States, the propellers are not tiltable from a vertical to horizontal position for landing or other maneuvering. They are fixed in place; they may be reversed in rotating direction, however, by reversing the engines. The engine cars, roomy enough to permit power repairs during flight, are reached by narrow gangways from inside the bag.

The landing gear is something of an innovation. Instead of the usual "bumper" bags on the bottom of the control car and lower fin to absorb landing shocks, there are fat rubber-tired wheels mounted on turn-tables. Each is partially retractable behind a streamlined guard to reduce air resistance in flight.

Lengthwise through the ship run two corridors, one along the bottom and the other in the center. The center corridor is little used except for inspection of the gas cells, which have openings in the middle through which the corridor extends. It serves also to some extent as a central bracing member for the entire framework. It is reached by three ladders from below, and directly from the lower corridor where the two join at the bow.

The lower, or keel, corridor is the main traffic artery. Along it are ranged, in order from the bow: the radio room, with control car beneath; living quar-

ters for 12 officers, the passenger quarters on two levels, including officers' and crew's mess rooms; the deck crew's quarters for 22 and the machinists' quarters for 12. All fuel and water tanks are also distributed along the lower corridor, in addition to the electric power plant, consisting of a fire-proof room where two carefully cowled 50 h.p. Diesels drive 33 kilowatt generators to supply the 220-volt direct current used on board. An entrance in the side of the lower rudder fin gives access to the corridor from the rear of the ship.

Radio equipment includes long and short wave sets and a radio direction finder.

The control room is the ship's nerve center. Here are located the signal systems—a central telephone with 14 stations elsewhere, and a steamship-type mechanical "telegraph" indicator. A lever on the indicator moved to any point on the dial causes the same command to be rung up on similar dials in each power car.

There are two control columns or steering stands, one for the rudders and one for the elevators. Each set of control surfaces is moved by hand through a system of gears and cables running to the tail. An electric motor may be clutched in to replace man power at any time, however, and disengaged immediately when no longer desired.

Ballast-dumping controls are grouped on a switchboard. Gas-releasing valves in each cell are of two types. The automatic valves operate only when the cell is completely inflated. The maneuvering valves are managed from the control car. They can all be operated at

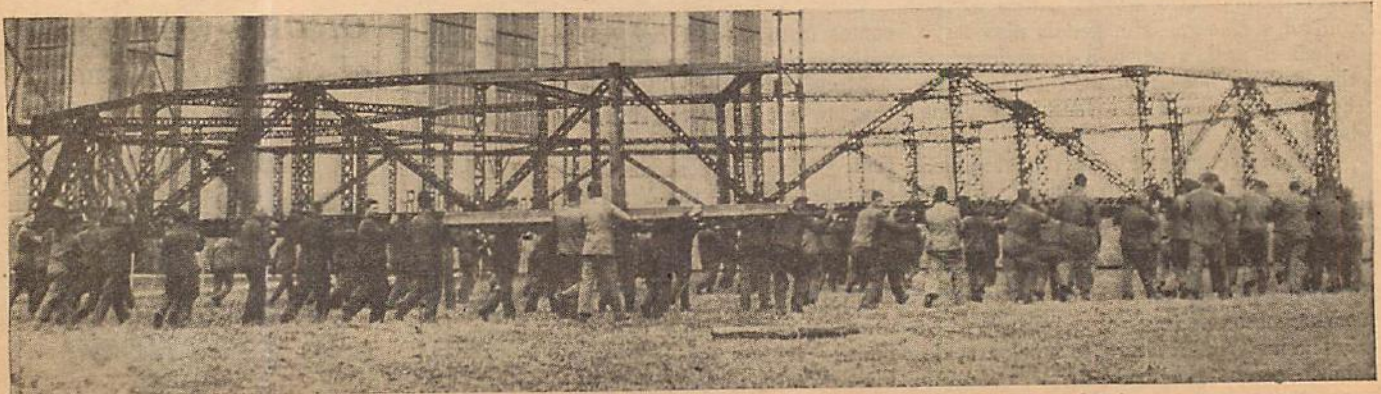
once by turning a hand wheel, or individually by hand-pulled toggle cords. The valves are located in the bulkheads between cells just above the central corridor. Ducts carry the released gas out at the top of the bag through hooded openings.

Simplicity marks the crew's sleeping quarters. Four rooms for officers and two for the chief engineers have single bunks; the others are double. Furnishing is kept to a minimum.

The passenger quarters are probably the outstanding new feature aboard the LZ-129. Where the *Graf Zeppelin* has 12 sleeping cabins and two small public salons totalling 1,076 square feet and accommodating 24 passengers, the *Von Hindenburg* has 25 cabins and three large salons of almost 5,000 square feet, with room for 50 passengers.

The passenger quarters are on two decks, as shown in the accompanying diagram. They are reached by gangways from the ground that lead up into hallways on B deck. On this level are located the kitchen, the officers' and crew's mess rooms, lavatories and a real shower bath, and biggest marvel of all—the much-proclaimed smoking room, where passengers may puff away to their lungs' content in perfect safety, although not far away are millions of cubic feet of highly inflammable hydrogen gas.

Let's examine the smoking room. We note as we approach that the door fits snugly all around—practically air-tight. We open it and walk inside. There's a small bar with an attentive steward behind it, and beyond, comfortable metal chairs and small aluminum tables. A slanting window gives a view of the



As soon as the LZ-129 moved out, the first ring of the LZ-130 moved in!



ground. The ash receivers on the tables are tricky. When a cigar or cigarette is dropped in one, it automatically closes and extinguishes the light. Everything in the room is fire-proof. We turn to go out and find that we can't open the door. But the steward eyes us and then presses a button at his bar, releasing the door lock. He has made sure first that we aren't absent-mindedly carrying out any lighted cigarettes.

The kitchen is worth a visit. It is completely electrical, with a four-burner range, double oven, plate warmer, and electric refrigerators. A big sink supplies hot and cold water. An electric fan draws out all odors. An electric dumbwaiter carries food to the deck above.

Stairs lead to a central hallway on A deck. Running from it are smaller corridors to the rows of cabins. All the cabins are "inside," with artificial light

and ventilation. Simply but tastefully furnished, each has two bunks, the lower usable as a couch during the daytime, while the upper is folded into the ceiling. There is also a folding desk, a clothes closet, and a hot-and-cold-water wash basin that folds into the wall when not in use.

Along the sides of the ship are public rooms that are spacious and inviting. On each side a promenade has continuous, wide, slanting celluloid windows, with fixed seats at intervals, where you can get a broad view of everything below and around the ship. Behind a railing on the port, or left, side is the dining room, and on the starboard are the lounge, with an aluminum and leather piano available for musical passengers, and the reading and writing room. The walls of the rooms are decorated with pictures showing scenes along the flying route to South America, the history of

transportation, and the progress of ocean travel.

The furniture is made of aluminum alloy tubing, surprising light, yet sufficiently strong. Heated air provides warmth when the temperature drops; in chilly weather, electric heaters placed under the tables insure comfort.

Summed up, the LZ-129 appears to leave little to be desired by the casual traveler for whom the big blimp was created. Designed to carry heavy loads of freight and high-priced mail, besides the passenger whose \$400 fare for his quick, pleasant ocean hop seems reasonable enough in comparison with present steamship rates, the new dirigible promises to be a commercial as well as an aeronautical success.

The airship has certainly set a new mark in transatlantic service. Now it's up to the speedy airplane to meet the challenge.

## THE MODEL WORKSHOP

(Continued from page 38)

### RUDDER CONSTRUCTION

Drawing #3 shows the rudder shape. By cementing pieces of 1/16" sheet balsa together so that the grain runs in the direction indicated, the maximum strength of sheet balsa construction can be obtained. The additional bracing with 1/16 x 1/16" balsa is done to prevent warping.

### COVERING

The entire model is covered with tissue and then sprayed with water to tighten the covering. A coat of light dope can be brushed on the tissue. This is not essential. If you do use dope, make sure it is a variety that will not shrink the tissue, since the additional strain will twist the wings out of shape.

The rudder is covered on both sides and cemented to the rear of the fuselage. The sheet balsa fuselage parts are covered with tissue. The last portion of the fuselage is left uncovered to permit access to the rubber motor. Remember that the best covering job is made with the grain of the tissue running lengthwise along fuselage and wing.

### FLYING

The model should balance at a point 3" back from the leading edge of the front wing. Add weight to the nosing of the model until it trims at this point. About one-fifth or .2 ounce of soft solder wire was added to our Flea. The amount varies with each particular model. Set both wings at zero incidence and try a glide. If your model stalls, add more weight to the nose. If it dives, increase the angle of the forward wing. This is done by lowering the wing saddle.

Don't try to correct stalling by raising the leading edge of the rear wing. While this adjustment might give the model a smooth glide, it will dive the model when flown with power. Keep the rear wing at zero, or even a negative setting, and make adjustments by adding weight to the nosing or changing the angle of the forward wing.

The wing tips of the large Flea show a decided wash-in. That is, the leading edge is warped upward. This does not seem advisable for the model Flea. Tests seemed to show that the exact opposite—that is, wash-out—was the best way to warp the wing tips.

A winder can be used on the rubber motor. Stretch it through the rear uncovered part of the fuselage. This operation will require skillful handling, but the lengthened flight is worth the trouble.

The Flea will take off from the ground in fine fashion. If you're in doubt about the adjustments, let it take off that way. Crashes will be less serious. Our Flea, nevertheless, withstood a great amount of punishment during the early stages of experiment, so don't be afraid to give your model a thorough testing.

This model represents a departure from the conventional forms of model design. We would like to hear about your model Fleas. We would like to compile the results of your flights, and in this way see how practicable the tandem wing design is. So if you have either trouble or success with your model, let us know about it. But don't necessarily confine your letters to the Flea. If you have other model-building or flying troubles, let's hear about them, too. Make sure you clear up questions when you first meet them. Putting them

chords. So the size of wing given in the drawing is a happy compromise between these two factors.

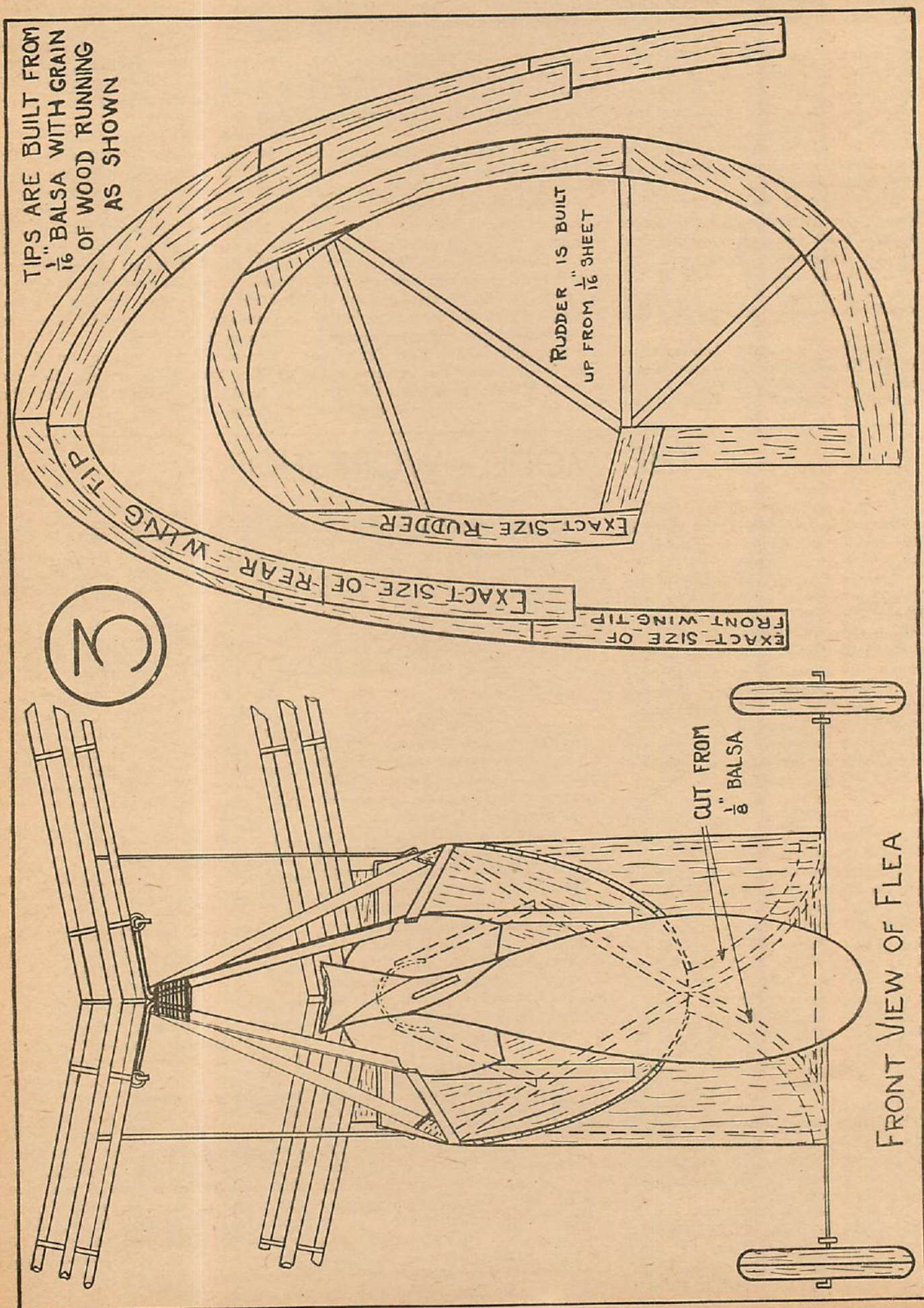
The front wing is attached to the fuselage by a wire fitting with two prongs that fit through wire eyelets mounted to the bottom of the wing. This is illustrated in drawings #1, 3, and 4. As a means of securing the rear of the wing to the fuselage, a U-shaped piece of wire is bent so that the bottom of the U forms a saddle that fits onto the top of the fuselage. The two upright ends are cemented and threaded to the wing's trailing edge. In drawing #4 you'll see that the bottom of the U is bent so rubber bands can be slipped through and tied around the fuselage to hold the wing in position.

This method of attachment enables you to adjust the wing at almost any angle by slipping different size balsa blocks underneath the wing saddle. The top of the fuselage directly beneath the trailing edge of the front wing is covered with 1/32" sheet balsa to withstand the pressure of the wire mount.

The rear wing is attached by a rubber band that runs over the top of the wing and underneath the fuselage. Small blocks must be cemented to the leading and trailing edges so the wing will rest flat on top of the fuselage. The wing is mounted so the flat underneath surface rests flush against the fuselage top. This sets the wing at zero degrees incidence—the setting we found to be the most successful.

The front wing should be set at about the same angle, except that the trailing edge is raised a slight amount. The exact setting of the front wing was difficult to measure exactly, but it did have a slight negative setting.







away unanswered will only be storing up trouble for the future.

### FLEA SPECIFICATIONS

Main wing area... 94 square inches  
 Rear wing area... 59 " "  
 Rudder area... 12 " "  
 Main wing incidence... 1 degree negative  
 Rear wing incidence... zero degrees  
 Center of gravity location: 3" back from leading edge of front wing, and 1 1/4" below the front wing or about 3/4" above the rubber motor.

### WEIGHTS

Front wing... .265 ounces  
 Rear wing... .135 "  
 Fuselage, rubber, propeller, etc... .850 "  
 Total R. T. F. 1.25 ounces

**SOME GOOD NEWS** for those planning to attend the national model contest, which will probably be at Akron in June, is that a team of six English boys will be there to fight for the Wakefield and Moffett International Trophies. Lord Wakefield, donor of the famous trophy, and other model-minded Englishmen contributed to a fund to pay the modelers' expenses.

This is the first time in six years that American builders will have an opportunity to fly with the English. Back in 1930 a delegation of American modelers was sent to England for their contest. But ever since then international competition between these two countries was carried on by proxy.

Alfred Ledertheil, a German model builder, has written to us about German models. Modeling is kingpin among German hobbies. Unlike our models, however, theirs are built from hard woods. Balsa is not permitted in contest competition. Metal models have proved quite successful. In recent competitions a record flight of 3 minutes and 7 seconds and 3,600 feet distance was turned in by a metal model.

But gliders are the German modelers'

strong point. Their gliders are really sensational, and lead the world. Their record for hand-launched gliders is 37 minutes. These flights start from level ground and in some mysterious manner the graceful gliders ride the air currents high into the sky. On the 37-minute world record flight, the model went up to 3,000 feet. Rubber models under full power do not climb much faster than a soaring glider that has found a favorable air current. These gliders are as large as 9 feet in span and weigh as much as 12 pounds.

Ledertheil promised us plans and specifications for some German models and gliders. We're anxious to learn about the German designs and compare them to the models we're flying over here.

The Aeronca company is staging a contest for scale models of their new ship, with attractive prizes. Flight Commander Carlson has included details of the contest in his article elsewhere in this issue.

### QUESTIONS

*Question: How is a winder constructed and used? R. W. R., Saskatchewan, Canada.*

*Answer:* Winders can be purchased from most model supply companies at prices ranging from 25 cents to several dollars. The smallest size will be satisfactory for rubber motors up to 10 strands. For heavier motors, more rugged winders will be easier to handle.

Many modelers use an ordinary mechanics' hand drill for winding rubber. Your hardware store can supply you with one for about a dollar. The advantage of investing in a drill is that it will comfortably handle as large a rubber motor as you'll ever use in a model. Many modelers attach a wooden pistol-shaped handle to the winder. This permits a tighter grip when winding a many-strand motor.

Using a winder effectively will double and oftentimes triple the length of hand-wound flights. Attach the rear end of the rubber to the winder with an "S" shaped wire hook. Bend this hook from wire that will not pull out of shape.

Have some one hold the propeller while you stretch the rubber two or three times its normal length before beginning to wind. This initial stretch is the secret of storing many turns in the rubber. After the rubber begins to tighten, slowly let the rubber return to its normal length, winding steadily as you do so. Add just as many turns as possible after the rubber is normal length. These last few turns add greatly to the initial thrust and will pull the model higher.

Numerical tables have been compiled to show how many turns rubber motors of various sizes will hold. Weather conditions, quality of rubber, and skill of the winder vary the tables so much that they're of little value. It's much better to develop a good winding technique.

*Question: What is the cost of building the 1935 Wakefield trophy winner presented in the April issue? H. M., Saskatchewan, Canada.*

*Answer:* The material for this model costs about one dollar. This figure can be substantially reduced if you use the scrap balsa, wire parts, etc., that are sure to be found in your workshop.

*Question: How do you determine the size of a model airplane propeller in relation to the wing and fuselage? S. S., Baltimore, Maryland.*

*Answer:* If the model is intended for duration, use a propeller that is at least 15 inches in diameter. This will give you long prop run. The other dimension of the block should be 1 1/2 x 2". The propeller should be reduced to 12 or 13" if the model is not intended for duration purposes. These propeller sizes are for a model with a 36" wing span.

You can form some definite ideas on propeller size by examining our past issues and noting the size of propeller used on the ships presented in this department. There are so many factors determining the selection of a propeller that no fixed rule can be set up. The next time you're in doubt about propeller size, write us the specifications of your model, including wing span, chord, fuselage length, weight, etc., and we'll give you information on a suitable prop.

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# It's a Fact That—

Canada flies several times as much express and freight in a year as the United States. All the transport lines below the border carried a total of 1,911 tons within the States last year, whereas the leading Canadian transport line, one of 62 operating companies, moved 2,637 tons. Most of the load went in and out of the northern regions.

Man's speed in the air with the present type of airplane wings is limited to 575 miles an hour. Tests in the new high-speed wind tunnel of the National Advisory Committee for Aeronautics at Langley Field, Virginia, show that at about 575 miles the air flows away from the wing in a "shock wave" and the wing loses all lift.

A recent air-raid alarm in a section of London, sounded experimentally with 36 types of noise-making devices, failed because the city's traffic roar drowned out the signals.

Airplanes for the private flier manufactured in the United States last year increased 34 per cent. The greatest increase was in the group of light one and two-place cabin monoplanes, which rose from 120 produced in 1934 to 460 in 1935. One company jumped its output from 73 to 227, and three others from 60 to 118, 5 to 56, and 4 to 43.

The proportion of monoplanes to biplanes among the year's output of 1,079 non-military ships was more than five to one. Single-winged planes totalled 908; the biplanes numbered 171. Military planes numbered 317, and 295 planes were manufactured for export, yielding a total production for the year of 1,691 airplanes.

The path is set to extend the Pacific air service southward from Hawaii to New Zealand, following a year of weather observation by 21 high-school boys stationed on South Pacific islands. Compilation of their data reveals that average atmospheric conditions are satisfactory for flights by way of Samoa and Suva.

Donations to the fund created in memory of Will Rogers, killed last year with Wiley Post, have reached the value of about \$1,750,000. The fund will be used to aid handicapped children. Included are a million-dollar hospital building at Saranac, New York, \$500,000 for its maintenance, and individual contributions from 541,490 persons totalling \$256,489.

The severe winter didn't hinder air travel. While snow and ice repeatedly tied up surface transportation, the air lines moved on to new traffic records. Strangely enough, extreme cold on the ground sometimes diminished as pilots flew higher. In one case, the temperature at the Chicago Municipal Airport was 12 degrees below zero, while 8,000 feet up it was 2 degrees above.

A Russian glider pilot recently reached a record height of 35,000 feet. He was towed there by an airplane. Set loose, he maneuvered his glider back to earth, descending from an altitude that was within about 12,000 feet of the world record for heavier-than-air craft.

Research to prevent carburetor ice formation is the most important step that the Bureau of Air Commerce is undertaking in order to advance safe flying, according to transport pilots. Answering a questionnaire, they listed other danger problems in the following order: propeller ice, rain and snow static interfering with radio, fog dissipation on runways, blind landing, approach lights, and instrument approach.



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"It saves me one gallon a day. I had to buy 5 gallons each day—now only 4 gallons."—*L. V. Sweet, Pa.*

"My Chevrolet certainly runs smoother, has more power and snap to it since I put the Vacu-Matic on."—*J. H. Nelson, Minn.*

"On my Dodge 8 I am getting 6 more miles per gal. with more power and pick-up, which is all anyone could ask."—*Lee D. Esty, Calif.*

"I have twelve Vacu-matics on cars now, and they all show an increase in mileage. The car owners are very well pleased."—*Fred Taylor, Okla.*

"I averaged 25 miles per gallon on a trip with a model A Ford at 40 miles per hour, where before I only averaged 20. Also better pickup and smoother running."—*Wm. Lyons, Calif.*

"I have been placing Vacu-matics on expert mechanics' cars. All are well pleased."—*J. W. Donahue, W. Va.*

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