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BILL BARNES

MAY 1936

AIR TRAILS



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WHAT GREAT COMBAT SECRET DID THE FOREIGN SPIES SEEK?
THE MAN WHO FELL FROM THE SKIES
BILL BARNES AIR ADVENTURE BY GEORGE L. EATON

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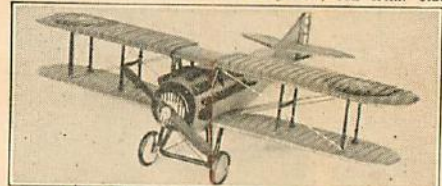
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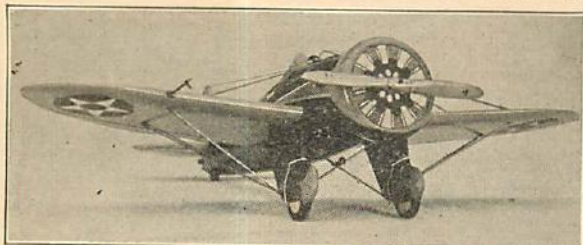
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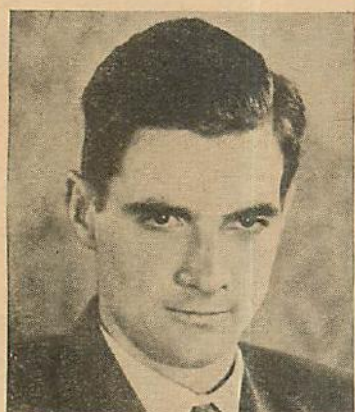
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Next Month:

Bill Barnes meets strange, new adventures in a complete novel

BRETHREN OF DEATH

Also: Plans for a flying model of the SKY FLEA!

BILL BARNES AIR TRAILS

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A STREET & SMITH PUBLICATION

VOL. VI

MAY, 1936

NO. 2

CONTENTS

Bill Barnes Air Novel:

The Man Who Fell From the Skies' 8

Evil forces held him, this white god ruling fierce jungle savages, and those forces met Bill's winged challenge in mid-air with desperate hate.

by George L. Eaton

This Month's Features:

THIS WINGED WORLD	4
<i>The picture story of what's new in the air.</i>	
GLIDER DEVELOPMENT	19
<i>Graphic instruction for aviation students.</i>	
"ALWAYS READY"	24
<i>The thrilling story of the flying heroes of the coast guard.</i>	
THE FLIER'S DICTIONARY	27
<i>Rigid Dirigible Balloon—eighth lesson in terminology.</i>	
WINGS OF TO-MORROW	28
<i>The startling new Wallis geodetic wing may revolutionize flying.</i>	
PICTORIAL HISTORY OF MAN IN THE AIR	31
<i>More episodes for an aeronautic scrapbook.</i>	
BUILD A MODEL OF THE CHINA CLIPPER	38
<i>Scale plans complete in every detail.</i>	
THE FASTEST LAND PLANE	40
<i>About Howard Hughes' racer on the cover.</i>	
FAMOUS FIRSTS	43
<i>Steps in the world's aviation development.</i>	
AIR TRAILS GALLERY	45
<i>A page of pictures of modern planes for the collector.</i>	
IT'S A FACT THAT—	80

Short Story:

CODE OF THE NAVY	20
<i>His hands weighed human mercy against a record!</i>	

Departments:

THE MODEL WORKSHOP	32
<i>Plans of the "Trainer" and some valuable contest hints.</i>	
WHAT'S YOUR QUESTION?	37
<i>Interesting answers from an expert.</i>	
AIR ADVENTURERS CLUB	44
<i>What's Our Course? A message for future pilots.</i>	

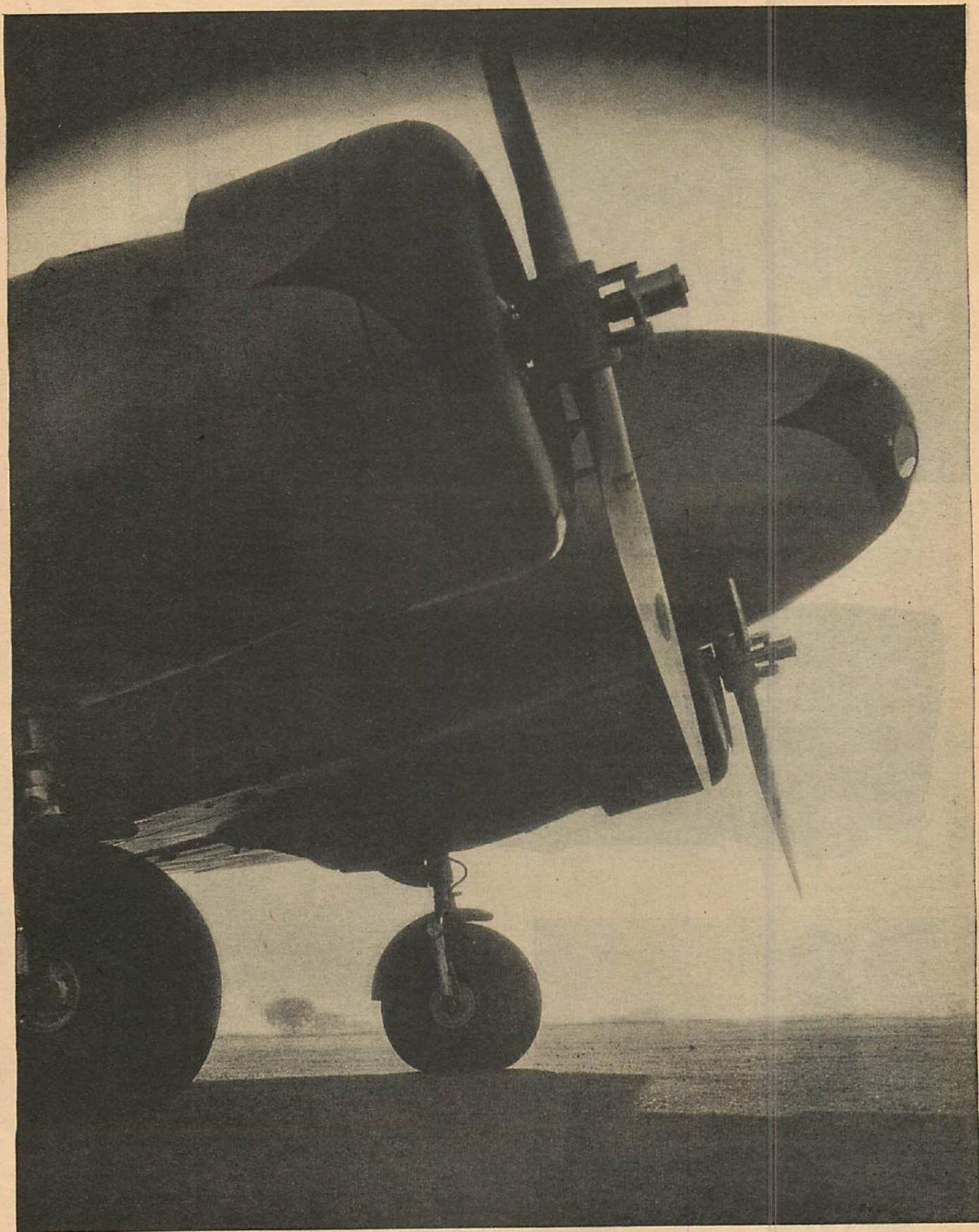
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THE MIGHT OF MODERN AVIATION is pictured in this striking view of a private bi-motored all-metal Lockheed Electra silhouetted against the late afternoon sky.

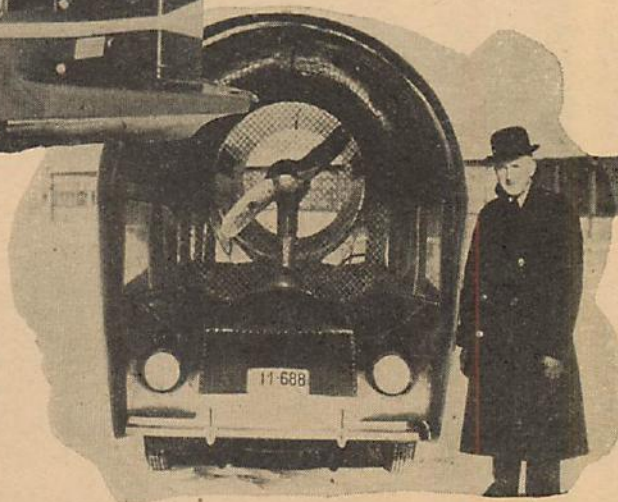


This Winged World

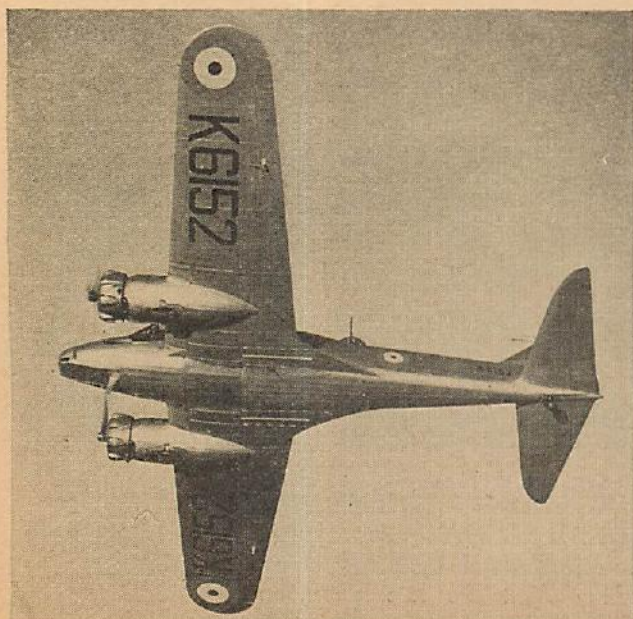
TIED together, three navy Curtiss Helldivers salute Liberty's statue in New York harbor on its fiftieth birthday. They take off, fly, and land linked with rope.



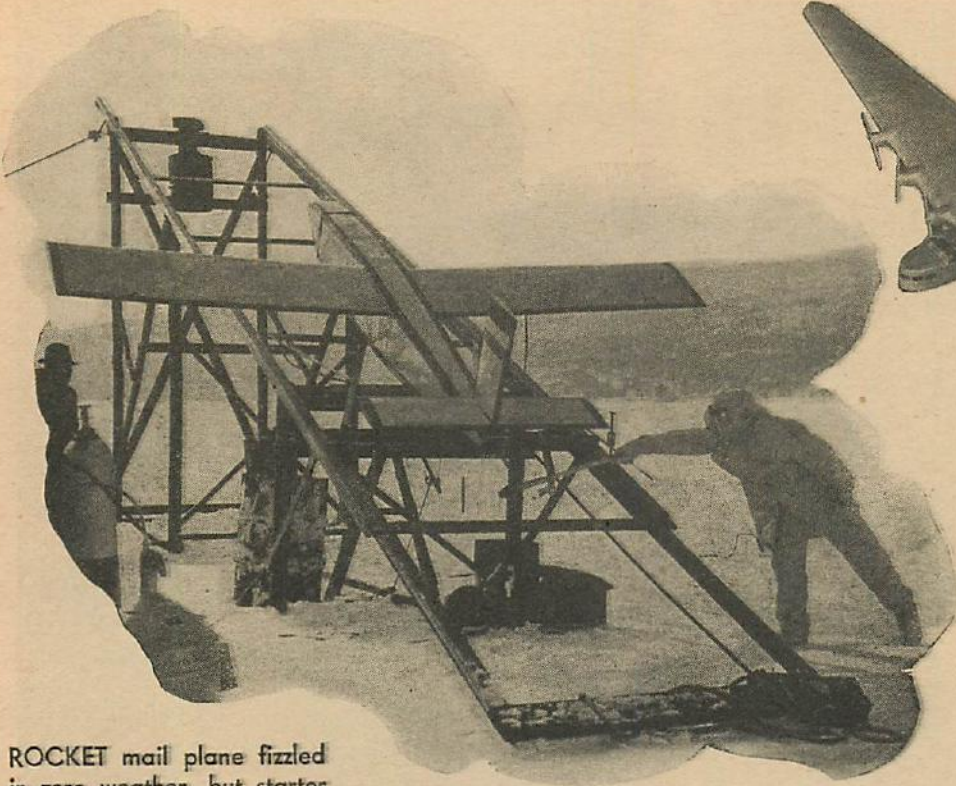
DEMON with flap mouth, slit nose, goggle eyes is army flier in new wool winter helmet.



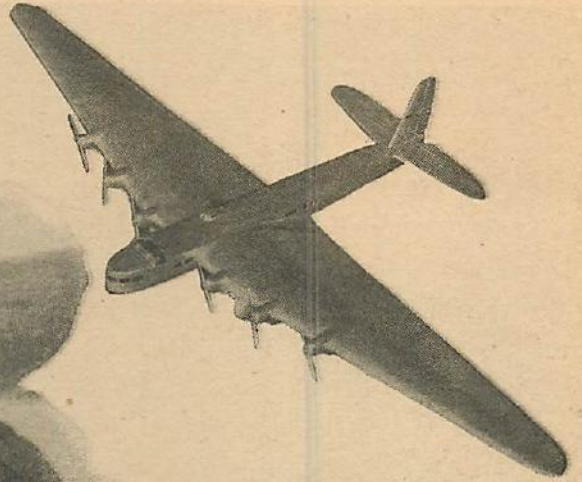
DIRIGIBLE-AUTO demonstrates idea which Inventor Thomas Finley, at window, hopes to apply to big tubular balloons. Prop pushes air out at back, sending car forward at 47-mile speed.



WORM'S-EYE view of Avro Anson, also on page 45, shows nose bomb window.



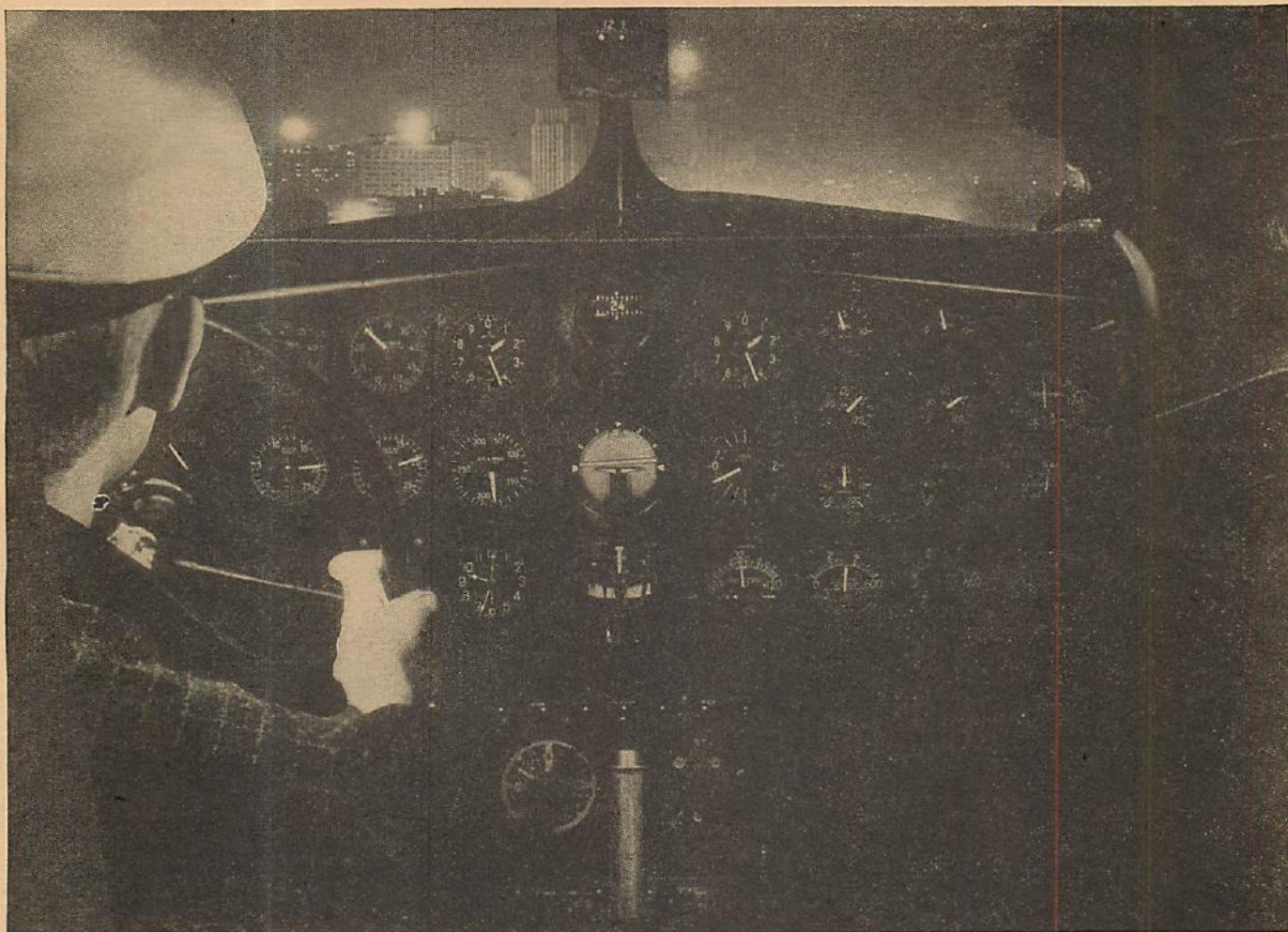
ROCKET mail plane fizzled in zero weather, but starter wore asbestos to guard against exhaust heat.



BIGGEST in the world, 16 new "Maxim Gorki" planes, pictured as model, are being built in Russia. With span 266 feet, length 116 feet, speed 170 miles, they'll carry 60.

UNUSUAL photo below shows Blackburn Baffin torpedo bomber lowered from deck of British carrier "Furious."





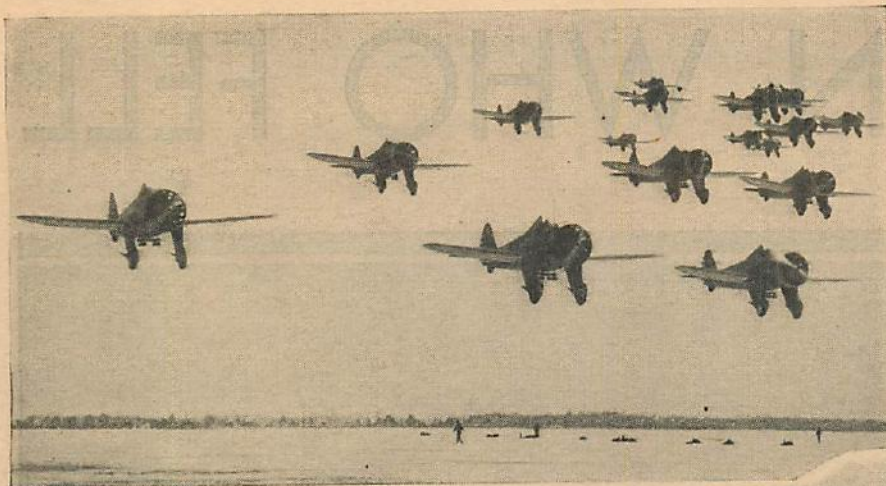
NIGHT FLIGHT presents scene above to pilots of a private Lockheed Electra. Glowing instrument dials of this plane are arranged slightly differently from the Electra transport instrument board given in daylight view in our last issue.



TOO CLOSE for comfort, we'd say of this Hawker Hart Trainer flying over a group of Royal Air Force pupils. But their discipline holds them steady—they don't duck!

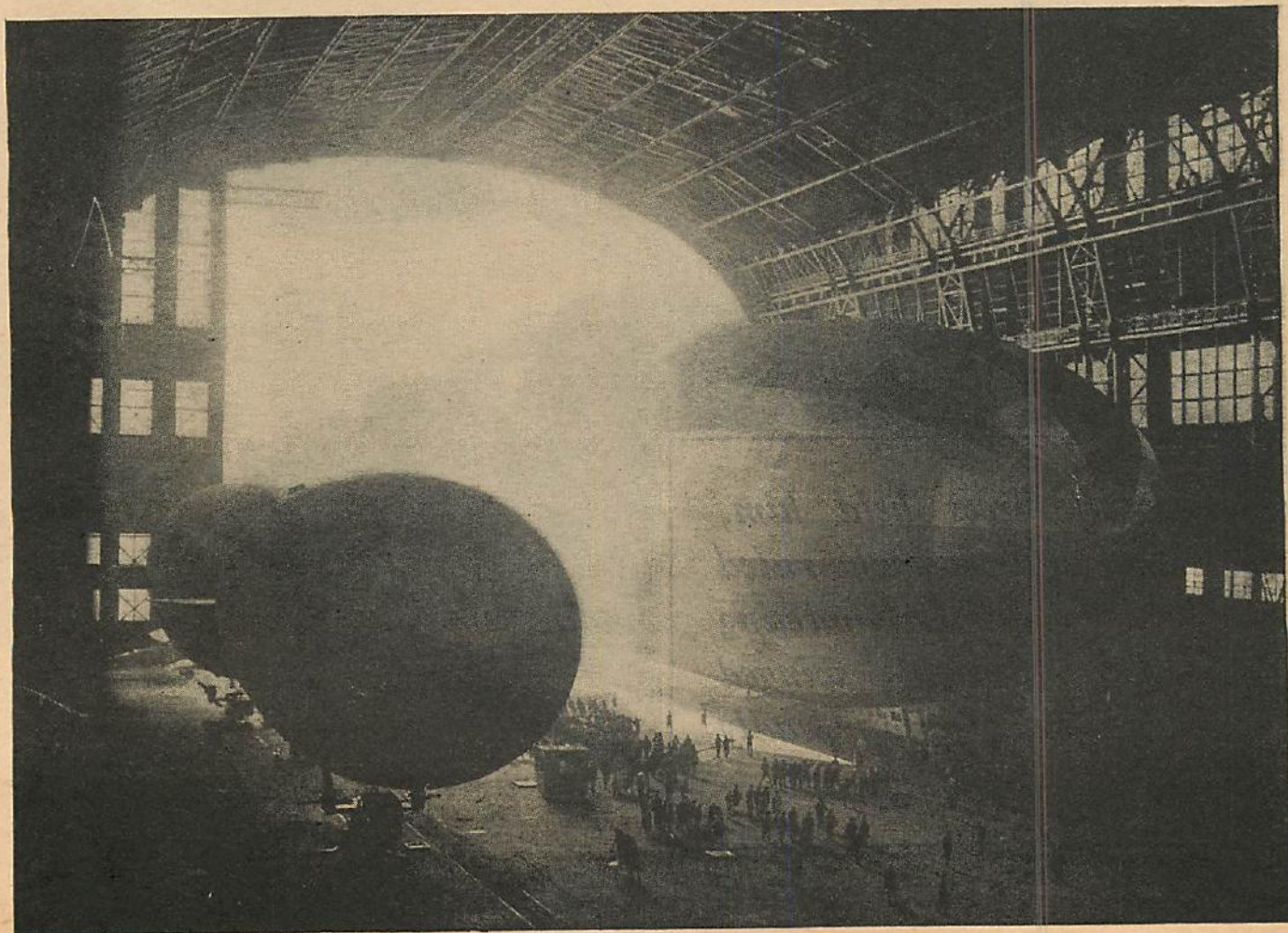
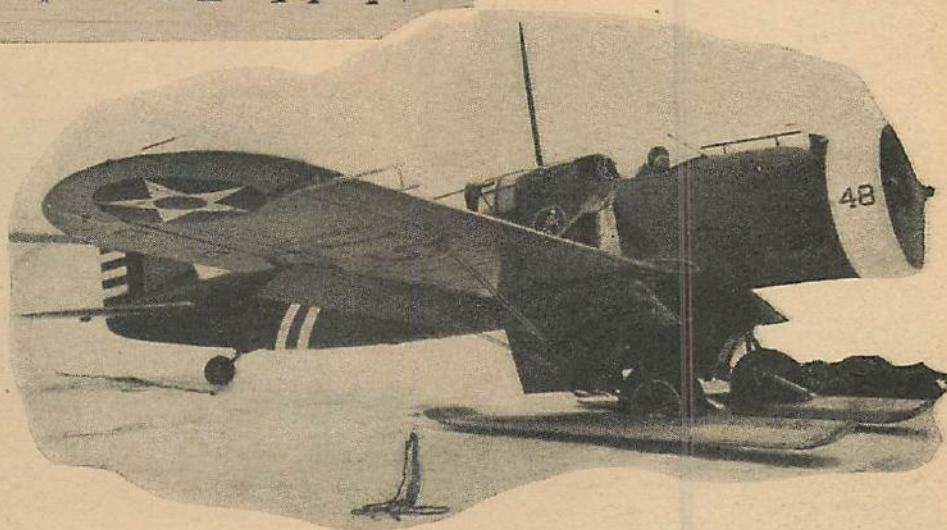
GUN that shoots signal sends smoke projectile 1,000 feet up above fog over Croydon airport, England, to show fliers the location of field.



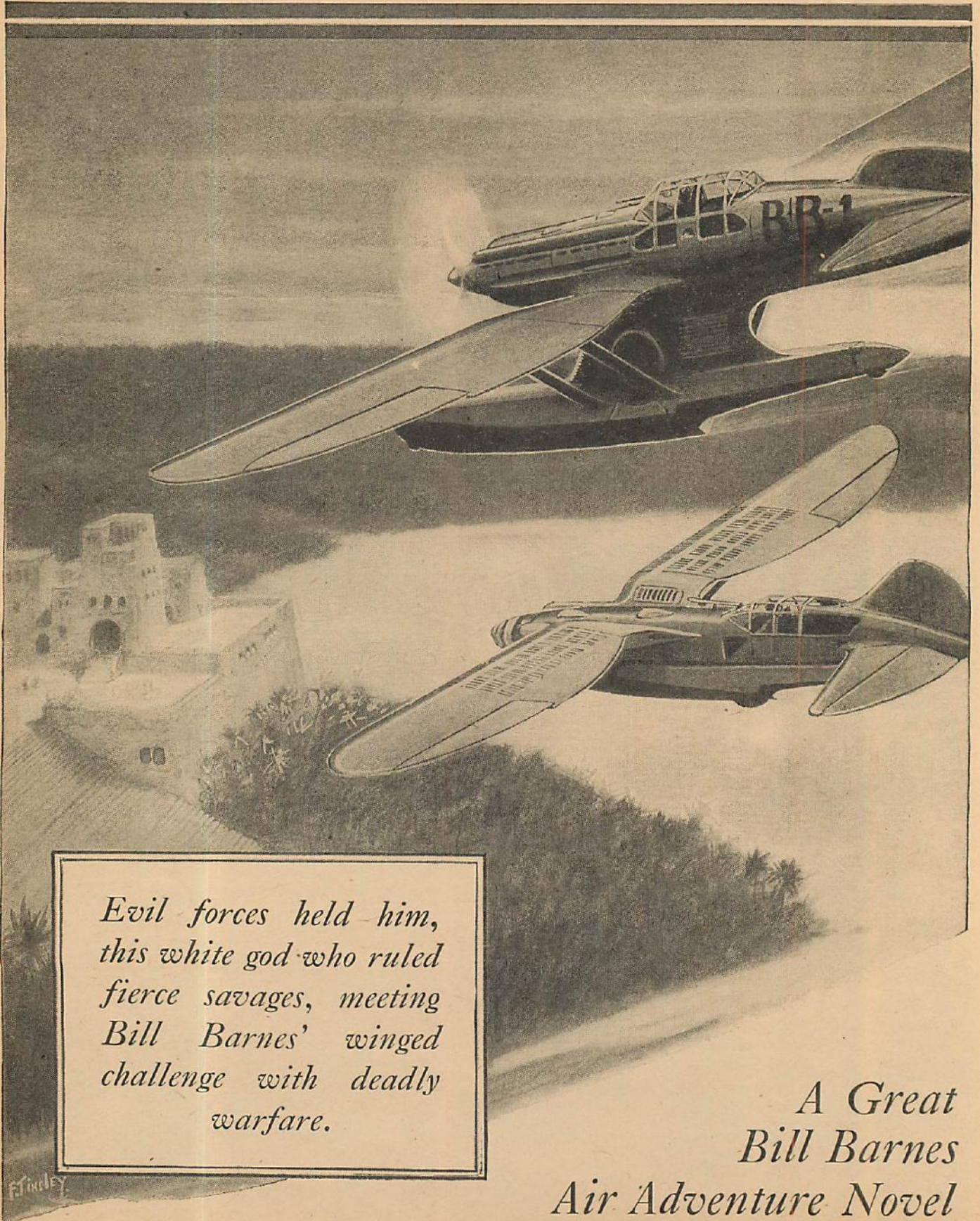


WINTER tested the mettle of our G.H.Q. air force during eastern maneuvers. Left, Boeing P-26As leave Long Island to rout New England bombers attacking New York. Below, a Curtiss A-12 Shrike tries out combination ski and wheel landing gear.

HALF a dirigible is being towed into the navy's Lakehurst dock, if we can believe the photo below! This view of the "Graf Zeppelin" illustrates the Lakehurst handling that awaits the LZ-129 when the new German airship starts north transatlantic service soon.



The MAN WHO FELL



*Evil forces held him,
this white god who ruled
fierce savages, meeting
Bill Barnes' winged
challenge with deadly
warfare.*

*A Great
Bill Barnes
Air Adventure Novel*

FROM THE SKIES



by

George L. Eaton

LATE in the afternoon of a day in May, 1930, Bill Barnes stuck the nose of his thundering amphibian down through a hole in the clouds, as the outskirts of the city of Miami, Florida, flashed beneath his wings.

The sun, a great, golden ball of burnished metal, was singing its swan song as it plunged into the palmetto scrub to the west. Below, the aquamarine waters of Biscayne Bay reflected the mulberry and copper tints of the sun on its dancing whitecaps.

A smile of relief wrinkled Barnes' youthful face as he spotted the red windsock atop one of the hangars at the international airport. He eased the stick back slightly and watched the shadows playing on the waters of the bay, watched the slow-moving objects that were automobiles cruising across the causeway to the beach.

"Blackstone," he said, "we are here."

He circled above the two gigantic hangars on the water's edge, while a thousand questions raced through his mind. Each time his thoughts came back to his

original questions. Why had David Blackstone sent him that cryptic telegram? What was behind it? How did Blackstone know that he would come?

For an instant the telegram itself danced before his eyes:

LEAVING FOR SOUTH AMERICA TO-
NIGHT STOP MEET ME NORTH-SOUTH
AMERICAN AIRWAYS AIRPORT MIAMI
EIGHT O'CLOCK BLACKSTONE

That was all.

His pontoons left a double wake behind him as he set the ship down on the waters of the bay, kicked it around and taxied toward the sea wall.

Ten minutes later a guard directed him to Blackstone's room in the administration building. It was a small square room overlooking the bay—the kind of room one

finds in any moderate-priced hotel. The bureau and table were scarred where a hundred pilots had laid their burning cigarettes. Blackstone's clothes were scattered about the room.

"He should be back any time," the guard said, and closed the door behind him.

Lights began to dance on in the houses on the bay islands, and aboard the yachts moored along the water front. The white lights on the causeway became a ribbon that connected the city with the beach.

Bill Barnes stood watching the beauty of the reflected lights of the tropical sunset. He was thinking about Blackstone again. He was remembering the things he and David Blackstone had gone through together. He remembered how they had worked over the plans of Bill's first planes. He shook his head a little angrily as he remembered one question that had been racing through his mind throughout that long flight from New York.

How did Blackstone know that he would come?

Of course, Blackstone would know that he would come. He, Blackstone, had never let Bill down when Bill needed him. He took it for granted that Bill would be the same with him.

Bill didn't feel the slight draft on the back of his neck as the door behind him opened silently. He didn't know there was any one in the room until he felt something hard jab into his back. As he started, a voice spoke into his ear—a voice that was raised only a little above a whisper. But it carried conviction. It carried enough conviction to keep him from whirling and perhaps losing his life.

"It is better if you do not move if you wish to live," the voice said.

Bill's whole body tensed and his big hands clenched into fists as he caught himself. He caught a glimpse of the florid face of the big man, the thatch of black hair. The slight accent and the glimpse of the man's face suggested that he was a Russian.

"Wire his hands," the voice said. Bands of steel fastened themselves on Bill's wrists and pulled his arms behind his back.

His brain was on fire now. He dug his powerful toes into the floor. The hard thing pressed even harder against his spine.

Another man stepped into Bill's vision—a man with a bald head and a face that was scarred and pock-marked. The scars where his eyebrows should have been gave him a horrible expression. He made peculiar noises in his throat as he fumbled with a loop of thin wire.

"Don't move!" the silky Russian voice said. For an

instant the pressure of the thing in Bill's back lessened.

It was during that instant that Bill brought his right knee up under the chin of the man with the scarred face. The man was bending forward to loop the wire around Bill's ankles. His head snapped back as though he had been struck by a battering-ram. His eyes rolled in his head as his arms dangled helplessly.

Bill tried to jump away from the gun in his back as he whirled. He expected to feel a bullet tear through him.

His left fist was circling in an arc toward the blur of a face behind him when something exploded on the side of his head. The room swayed back and forth as he plunged forward on his face.

He caught the throat of the scarred-face man as he struggled upward. Bill tried to throw his body up in front of him. Another blow glanced off the side of his head. The big, florid-faced man was hitting at him with the butt of an automatic.

Bill staggered back and hooked a right fist to the man's red face. Then something fastened around his throat—something that cut into his windpipe savagely and cruelly. He tried to tear the fingers away, tried to tear away the elbow that

was crooked around his face. He lashed out with his feet, kicking behind him. A gurgling sound, like the voice of a baby trying to speak, sounded in his ear.

"Don't kill him!" he heard a voice say.

Then the world exploded and he slumped to the floor.

When Bill opened his eyes he got the idea that he was doing outside loops and barrel rolls. Only, instead of the sky and the earth swinging in and out of his vision he saw four walls and a ceiling that wouldn't stop rolling. A bright, overhead light flashed back and forth across the room, dazzling him. He clenched his teeth and tried to concentrate his gaze on the rocking windows. His head and face felt hot and sticky and his whole body was covered with a cold, clammy perspiration.

He groaned and tried to lift his hands to his head. He found that they were secured behind his back and they ached unmercifully. His lips were tightly taped together. When he tried to shout the tape tore at his lips and only a dull rumbling came forth from his throat. He could see the piece of wire that bound his ankles together.

As the room stopped rocking he saw that the place was a shambles. The mattress had been torn off the bed and ripped open. The sheets were piled in a corner of the room. The rugs had been thrown on top of them. Drawers were emptied of their contents. Clothes were ripped apart, the linings of coats having been torn out. The room looked as though a hurricane had come off the bay and raced through the windows.



Bill found his hands tied behind his back.

Bill managed to roll to a sitting position against a wall. His head felt like a barrel being filled with water under pressure. He could feel it bulging and wondered if it would burst. He tried to free the wire on his wrists. The effort brought a grimace of pain. He couldn't remember where he was or why he was there.

He knew that he had been clubbed unconscious because he could taste the blood that coursed down over his forehead and into his mouth. He clenched his teeth and groaned as nausea and faintness nearly caused him to lose his senses again.

Then he heard footsteps in the hallway outside. The doorknob rattled impatiently as some one tried to open the door. A voice cried from outside, "Hey! Open up!"

Bill tried to answer. He wrenched at his bonds until the wire cut deep into his wrists. He heard a key rattling in the door.

When the door was flung wide and a tall, brown-haired man with keen blue eyes and a leathery face appeared, everything came back to Bill.

He recognized the startled man who stopped in the doorway as David Blackstone. And he remembered the gun that had been pushed into his back, and the horribly scarred man who had started to bind his hands and feet.

"Bill!" Blackstone shouted. "Bill Barnes!"

Bill's eyes gleamed as Blackstone shot across the room and dropped down beside him. He rolled forward on his stomach so that Blackstone could get at the wire binding his wrists behind his back. When his hands were free he rolled over and made a motion, moving his hand quickly across his mouth. Blackstone understood. He took one corner of the tape and yanked. Bill winced as the gag tore skin off his lips.

"I suppose," he said to Blackstone, "this is what you call old-fashioned Southern hospitality!"

"What the hell?" Blackstone asked.

"Get that wire off my feet," Bill snapped. "My hands are numb."

He staggered to his feet a moment later and gazed into a mirror hung over a washbasin. His head was matted with blood. His face was battered and bruised.

"I'll tell you about it in a minute," he said to Blackstone. "Do you have any iodine?"

They washed the blood out of his hair and covered the two jagged cuts with iodine and crude bandages.

"How's the head?" Blackstone asked, when they had finished.

"Awful," Bill answered. "It feels as though it was going to explode."

"What happened? What time did you get here?"

"About seven forty-five," Bill said. "A guard brought me over here. I was looking out the window there when some one shoved a gun into my back. I think he was a Russian—a big man with a florid face and a lot of black hair. Another one, a man with a scar for a face, started to bind my arms behind me. I objected

and they conked me. I just regained consciousness before you came. That's all I know."

"That's enough," David Blackstone said bitterly. "It all fits, Bill. I'm sorry I let you in for this. I should have been here when you arrived."

"What are they after?" Bill asked. "They went through the room like a couple of mystery-story detectives."

"Wait a minute," Blackstone said. "Let me tell you why I sent for you, then you'll understand."

"Make it quick," Bill said. "I've got to get something for this headache. It's going to shake loose."

Blackstone nodded his head like an automaton. His eyes suddenly kindled with excitement.

"Listen, Bill," he said, "I've been working at the Boswell plant in Baltimore for the last six months. They've allowed me to use some of their men and machines. But the expense was too great. I had to take on this trail-blazing job for North-South Airways to make some money. I need plenty. I'm going to do a little pioneering for them, laying out routes through the West Indies, Central and South America. I need the money to go on with my work in Baltimore."

"I took on this job and left all my work in Baltimore. When I got down here I got scared. I didn't dare put anything on paper. I've had to keep it all in my head. I got the idea last night that I would make some plans and give them to you."

"What happened to you proved that even that won't be safe. Some one has tried to break into my workroom a half dozen times. They've searched my apartment, torn it apart, and my workshop. They haven't taken my life because they couldn't find any plans, and they can't learn anything from my experiments at the Boswell shops."

Bill gazed at Blackstone with a curious expression.

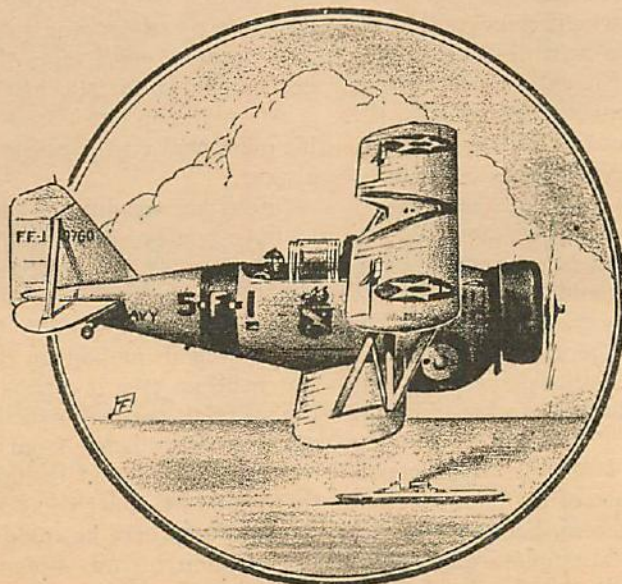
"Listen, yourself, Dave," he said. "You're talking in circles. First, what have you been working on? Second, what value would it be to any one?"

Blackstone got to his feet and moved quietly across the room. He threw the door open and peered into the hallway. When he came back to sit down beside Bill he grinned sheepishly.

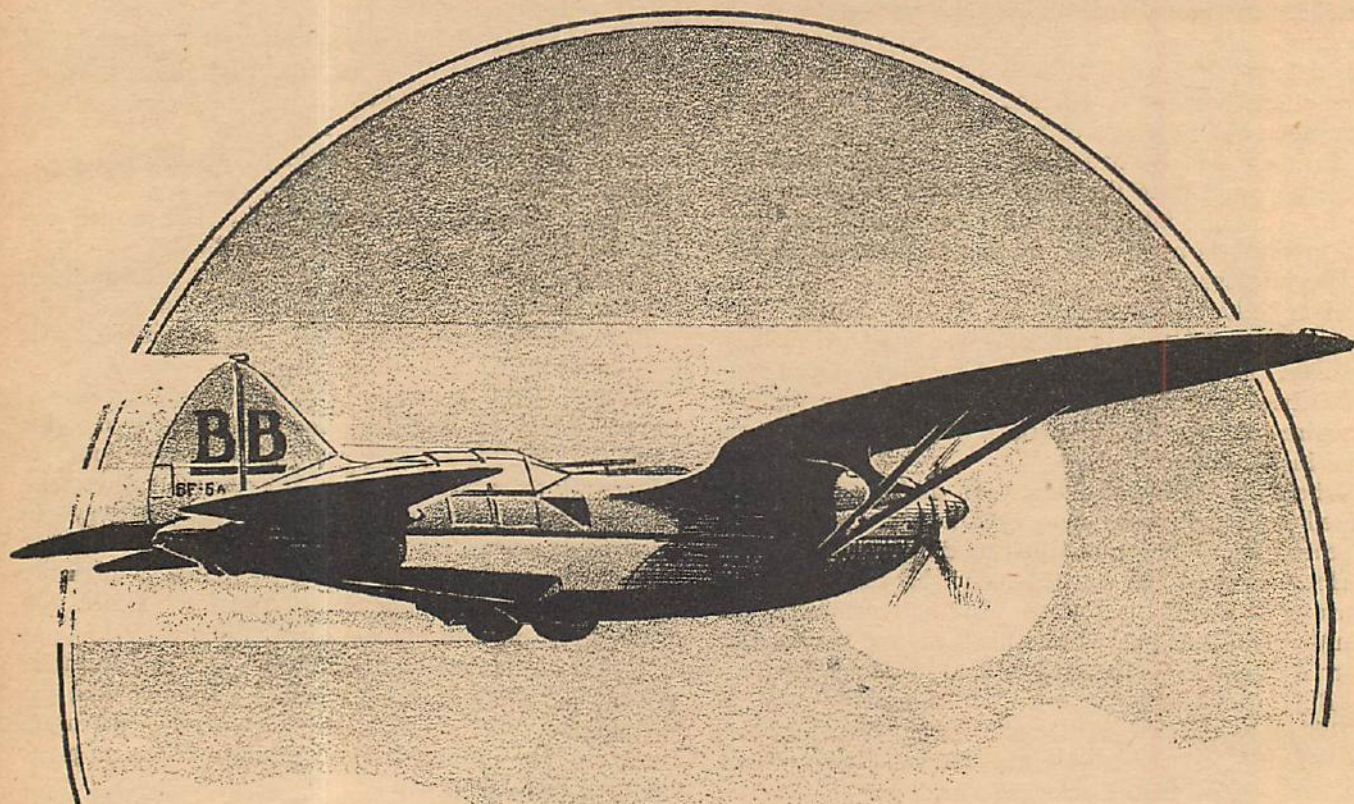
"That looks dramatic, I know," he said. "But I've got to be careful." He lowered his voice. "I've got something that is going to revolutionize aerial combat, Bill," he whispered. "I'm working out an idea that will equip single-seater fighters with tail armament!"

Bill gazed at him now as though he thought he was crazy.

"It's a fact, Bill. And it's going to work. A pair of machine guns that will protect the tail of a single-seater. Imagine the difference it will make in combat work. Imagine the surprise an attacker would get if he dived on the tail of a single-seater, expecting he would



The navy's Grumman fighter.



Thirty thousand feet. The blue canopy of heaven spreading above. He could think here.

have no defense to the rear and, suddenly, two guns opened up on him."

"I can imagine his surprise," Bill said. "But I don't see how you're going to do it."

"That's what those men wanted to find out who hit you over the head and went through my things," Blackstone said, his eyes shining. "A dozen spies have been snooping around. I don't know whether they represent foreign governments or rival armament designers. But they know what I'm trying to do. I sent for you because I wanted to know that some one would go on with the work if anything happens to me on this trip."

"Nothing will happen to you," Bill said. "It will be like taking a Sunday drive with a horse and buggy."

"That's what I decided to-day," Blackstone said, to Bill's surprise. "I decided I hadn't better put anything on paper. And the risk to you would be too great if I told you anything about it. I'm sorry, Bill. I mean I'm sorry I got you all the way down here for nothing."

Bill got to his feet and gazed at Blackstone long and earnestly. Finally, he lifted his hands from his hips and spread them, palms upward.

"All right, Dave," he said. "I always thought you were a little screwy. Now I'm sure of it."

"It isn't that I don't want to tell you, Bill. I——"

"I don't want to know," Bill said emphatically. "All I want to do is get something for this head. I have enough troubles of my own without having to worry

about yours. I've dabbled with tail protection for single-seaters myself and I don't think it can be done. The only way is to stick on another cockpit and put a gunner in it with a couple of swivel guns."

"I'll show you you're wrong when I get back, Bill," Blackstone said. "I'll show you something that will open your eyes. Only I'm really sorry I got you all the way down here and got you that headache."

"Forget it," Bill said. "I needed the trip. But let's get something for the headache."

At midnight that same night Bill shook hands with his old friend on the apron of the North-South Airways airport.

"Feed her the juice," Bill said to him. "I'm anxious to have you get back and have a look at that new tail armament. If it's any good you can write your own ticket."

Bill stood on the water front while Blackstone kicked his powerful amphibian around into the wind, and watched him take it off the water. He stood there until the sound of the motor died away in the distance and the running lights faded from view.

"There," Bill said to himself, "goes a gimper—a guy that would never let you down." He began to figure out in his mind where he could fit David Blackstone into the organization he was hoping to form when he had the money.

When Bill Barnes opened his morning paper three

days later, headlines jumped at him from the front page. Headlines that sent his heart up into his throat:

NOTED ACE DOWN IN JUNGLE

DAVID BLACKSTONE, FAMED AVIATOR AND ENGINEER,
BELIEVED DOWN IN HEART OF SOUTH
AMERICAN JUNGLE

The ensuing report told of Blackstone's flight from Miami to Kingston, Jamaica, his arrival at Barranquilla, Colombia and Maracaibo, Venezuela. From there he had chosen a perilous course over Lake Maracaibo, the dense jungles of Venezuela and the Sierra Parima, to Manaos in Brazil.

But he was now twelve hours overdue at Manaos. It went on to say that if he had been forced down around the then undiscovered source of the Orinoco River, in the Parima Mountains, there was little chance of his winning his way back to civilization because of the insuperable difficulties of overcoming the human and animal enemies aligned against him.

"The reckless fool!" Bill spat out between his teeth. "Why in the name of his Aunt Hettie's back teeth didn't he follow the coast line?"

Through the next week, while every resource at the command of man was utilized to find David Blackstone,

else would have brought him down. He may be injured. But he'll come back."

"That's the way to talk!" Bill said. He tried to make his voice sound as though he believed what she had said. But it didn't carry the conviction he wanted it to. "I'll keep in touch with you," he finished, lamely.

"I'll let you know the minute I have word from him," she said.

"She's got what it takes," he said aloud as he hung up the receiver. But his eyes were a little misty as he placed David Blackstone among the long list of immortals who were treading the halls of Valhalla.

II—PLANS

THROUGH the next five years, from 1930 into 1935, Bill Barnes and his squadron of famous aces flamed across the skies above the seven seas. Bill's supple body had become even more powerful. His tanned face had become a lined, bronze mask. His clear, blue eyes had become permanently narrowed from squinting into the sun in search of enemies and gazing toward the far places to which he was called.

His face was his passport the world over. He and the names of his men were known to schoolboys and statesmen, soldiers and salesmen, wherever the human tongue was used.

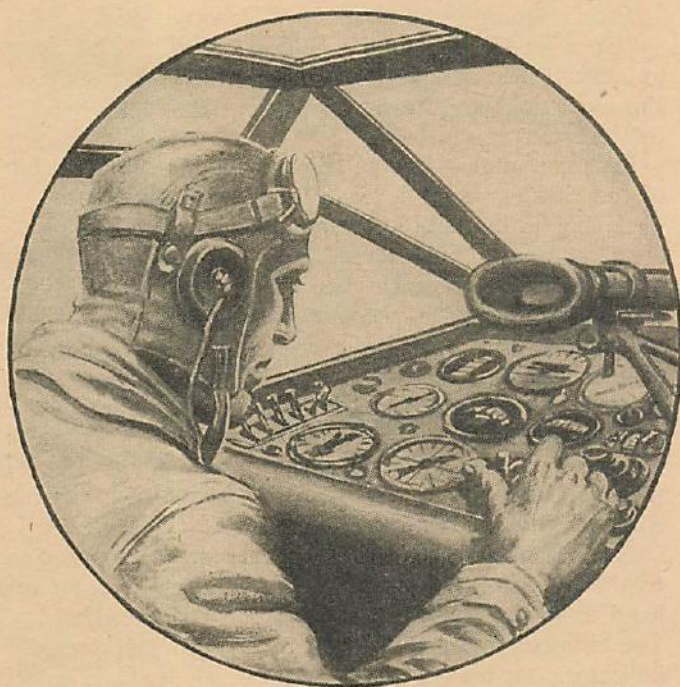
"Let Bill Barnes do it," had become a phrase that was spoken not in ridicule, but in sincere tribute to the things he had accomplished—things he had accomplished after other men had failed.

Barnes Field on Long Island was now his headquarters. There, under his own supervision, in his own workshops, had been built the famous red-lacquered Snorters, the huge carrier-transport BT-4, and the fastest fighting ship in the world, the Scarlet Stormer. Incorporated in his shops, and in his ships, was every improvement known to the science of aviation—and some that were not known beyond the electrically charged wires that surrounded the field.

Machine-gun bullets and bombs had been rained upon the field time and again by enemies who sought to destroy it. Poison gas had cut down mechanics in the workshops and guards on the gates. Poisoned food and infernal machines had been received that were meant for the lips and hands of Bill Barnes.

But like an old war horse who knows the tricks of his trade, he had survived them. Still in his late twenties, he was regarded the world over as the premier flier of the age.

Around him he had built an organization of men who were known, affectionately, by their nicknames: "Shorty" Hassfurth, his stocky, blue-eyed, reckless chief of staff; "Red" Gleason, the carrot-topped fire brand who had learned his art with Shorty, over the German lines in 1917 and 1918; young "Sandy" Sanders, a kid who had just turned seventeen—a kid who could fly his famous little Eaglet with the skill and daring of a veteran; Bev Bates, the brown-eyed product of Boston with a Harvard accent, and the courage of a wounded grizzly; "Cy" Hawkins, the slow-speaking, leathery-faced Texan who moved with the speed of the wind; old "Scotty" MacCloskey, the major-domo of Barnes Field, who had forgotten more about aeronautical engineering than most engineers remembered; Tony Lamport, the chief radio operator of Barnes Field; and a hundred others—pilots



A red light bloomed on the panel—the flaps opened.

Bill kept in touch with David's wife and his friend, Ann Blackstone, by telephone.

In spite of the fact that Bill was up to his neck in work, organizing the squadron of fliers which was to become world-renowned, he offered his services to Blackstone's wife.

"There's nothing you can do, Bill," she said. "North-South Airways is doing everything possible. They have about given up hope of finding him. But they don't know David the way we know him, Bill. He'll come through. It may take him a long time to get out, but he'll do it. His engine must have conked. Nothing

and engineers, mechanics and grease monkeys, machine gunners and bombers. All in all they made up the finest collection of fliers the world has ever known. When they took on a job it was a ten-to-one bet that the impossible would be accomplished.

From their record came that phrase: "Let Bill Barnes do it!"

And through those five tempestuous years Bill Barnes had regretted one thing more than he regretted anything else. That was the death of David Blackstone. Through those five years he had seen death in the air a thousand times. But none of them had affected him as had the loss of Blackstone.

Blackstone had meant as much to him as any other living man. He had counted on Blackstone when the idea of his present organization first entered his mind. He had missed him more than he would admit even to himself during those five years. It was as though a half of himself had died.

Meetings with Blackstone's widow, Ann, were becoming more and more difficult for him, because she had not yet admitted that she was a widow.

"He'll come back, Bill," she said. Then she would tell him what things she had planned to do when he returned.

"He'll want to be with you, Bill," she would say. "He won't be happy unless he can be a part of your organization. You know how much he respected you, and loved you, Bill."

Bill was certain that her mind had been affected by the sudden death of Blackstone. He didn't try to disillusion her. He thought she was happier in her conviction that Blackstone would return.

On three occasions, when Bill had been in South America on expeditions of his own, he had tried to dig up some trace of Blackstone. He had placed the thing in the hands of his old friend Miquel Morales, the dictator of Samerra. But he had learned nothing—that is, nothing of any importance.

Time and again word came out of the jungle that a white man was living deep in the interior with native savages. In one story the white man was demented; in another he was a cripple. A native brought a story

out of the bush of a white man who had fallen from the skies.

Bill tried to trace those stories down. His efforts always brought him into a dead-end alley and came to a halt. Blackstone had disappeared as completely as had those two brave Frenchmen, Nungesser and Coli, in their attempt to fly the Atlantic from east to west. He was now a legend, a man who would be a part of the history of aviation. A man that airmen, if no one else, would remember.

The year 1935 passed for Bill Barnes with the speed of his bulletlike Scarlet Stormer. And during that year the red flame that was war spread its alarm over Europe. Aircraft development proceeded with feverish haste. Ships that had been considered of vital importance to the defense of nations became obsolete overnight. A ship that was regarded as the acme of perfection one day became fit only for training camps and back-area hangars the next.

The world went air mad as the ugly head of war reared itself above the billions of people who were desperately struggling out of a morass of world-wide depression and starvation.

It was late in the afternoon of a day in the early part of 1936 that Bill Barnes picked up the telephone on his desk and got old Scotty MacCloskey on the wire.

"Warm up the Stormer, Scotty," he snapped into the mouthpiece.

"You're going some place, boy?" Scotty asked.

"Up where I can think," Bill answered. "Tell Tony to contact me when Major General Robertshaw arrives. I'm expecting him almost any time. I want to get the cobwebs out of my head."

Fifteen minutes later he climbed into the sealed cabin of the Stormer and threw off the wheel brakes. The sleek ship swung lightly around and rolled down the concrete runway. Transverse bands of yellow-and-black pigment flashed beneath the wings. Where the main runways converged in the center of the field, Bill kicked the rudder and turned the ship into the wind. The engines blasted. The flaps came down as twenty-four hundred horses took the ship into the air. The landing gear disappeared inside the belly of the red streak as the flaps came up. The air-speed indicator moved up to two hundred miles an hour as Bill poured juice into the engines while he probed the air ahead.

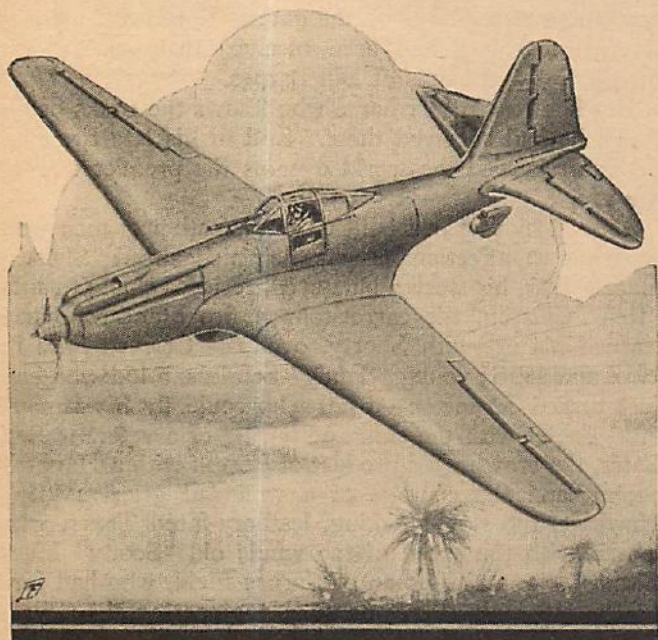
A grim smile twisted his lips as the needle crept up to two fifty, three hundred miles an hour. His tanned hand tightened on the control column and drew it back. The altimeter raced to keep company with the air-speed indicator. At ten thousand feet he leveled off. The red ship was flaming through the air at three hundred and fifty miles an hour.

Long Island spread itself out in a long back ribbon between the creamy strip of water that was the Sound, and the Atlantic Ocean. Montauk Point was underneath him; then was gone.

Bill adjusted the flaps and propeller-pitch controls and switched on the oxygen tank as the air began to thin. At thirty thousand feet he straightened out again.

As the Stormer fled into a layer of clouds, Bill settled back in his seat. The blue canopy of heaven opened up above him. Great rolling, white valleys, dotted with minarets and spires spread out below him in the clouds.

"Now," Bill said to himself, "I can think. I can decide whether I'm going to release the secrets of the



Cortez' dun-colored monoplane.

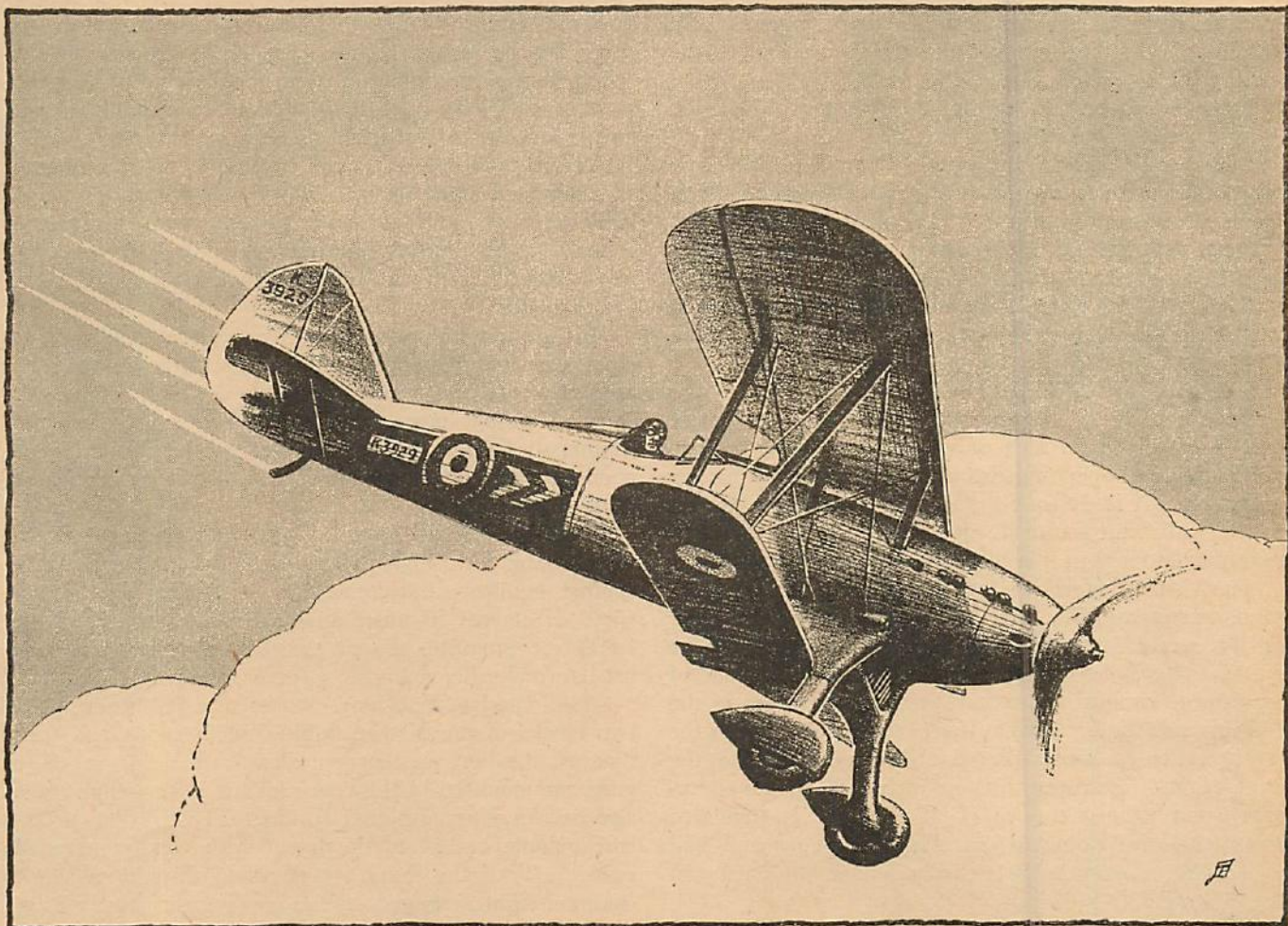
Stormer to the United States government or keep them for myself. If the country was actually at war it would be a simple matter to decide."

He caressed the control column of the Scarlet Stormer as an owner might caress the silky nose of a thoroughbred three-year-old. From the iridescent arc of the propellers to the taut tail surfaces, the Scarlet Stormer was a loved child of his own creation. He had worked like a madman when things had been the blackest to put the ship in the air to win a round-the-world race. The money he had won in that race had been the nucleus of his present organization. During the past year and a

Another red light bloomed on the instrument panel as the wing flaps opened and the landing gear began to unfold. A click sounded and the red light was extinguished. The pontoons were locked rigidly in place as the Scarlet Stormer touched the runway with scarcely a jar.

He taxied up to the apron and swung the big red ship around. A few minutes later he mounted the steps and returned the respectful salute of a guard at the door of the administration building.

"I'm out to every one," he said to young Sandy Sanders as he opened the door of his private office.



The cannon-equipped Fairey Fantome, Britain's high-performance fighter.

half the Scarlet Stormer had never failed him. It was the greatest military plane in existence.

Bill flipped the radio switch as a light burned a bright red on the radio panel.

"Calling B. B. . . . Calling B. B." Tony Lamport's voice said into his ear.

"O. K., Tony," Bill answered. "This is Bill."

"Major General Robertshaw is on his way, Bill. I just had word a few minutes ago. He's alone, flying a P-26."

"I'll be in in a few minutes, Tony," Bill said. "Take him to my office."

"Signing off," Tony said.

Bill took his bearings, kicked the speeding ship around, and stuck its nose down through the clouds. While the ground raced up to meet him he made up his mind. He knew there was only one decision for him to make, and he made it.

"I'll be here if the general wants to meet me," Sandy hissed at his back, his freckled face grinning.

Bill Barnes pushed his white helmet back on his head as he advanced across the room to shake hands with the trim man who arose as he came into the room. His pleasant face was wrinkled as he smiled into the stern, grim face of Major General Robertshaw, commanding general of the GHQ air force of the United States army.

"This is an honor, sir," Bill said simply.

"I'm afraid," Robertshaw said, "you don't know your fame, Barnes. A major general rates nothing in this country, when Bill Barnes is around."

Bill waved a hand to dismiss the general's words and crossed the room to open the door of an innocent-looking closet. Inside were coats on hangers and a shelf with two or three hat boxes. Bill's finger pressed a concealed switch and the whole back of the closet swung open, revealing a flight of steps leading somewhere below.

"We can talk down here without any danger of being overheard," he said to Robertshaw.

The general followed Bill down the steps and into a brightly lighted passageway. At the end of the corridor an armed guard saluted smartly and unlocked a steel door. Bill produced a key similar to that used by the guard and turned it in a second lock. The massive steel door swung open, and they entered Bill's secret workroom and study.

Robertshaw looked around with interest at the well-guarded vault in which Bill's confidential plans and records were kept, and inspected the priceless collection of technical books, scientific monographs and translations from the works of leading foreign aviation experts. He gazed with gleaming eyes at the designs tacked to the drafting tables against one of the walls.

"This is where you do it, eh, Barnes?" he said. "You're well protected down here."

"I have to be," Bill said simply. "You've no idea how many times enemies have tried to get at the stuff in here. They've even used bombs, but this place is bombproof."

"I can understand," Robertshaw said. They both sat down in large, comfortable leather chairs.

"I couldn't say what I wanted to say in my letter to you," Robertshaw said in a moment. "But perhaps you got the idea."

"I think I did," Bill said. "I——"

"Wait a minute," the general interrupted. "First, I want to give you an idea of what we're facing to-day. Every nation is spending more and more money for air equipment. It is difficult for us to get accurate figures. It is also difficult for us to get appropriations that will keep our air force in line with those of other nations."

"The General Headquarters Air Force, which I command, was created last year. It is that part of the army air force located within the continental limits of the United States. I am responsible to the chief of staff of the army in time of peace, and to the commander of the field forces in time of war. I am responsible, within the limits of the resources placed at my disposal, for the preparation of the peace-time air force, and for its operations against the enemy in event of war. It stands to reason that if I cannot prepare in time of peace I will not be able to operate successfully against the enemy in time of war."

"We have almost impossible difficulties getting appropriations. As you know, a few years ago a first-line bomber could carry 1,500 pounds of bombs for 245 miles and return. To-day, the first-line bomber carries 6,500 pounds of bombs 435 miles and return. But a few years ago those bombers could be built for around fifty thousand dollars. To-day, the latest in bombers runs from two hundred thousand to four hundred thousand dollars. That is the price of speed, climb, and duration."

"The English Heyfords, the French Farmans, the Russian giants, the American Boeing 299, the Martin and Douglas bombers, all cost terrific sums to build. We can keep up to other nations in fast bombers if the politicians leave us alone."

Robertshaw stopped speaking and peered at Bill.

"I want you to remember, Barnes, what I am telling you is entirely confidential. And I want you to absorb what I say. I am leading up to my reason for coming to you."

"Naturally, I will consider it entirely confidential," Bill said. "I am more interested in what you are saying than you can possibly imagine."

"Good!" Robertshaw cried. "During 1917-1918 we had competent engineers, but they were baffled and confused by bureau chiefs with some political axes to grind. As a result, our designs were obsolete long before production was started and we had to rely on our allies for service planes. In our next war we may have no allies. We must have plenty of fully equipped plants available for rapid production on short notice."

"My job is to have four classes of tactical ships ready when, and if, the time comes. First, I must have observers ready to discover and maintain surveillance over hostile forces threatening to attack. Second, I must have bombers capable of carrying heavy loads of bombs to great distances. Third, I must have attack ships to carry lighter bombs shorter distances, and also to lay down heavy machine-gun fire, smoke and chemicals. Last, I must have pursuit ships to intercept and destroy hostile aircraft in flight and protect my first three units."

"We've got to be ready and waiting to operate against an enemy on short notice. They won't wait for us to build airplanes and accessory equipment, and train personnel. They'll attack. If we are ready, they probably won't attack. But you know all that."

Bill nodded.

"In the first three groups I have mentioned—namely: observers, long-distance bombers, and attack ships—we are fairly well prepared. But we do not have the pursuit ships we should have. Our navy has, among others, the Grumman fighter, for instance—a good ship, but is it good enough? As a matter of fact, this is the weakness of most nations."

"Now the British have brought out the Fairey Fantome. She is a high-performance fighter for defense against bombers and for attack missions. She has a speed of about 250 miles an hour and can climb about 2,800 feet a minute. Every possible refinement has been used to make her a highly effective weapon."

"Also, she has a 20 mm. cannon that lies between the two blocks of the V-type liquid-cooled engine and fires through the bore in the propeller shaft. Two machine guns are mounted in the center of the lower wing. She also carries four 22-pound bombs. The ship has a terrific volume of fire to the front, with rigidly mounted guns. All of the guns are operated through a single common sight arranged on the cowlings directly in front of the pilot and are fired separately or together with triggers mounted on the stick. The master cock for all guns is a foot button."

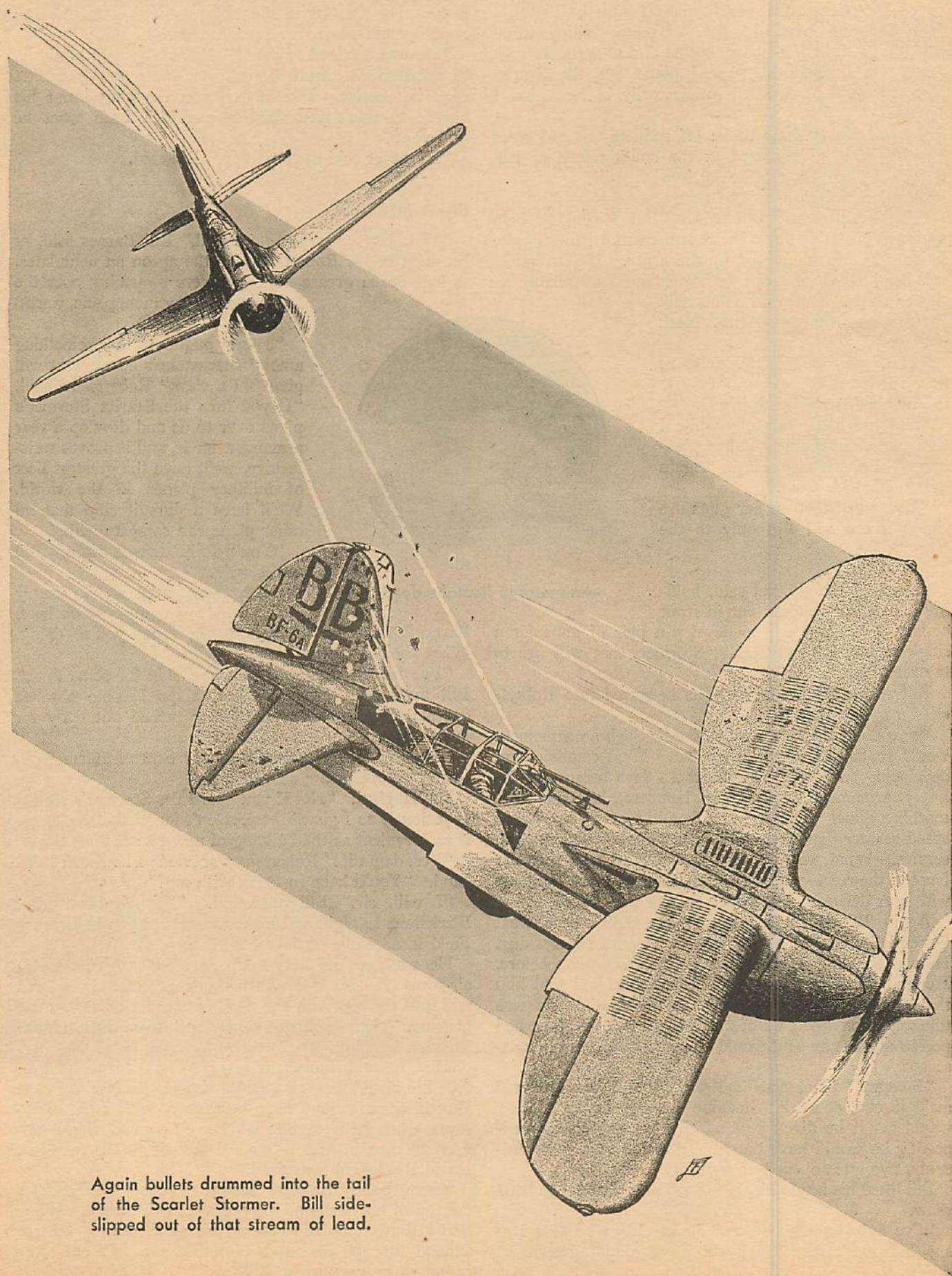
"Compressed air starts the engine, works the brakes and loads and fires the guns. The air is stored in a tank at the rear of the fuselage—also the motor generator and battery for radio equipment, handled by remote control from the cockpit."

Again Robertshaw stopped talking and regarded Bill sharply with his steel-gray eyes.

"You say you know why I came to you?" he asked, in a moment.

"I know," Bill said quietly. "You want the plans and specifications of the Scarlet Stormer. You want to use them for experiment and practice."

"That's right, Barnes," Robertshaw said. "She may not prove practical for mass military work. I know you built her for your own private use. We will have to find out how she will perform in formation flying and fighting. I know how she has performed for you. But mostly you have used the tactics of the individual aces in



Again bullets drummed into the tail of the Scarlet Stormer. Bill side-slipped out of that stream of lead.

the World War. Those tactics are a thing of the past. No longer can men like Fonk and Guynemer, Richthofen and Immelmann, Lufberry and Rickenbacker, peel off from their formations and go it alone.

"Each tactical maneuver formation must be flown in tight, compact order with the fast pursuit ships sitting only six or eight feet above, beside and underneath each other. Whether a high-speed plane like the Scarlet Stormer could be handled satisfactorily in formation I don't—"

General Robertshaw broke off suddenly as red crept into his face. He glared at the smiling face of Bill Barnes. Then he, too, broke into a smile.

"Pardon me, Barnes," he said. "I—I—"

"That's all right," Bill said. "But I couldn't help smiling a bit. I've flown the Stormer in formations quite as tight as anything used by the army. If your pilots can handle her, she can be maneuvered as readily as slower ships. But your pilots will have to be men who do not 'black out' readily."

"Then you are willing to let us have the plans?"

Bill nodded his head grimly.

"Did you listen carefully while I told you about the new Fairey Fantome?" Robertshaw asked. Again Bill nodded his head.

"You noted that all her guns are rigidly fixed and fire only to the front?"

"I did."

"Barnes," the general said, holding his right forefinger out in front of him, "we want you to develop a pair of guns for a single-seater, for the Scarlet Stormer, that will fire to the rear."

Bill shook his head slowly as he gazed into Robertshaw's eyes.

"You don't think it can be done? Such an armament would revolutionize aerial combat. Most countries are developing two-seater fighters these days because of the heavy armament of the new bombers, bristling with machine guns. The average bomber of to-day has a speed greater than that of the 1932 single-seaters still in service. What we need is a fast single-seater with defense to the rear—a single-seater faster than the Fantome with rear defense. Then we will rule the skies."

Again Bill shook his head. He didn't hear what General Robertshaw was saying as he went on speaking. He was thinking about that day nearly six years before. He was thinking what David Blackstone had told him that day before he flew away to his death. He was thinking about the pair of machine guns Blackstone had perfected, that he said would protect the tail of a single-seater.

"Imagine," Blackstone had said, "the difference it will make in combat work. Imagine the surprise an attacker would get if he dived on the tail of a single-seater expecting he would have no defense to the rear, and, suddenly, two guns opened up on him!"

Bill lifted his head quickly to interrupt General Robertshaw.

"I've only known one man in my life who ever had any luck with rear armament for a single-seater," he said.

"Has he been successful?" Robertshaw asked, his eyes gleaming. "Where is he?"

"He's dead," Bill answered. "And he left no plans or specifications of his secret. He was David Blackstone. He crashed in the jungle some place in South America and has never been heard from since."

"He was a friend of yours," Robertshaw said quickly. "I remember he worked with you when you were first receiving notice. Did he tell you anything about his idea? Couldn't you develop the idea from what he told you?"

"He never told me anything," Bill said.

III—A MESSAGE

"I'LL DO what I can, general," Bill Barnes said, as he stood beside Robertshaw on the apron an hour later. A half dozen grease monkeys were swarming over the low-winged army monoplane, warming it up.

"There ought to be something among Blackstone's effects that will give you a clew," Robertshaw said. "If you turn the Scarlet Stormer's plans over to us and develop a rear armament for it, and it proves satisfactory, we'll have the greatest fleet of military planes in the world. We'll have a pursuit ship that no other plane can compete with."

"You'll have that all right," Bill said slowly.

Robertshaw gazed at him keenly in the dimming light. "Look here,

Barnes," he said, "this is a big thing you're doing. What about yourself?"

"I've been thinking about a new ship for some time," Bill answered. "As you say, ships become obsolete overnight; new models are being turned out daily for flight tests."

"Your new ship can't make your Scarlet Stormer obsolete!" Robertshaw said, angrily.

Bill laughed. "Not if you guard the Stormer's secrets as jealously as I guard them. Don't forget that espionage is as prevalent as the building of new planes these days."

"Yes, damn it!" Robertshaw snarled as he shook Bill's hand. "You'll keep in touch with me?"

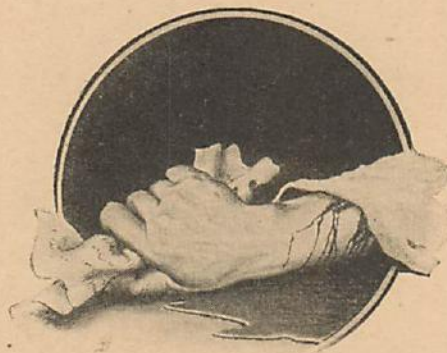
"I will, sir," Bill answered. "I'll telephone Mrs. Blackstone to-night and make a report to you at Langley Field in a couple of days."

He watched the fiery-eyed commander of the GHQ air force take his P-26 down the length of Barnes Field and into the air, with the dash of a cadet officer feeling his oats. Then he turned slowly back toward the administration building.

This, he told himself, is going to be a tough thing to do. He would have to spend a couple of days out in the Worthington Valley, near Baltimore, with Ann Blackstone, while he went through Dave's papers. He hoped that she had at last reconciled herself to the fact that David Blackstone was dead.

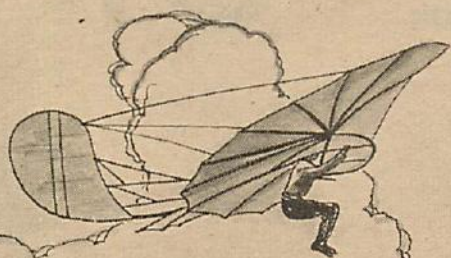
Young Sandy Sanders hastily removed his feet from the top of his desk and slipped the book he was reading into a drawer, as Bill entered his small office. He ran a hand through his sand-colored hair to hide his confusion as he grinned at Bill.

(Turn to page 46)

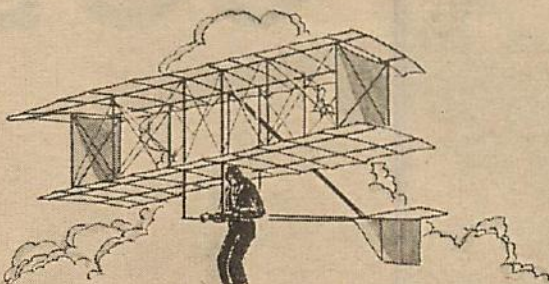


—a message from the dead!

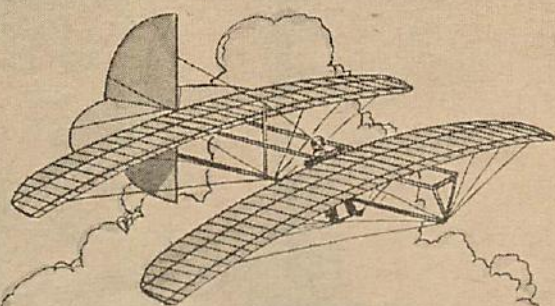
Glider Development



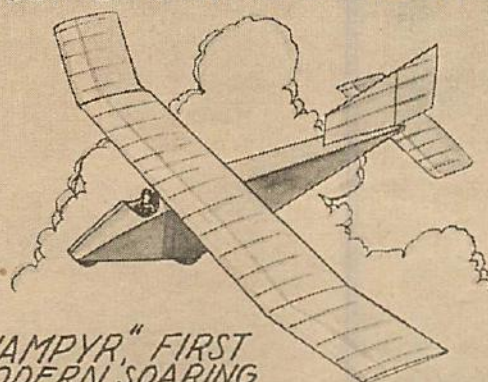
EARLY MONOPLANE HANG GLIDER
FLOWN BY OTTO LILIENTHAL
ABOUT 1892. VERY UNSTABLE.



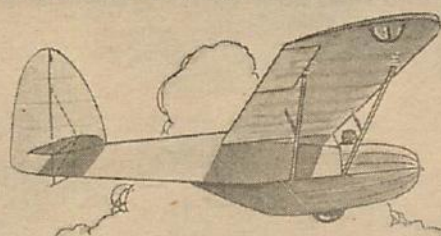
IMPROVED BIPLANE HANG GLIDER
FLOWN BY OCTAVE CHANUTE IN
ABOUT 1896. STABLE AND STRONG



TANDEM MONOPLANE GLIDER
BUILT ABOUT 1905 BY FIRST
GLIDER PILOT, JOHN MONTGOMERY.
VERY STABLE WITH GOOD CONTROL



THE "VAMPYR," FIRST
OF MODERN SOARING
GLIDERS. BUILT IN 1922
BY MARTENS HENTZEN
AND BLUME. MADE THE
FIRST ONE, TWO, AND THREE
HOUR SOARING FLIGHTS



THE FRANKLIN P.S. 2 UTILITY
GLIDER DESIGNED IN 1930
FOR TRAINING, SOARING, AND
PLANE TOWING. FLOWN BY THE
ARTIST AND FOUND RESPONSIVE.
VERY STURDY AND VERY STABLE

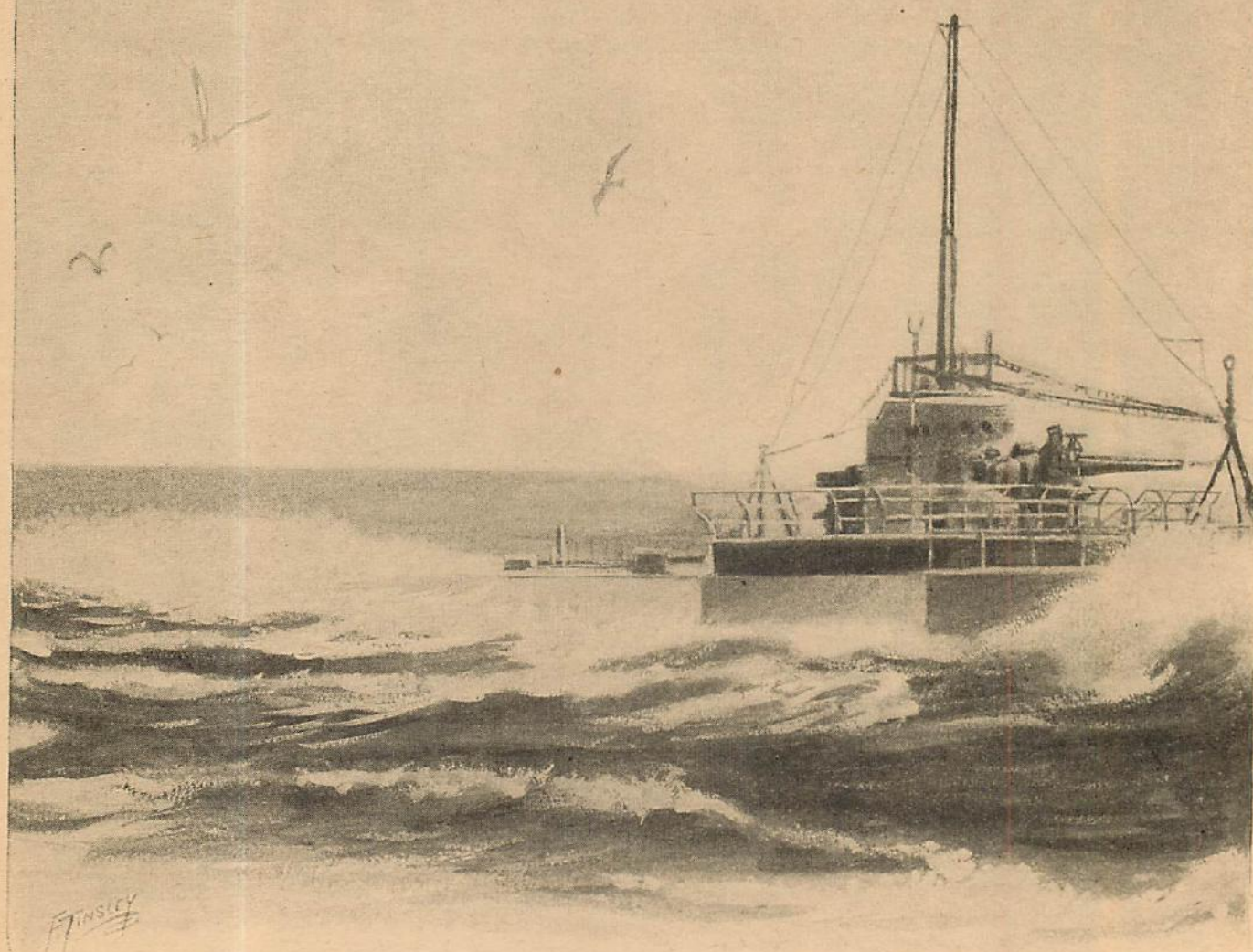


THE BOWLUS SOARER WITH WING
TIP AILERONS. THE FIRST SOARER TO
REMAIN ALOFT FIFTEEN HOURS. THIS
SOARING SHIP WAS BUILT IN 1929.



A NEW TYPE OF SOARER FEATURING THE "GULL WING" TYPE OF
AEROFOIL WHICH SLANTS UP FROM THE FUSELAGE AND THEN DOWN-
WARDS AGAIN TO THE TIPS. THIS ADDS GREATLY TO LATERAL STABILITY

CODE OF



CLINTOCK BENTON was a tall, lean man with a horse face. He had a massive nose and a mouth that was generous. He had a broad forehead and cold, steely eyes. His hair was thin and neatly brushed. His hands were massive and square, and the fingers seemed to be all of the same length. He spoke in a low, well modulated voice, and each word was pronounced with unusual distinctness.

The man before him had left a cell in Moordaunt Prison twenty-eight hours before.

"Plunging" Platt took in all these points as he stood

in Benton's massive library. But his eyes moved from his host to devour the trim airplane model that stood on Benton's desk.

The new Benton Brigantine!

"Sit down—er, Platt," Benton ordered. "Have a nice trip out?"

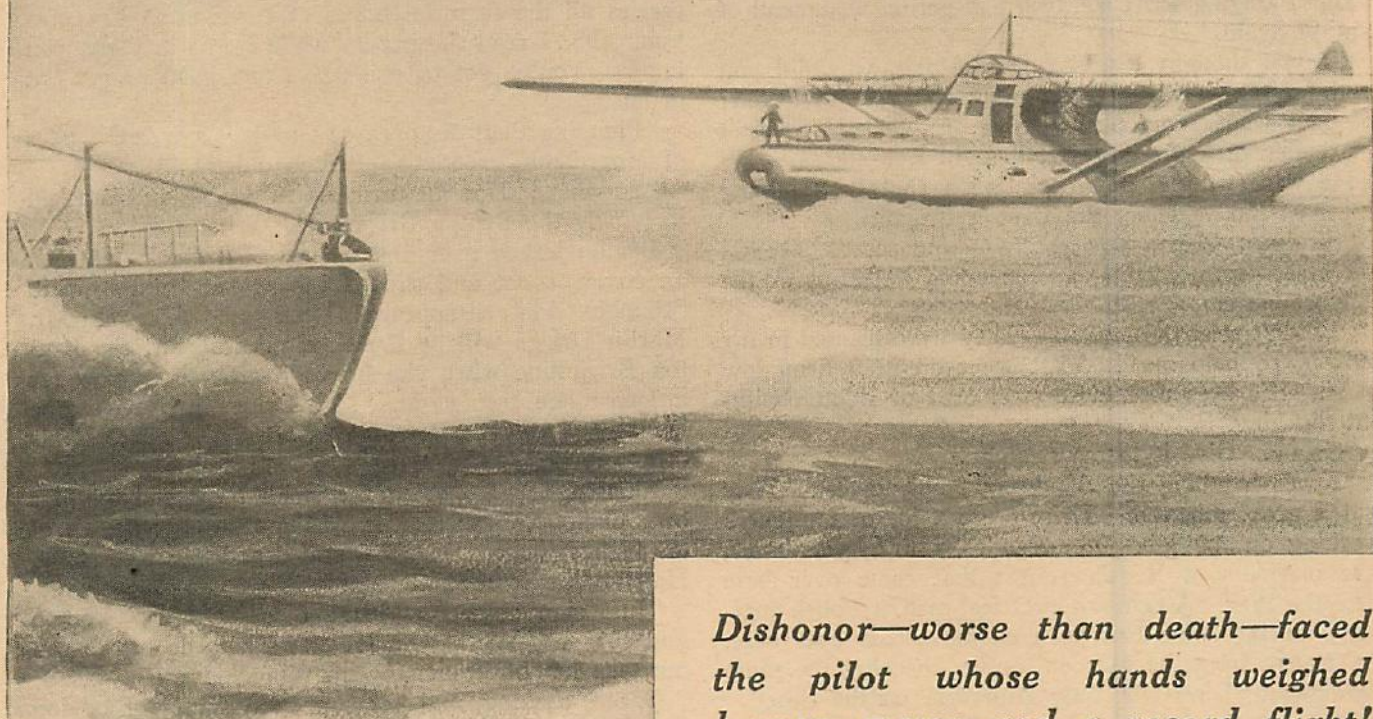
"Yes, sir. A very nice trip. But I'm pretty much mystified about it all, of course."

"Naturally. But we'll come to that later. I want to talk to you before we go down to dinner. We're dining alone to-night. My family is away for a few days, so

THE NAVY

By

ARCH WHITEHOUSE



Dishonor—worse than death—faced the pilot whose hands weighed human mercy and a record flight!

there's nothing to worry about—if you are worrying."

Plunging Platt did not answer. There was no answer to anything yet. He watched Clintock Benton take a sheaf of papers from the top drawer of his desk and study it. There were several lines of typewriting on it.

"Now let's get your history straight, Platt," opened Benton again. "Born in Boston twenty-eight years ago. You attended Malvern High and then received an appointment to Annapolis. Upon graduation, you took

flight training at Pensacola and rated high on all types. Is that right?"

"Yes, sir."

"You were sent to M. I. T. for a special post-graduate course in aeronautical engineering, went abroad to Europe for one year and observed military construction methods in several British factories. That right?"

"Yes, sir."

"After that you were chief pilot on the navy's experimental flight from New York to Cape Town, a remark-

able flight that covered both the north and south portions of the Atlantic. You received the Distinguished Service Cross for that effort?"

"Yes, sir, but——"

"I'll go on, Platt. About three years ago you left the navy for a short leave of absence to do certain experimental work for a noted Eastern aeronautical firm. During that time you became involved in the theft of a set of plans and were sentenced to two years in jail under civil law. While you served out your term in Moordaunt you achieved considerable fame on the prison football team."

Platt gulped and finally got out, "Yes, sir."

Clintock Benton sat studying the paper for several minutes. Plunging Platt was staring at the model on the desk. His fingers were twitching and fumbling for something to mangle.

"Well!" Benton suddenly snapped in a loud voice. "What are you waiting for?"

"Nothing!" gasped Plunging Platt in a hoarse whisper.

"Is that all?" replied Benton, swinging around and facing his man with eyes blazing. "Did I bring you all the way out here for nothing?"

Plunging Platt sat stiff in his chair, uncertain what move to make next. Benton went on.

"So you were guilty, eh? You *did* steal those plans of that flying boat and take them across the border, eh? Well, that's all I wanted to know. You can go—now!"

But Plunging Platt succeeded in getting command of himself again.

"If you thought I was guilty of that, why did you send for me? Expect me to pull something for you? Do you want some plans from somewhere? Doesn't this boiler click the way you thought it would?"

He was standing now, pointing a slightly trembling finger at the model of the Benton Brigantine.

"Sit down, Platt. Now you're talking. Let's have it."

He sat down, panting and gripping the arms of the comfortable club chair.

"I didn't steal those plans. They were planted in my cockpit, so help me!" Platt went on in a firm, low voice. His eyes met those steel orbs of Benton without flinching.

"Go on. Give it to me straight."

"I was handling the Sandusky seaplane test. They had a great job, too. There were a lot of foreigners working on the job. The Sandusky firm, you know, was originally a Russian outfit that came over here after the War. A German electrical man, a Polish engineer, putting some European engine across over here. An Italian from the Marconi outfit, checking the radio equipment. I was the only American on the ship."

"I know that much. Go on with your side."

"Well, on the day in question, I went back to the office to get a folio of clearance papers that had been arranged for us, so that we could do the South American trial trip with as little customs trouble as possible. But the plans of the Sandusky Shark—it was a high-speed torpedo-bomber with a lot of new stuff on it—had been slipped in that big brown envelope by some one inside. I had access to the safe where these clearance papers were kept, and when the stuff got across to Venezuela, I took the rap. Actually, the rest of my crew pulled it from start to finish. I was just a carrier. That's the true story, and I've never been able

to tell it before, because in court they would not admit the names of these foreigners who had been aboard. It was kept out of court—why, I don't know, unless they were afraid of some international complications."

"That's the angle I have been trying to get at, Platt," Benton said quickly. "Do you know where those men went?"

"No, sir. I do not. They shoved me off to Moordaunt so fast that I couldn't get anything straight."

"That's what worries me."

"What do you mean?"

"Never mind. Maybe I'm just queer, but I would like to know where those birds went to."

"I might be able to find out, if that's what you want me for."

"No. This is something different. How do you like the Brigantine?"

"This? This ship, sir?" replied Platt. "She looks all right. Why, what's the matter with her?"

"You still think I'm after something, eh? Well, I am. I'm after you, to pilot her on her six-thousand-mile flight test. How does that sound?"

"I guess it's time to go," replied Platt, getting up again.

"Sit down. I mean it. That's why I brought you out here."

"Of course. You are going to send Plunging Platt, the penitentiary wonder, up in the air with a ship that cost nearly a million dollars. A government job, that carries all the financial hopes of the Benton Corporation. Oh, I read the papers while I was in there, you know. You've got to make this one good or get out of business."

"Plunging Platt disappeared two days ago at the gates of Moordaunt," reminded Benton quietly.

"So what? Now he turns up in Seattle and is asked to test-fly the Benton Brigantine. What on?"

Benton leaned over and opened a drawer. He took an envelope out and slipped the rubber band from it. "Plunging Platt disappeared, I tell you. A certain Mr. Martin Driggs will be the chief pilot aboard the Benton Brigantine when she leaves Seattle to-morrow for a long-range test flight. Mr. Driggs arrived at the home of President Benton this afternoon. Here's his transport ticket, if you care to look at it."

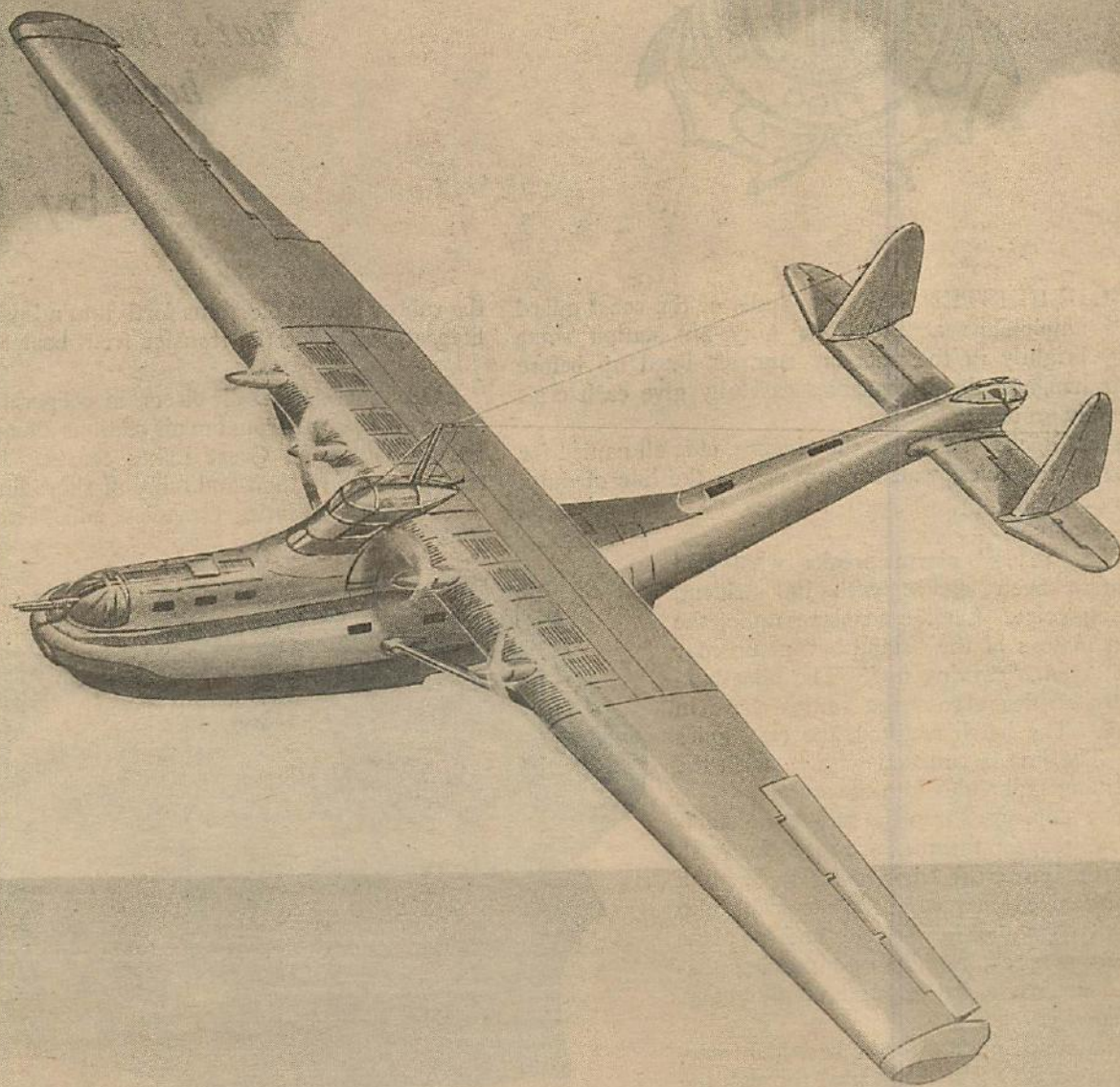
Plunging Platt opened the small book and saw his own photograph there. It was a transport license of the highest rank. Stamped, sealed and dated correctly. He stared at it in amazement.

"Just sign your new name there, Driggs," Benton said coolly. "We have a lot of work to do before you can take her off to-morrow morning."

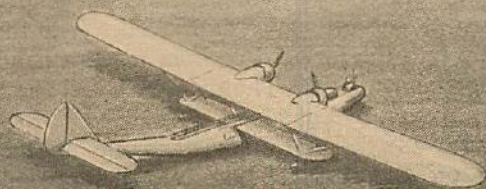
Dazed, shaking, and yet supremely happy, Plunging Platt wrote: "Martin Driggs" underneath his photograph on the transport license.

SOLLY BLAINE took them down to the Benton seaplane apron and they went aboard the Brigantine and studied her from rudder to front cabin. "Hod" Stevens, the man who had made her first shakedown flights, took her off and let Driggs handle her in the air. Two years slipped away from the ex-navy man's shoulders in two minutes. The big four-engined seaplane handled beautifully, and he had no trouble with her landings or take-offs.

"He'll do, Mr. Benton," Hod said (Turn to page 72)



The men aboard the Brigantine were stunned. Driggs was guiding the finest piece of flying equipment the world had ever seen down to the white plane bobbing on the ocean below.





"Always

*That's the coast guard
heroes of peace on*

by Sidney

THE GLISTENING silver hulls of the coast guard amphibians at the Cape May air station shine brightly in the noonday sun, as, lined up before their hangars, their mechanics carefully give each craft its daily grooming.

The *Capella*, the *Spica*, the *Adhara*, etc., all named for stars of the skies, wait for any call in the line of duty, day or night.

Gong!

The "ready" alarm breaks what had hitherto been silence with its strident, urging voice. On the seaplane ramp, the twin motors of the "stand-by" plane roar into action, "revving up." The pilot hurriedly strides across the ramp, chart in hand. The hatch is lifted, the crew piles in. The line is cut, and with a swish the gleaming hull slides into the water.

The ship noses into the wind; the stabilizer is set; the throttles are eased forward, and the powerful engines bellow with a synchronized roar as the plane leaps into the air. Another few seconds and the plane is but a speck, rapidly disappearing seaward against a background of an angry, sullen sky.

The radio operator at the base had intercepted an S O S that crackled through the ether from a small vessel twenty-odd miles off shore:

"Fire on board. Request immediate assistance. Hurry, please!!!"

The seaplane gained altitude slowly, then steadied on its course.

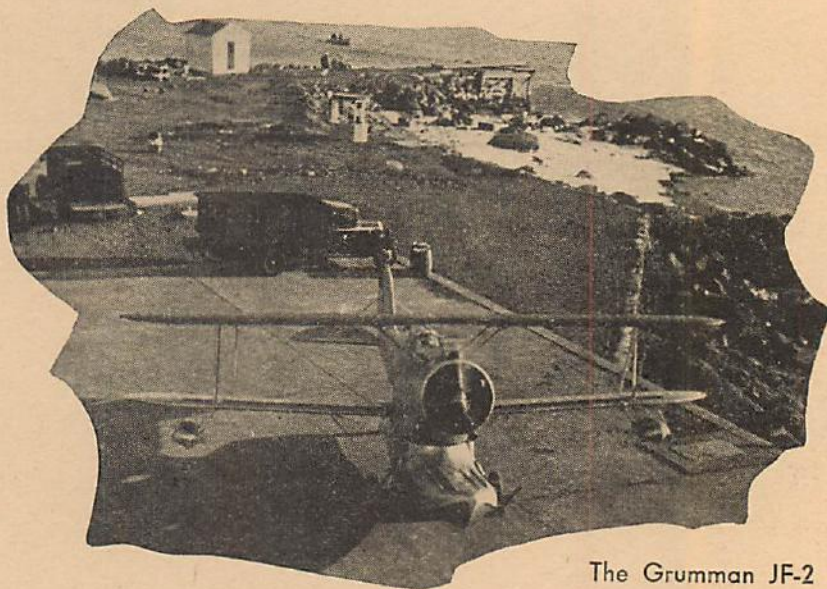
Fifteen minutes later the plane's radio crackled, "Ready to land" and then was quiet as all hands prepared for the dangerous task of rescue.

Swooping gracefully around, the aircraft engines' roar died down as she gradually descended. The mechanic, coming up into the forward cockpit, stuck a hand out of the window and waved. The men on board the burning boat were frenziedly signaling.

The CG 130 settled and thumped solidly into the waves, bouncing off the first, sliding into the second. The engines were cut, the hatch thrown open; a sacklike bundle of heavy yellow-covered rubber was thrust out—the trigger of a large CO₂ cartridge pulled, and presto!

the rubber bundle blossoms forth into a husky, eight-man lifeboat, ready for the transfer from boat to plane.

COAST GUARD air fleets, in coöperation with surface craft, operate from ten air stations along the Atlantic, Pacific, Gulf, and Great Lakes coasts. They patrol a total of over five thousand miles of shore line, in addition to covering the entire Canadian and Mexican borders.



The Grumman JF-2

Each plane, out on an ordinary patrol flight, may cover an area of approximately six thousand square miles every day it is in the air. Fifty coast guard aircraft are strategically placed at these bases throughout the United States, and are in flight every day on which it is possible to fly. On many days, when all other aircraft are grounded by adverse weather and other conditions, they take the air. The saving of lives and aid to the injured know neither time nor place, nor weather.

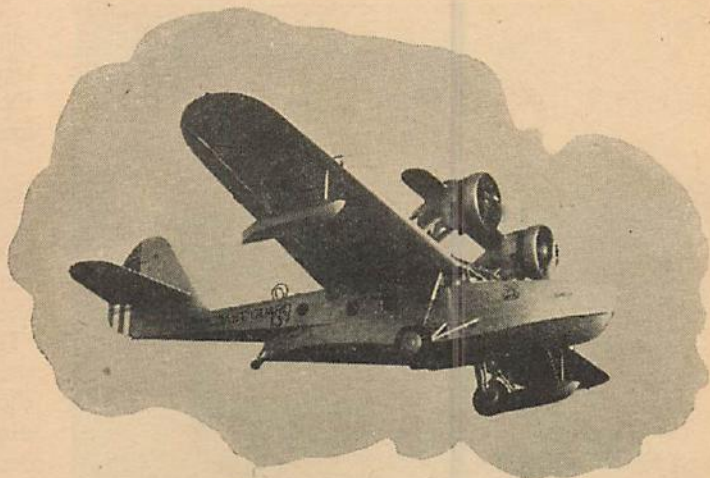
Coast guard aircraft may be divided into four distinct types. First the large, extremely seaworthy, but comparatively slow FLB Fokker "Flying Lifeboats," seaplanes which depend for power on two P&W 420 horsepower engines, giving a cruising speed of eighty miles per hour and a maximum speed of about one hundred miles per hour.

The FLBs have proven themselves continually steady

Ready"

*motto that guides flying
thrilling sky patrols.*

Ross



The Douglas RD-4 Dolphin

and capable of withstanding much hard usage. Next are the Douglas RD-4 amphibians or Dolphins, as they are sometimes called, twin-motored patrol and rescue planes that are equipped with two P&W 450 horse-power Wasps, under which they average a cruising speed of about one hundred miles per hour and a maximum speed of about one hundred and thirty miles per hour.

Following this, we have the Grumman JF-2s, the power plant of which is a 715 h. p. Cyclone, which gives this aircraft a cruising speed of one hundred and twenty-five miles per hour and a top speed of approximately one hundred and ninety miles per hour. The JF-2s are the scouting amphibians and "eagles" of the service. The first three types are used for patrol, scouting, and rescue missions.

Finally, there are miscellaneous single-seater land planes, such as Vought Corsairs, Northrops, Consolidateds, and Stinsons for various overland work.

Coast guard air activities vary from the duties of making thrilling rescues at sea to the hunting down of hardened criminals in this country's interior swamps and woods. The planes work in conjunction with their service vessels at sea; and on land, with the secret service, the customs, the internal revenue, and narcotics squads.

Every station has a stand-by plane warmed up at the ramp, ready to depart at an instant's notice; ready to track down a smuggler hovering along our shores; ready

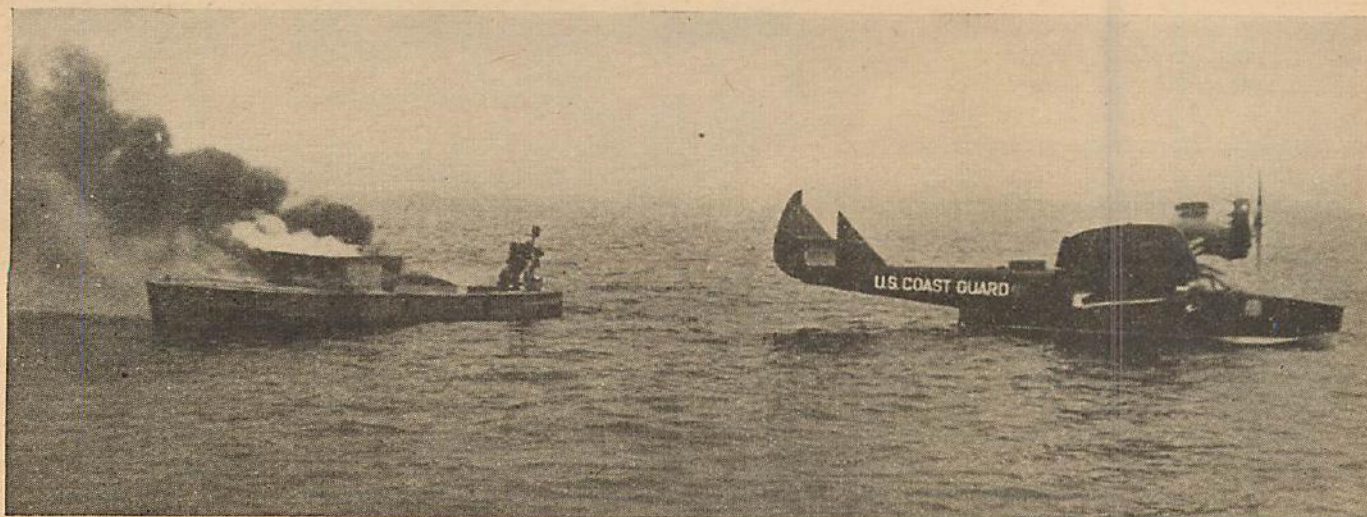
to answer the plea for aid and to become the ambulance of the skies for some stricken sailor at sea; ready to land in the treacherous waters of far-off islands to transport their stranded patients to hospital and safety.

Coast guard airmen stand proudly among the most efficiently trained aviators in the world. Eight years of highly intensified training and study are necessary between the time that an officer enters the service and the time he finally completes the aviation course.

He starts with four years at the Coast Guard Academy, located at New London, Connecticut, a highly specialized and technical military college that is similar in scope to the naval and military academies of Annapolis and West Point. After these four years of training, he obtains his commission and becomes an officer aboard one of the many coast guard surface craft. After three years of familiarization with navigation, gunnery, and the sea, he is eligible for specific aviation training. If the stringent physical examination is passed, he proceeds to the naval air training station at Pensacola, Florida, where he undertakes one year of intensive aviation training.

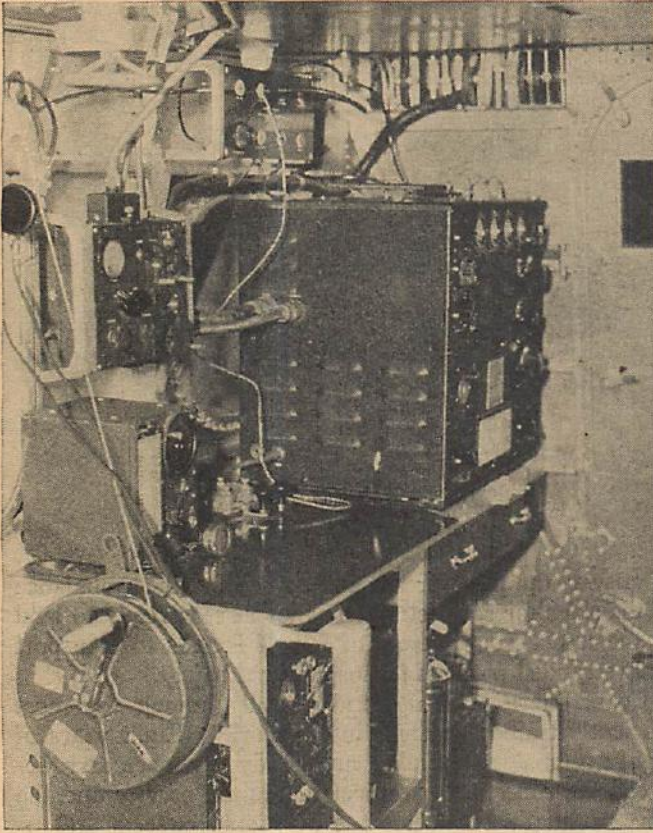
After completion of this course he has three hundred and fifty solo flying hours to his credit, and is designated as a "coast guard aviator."

Any American boy of excellent character, possessing a high school or college education, and under twenty-two years of age, has an opportunity to qualify for entrance.



The boatman's most dreaded enemy—fire at sea! But the coast guard has flown to the rescue.

Photos by Rudy Arnold



Four hundred pounds of powerful, up-to-date radio in a Douglas Dolphin cabin.

Appointments to the academy are obtained strictly on the basis of competitive examination. Every year approximately fifty candidates are selected from the thousands of applicants throughout the United States, and these fortunate few embark on the thrilling career of the coast guard service, a service of tradition and honor older than the navy itself.

A recapitulation of the duties of the coast guard air division, given in more detail, serves to bring out further the diversity of its activities.

The St. Petersburg and Miami, Florida, bases have worked out a comprehensive plan, to avoid the tragic loss of life which has attended the terrible hurricanes.

Operating in conjunction with the United States Weather Bureau stations in that area, coast guard amphibians are put in readiness at the first hint of a hurricane's approach. Planes are loaded up with hundreds of "message blocks," which are flown out at sea, and dropped to fishing vessels, sponge-fishing fleets, etc.

These boats are out of touch with land for weeks at a time, and have no means of communication. The planes speed along from vessel to vessel, covering a large area, and drop these hurricane warnings, urgently advising a quick return to shore and safety. The message blocks contain a slot in which is inserted a detailed message of instruction, giving the course of the hurricane, the time it is expected to strike, etc. Similar duties are performed by planes which fly over the many southern keys, bombarding these tiny settlements with warning messages.

During the last crisis the coast guard aircraft accomplished herculean feats of mercy before the hurricane struck, and no sooner was the storm's force abated, than the planes were in the air again, combing the stricken areas, rescuing the injured. Day and night the work was carried on, without cessation, earning for the service the commendation and thanks of officials from all walks of life.

A plan is now being worked out to equip planes with loud speakers. Another idea being considered is to have the planes tow large "sky signs," bearing the words: "Hurricane warning," when the storm is on its way.

Aircraft transmitters, with a radius of well over a thousand miles; receivers, with a far greater range; direction finders that are unsurpassed, all operate successfully under all conditions.

The direction finder, a radio that will find any vessel that may send out an S O S or other signal, has a loop antenna which is rotated through the various degrees of the compass. This antenna is operated by remote control. When the face of the loop points directly at the source of the incoming waves, the radio signals die out completely. This is called the "null." The compass reading at which this occurs is called the "relative bearing" of the sender. By keeping this direction finder in operation constantly, and the plane headed on a zero relative course, this invisible wave line may be followed to the plane's ultimate destination.

One instance in which the direction finder was instrumental in saving a life was when a vessel, about one hundred and twenty miles off shore, sent through a message that a seaman was in immediate need of medical attention; his skull had been broken. A coast guard plane was dispatched—but the vessel had neglected to give any other position except that it was "one hundred and twenty miles off shore and headed for Norfolk."

After the "in the air" signal had been dispatched to



Coast Guard Photo

The Fokker FLB

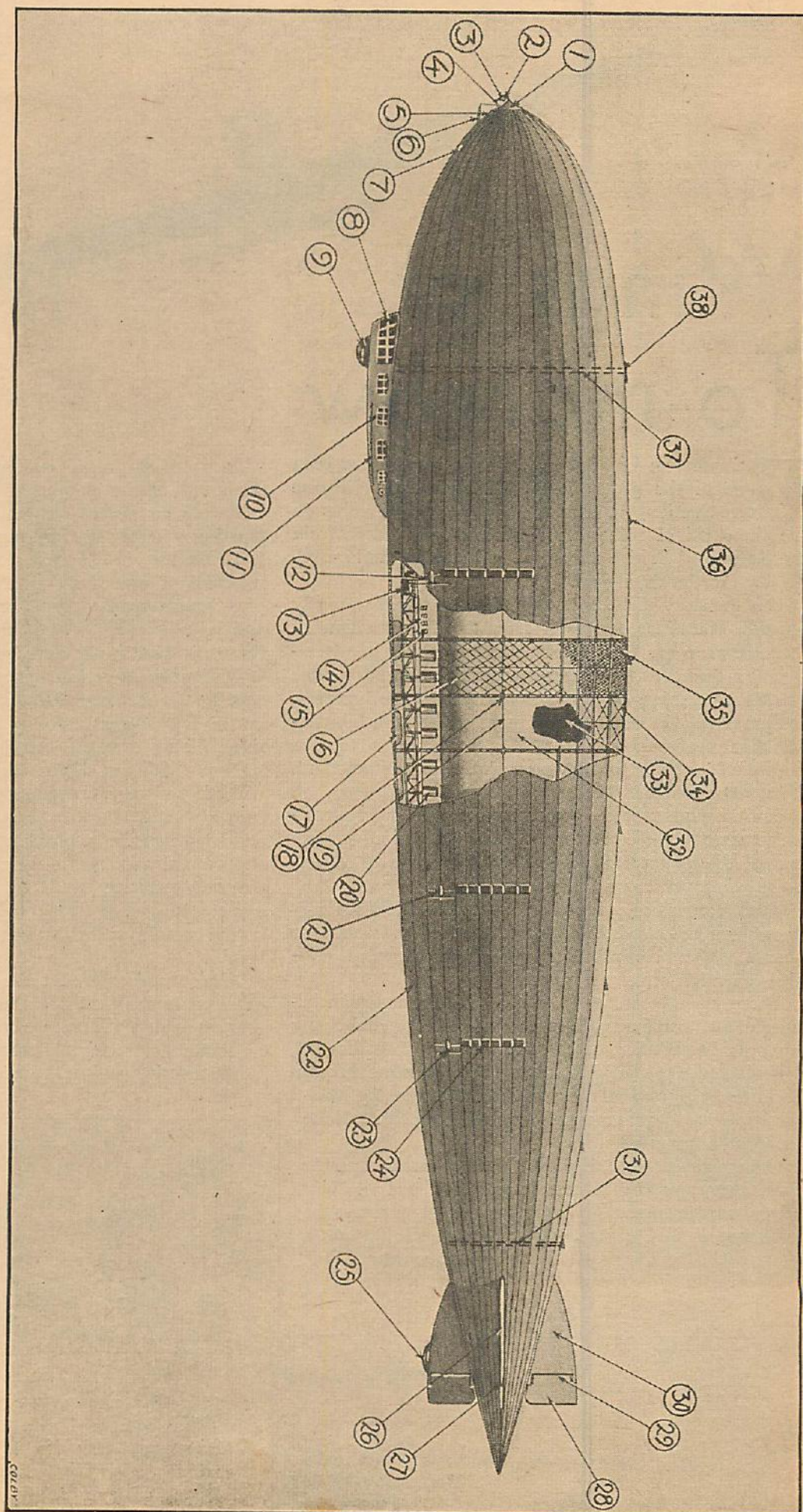
the home base, the plane's radio man communicated with the boat and obtained a radio direction-finder bearing. Trusting solely to the instrument's accuracy, this course was followed for about forty-five minutes, scudding through a light fog that made for very poor visibility. Nothing farther ahead than two miles could be observed. Suddenly, out of the mist, a dark hull appeared. The plane spiraled down to a landing, took the man on board and sped to Norfolk, where one hour later he was resting comfortably in a hospital bed. (Turn to page 76)

THE FLIER'S DICTIONARY

The eighth lesson in the technical terminology of the air. Save your files!

RIGID DIRIGIBLE BALLOON

- 1 BOW CAP
- 2 MOORING CONE
- 3 MOORING CONE
- 4 MAIN MOORING LINE
- 5 GANGPLANK DOOR
- 6 GANGPLANK
- 7 WATER BALLAST DISCHARGE
- 8 CONTROL CAR
- 9 P N E U M A T I C BUMPER
- 10 OFFICERS QUARTERS
- 11 HAND RAIL
- 12 P R O P E L L E R DRIVE SHAFT
- 13 MOTOR WITHIN THE HULL
- 14 CREW'S QUARTERS
- 15 PARACHUTES
- 16 WIRE NETTING BETWEEN CORD NETTING AND FRAMEWORK
- 17 WATER BALLAST CONTAINERS
- 18 AXIAL CONE
- 19 AXIAL CABLE FROM BOW TO STERN
- 20 FUEL AND DRINKING WATER CONTAINERS
- 21 EXTERNAL DRIVE GEAR BOX
- 22 OUTER COVER
- 23 THREE-BLADED PROPELLER
- 24 WATER RECOVERY APPARATUS
- 25 STERN BUMPER ATTACHED TO VERTICAL FIN (LOWER)
- 26 HORIZONTAL STABILIZER
- 27 ELEVATOR
- 28 VERTICAL RUD- DER (BALANCED)
- 29 BALANCING AREA
- 30 VERTICAL FIN
- 31 GAS SHAFT
- 32 GAS CELL COVER- ING
- 33 GAS
- 34 DIAGONAL BRAC- ING WIRES
- 35 CORD GAS CELL NET BETWEEN CELL AND WIRE NETTING
- 36 MANEUVERING VALVE HOOD
- 37 CLIMBING SHAFT TO OBSERVATION PLATFORM
- 38 OBSERVATION PLATFORM



The Vickers Wellesley, shown in view enlarged from our last issue, is first plane of geodetic structure.

Wings of To-morrow

THE problem of high aspect ratio, which has been one of the great practical difficulties in airplane construction, appears to have reached a point on the threshold of solution. A recent news letter from the Society of British Aircraft Constructors, Ltd., gives details for the first time.

It is the story of years of experimenting, and strangely enough, comes as a lesson from the construction of dirigible airships. A sort of "chicken-wire web," developed for tensile and resistive strength in the outer skins of the great ships, gave the suggestion to the inventor.

If meshed arcs could test to great strength in the construction of gigantic surfaces, why should they not prove insuperably strong in the comparatively tiny expanse of airplane wings?

And if experiments could prove this to be a practical thesis, would it not finally solve the desired perfection of the monoplane wing, making the use of the biplane construction no longer necessary?

With the possible exception of a few individuals in the throes of over-imbibing, no one has ever seen or "heard tell of" a bird with two sets of wings on each side—in other words, a biplane bird!

There must be some reason for this phenomenon besides nature's difficulty in rigging up landing and flying wires for her feathered offspring. True, you will argue, but what monoplane bird, no matter how powerful, can begin to keep up with the machines that are the modern product of man's insatiable desire to fly? None can that I know of.

On the other hand, if planes used as small a power plant in proportion to the span and chord of their wings as the muscular mechanism that powers the majority of bird wings, think how much farther a plane would be able to go on the same quantity of fuel.

The main objection so far to the monoplane wing

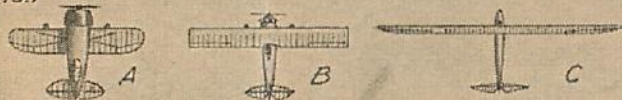
with which birds are equipped, as applied to aircraft, seemed to be the inability of aeronautical designers and engineers to build strength and rigidity into a long, tapering wing of the high aspect ratio desired.

To clarify our discussion, let's review right here the meaning of aspect ratio. Aspect ratio is the relation of a wing's span to its breadth measured fore-and-aft, and is expressed by the number obtained by dividing the wing span by the average breadth.

Of course, in certain types of military aircraft a low aspect ratio is more desirable, as it tends greatly to increase fast maneuverability and high speed. Pursuit ships, diving bombers, certain light bombers, and planes such as shipboard fighters where small size is required, will always be an argument for short, comparatively stubby wings. On the other hand, the modern transport and long-distance bombers whose maneuverability is secondary in importance to their load-carrying and distance-covering qualities, would be vastly improved by a high-aspect ratio wing that could support the great weight of the motors and the payload, whether passengers or bombs.

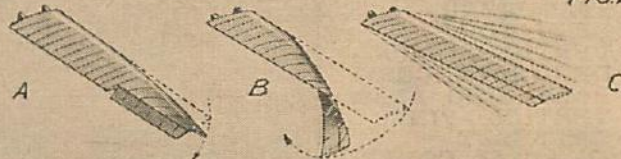
The only aircraft that has been able safely to use the extreme high-aspect ratio wing has been the delicate soaring glider. Here we have extremely low weight, no motor, and the smallest possible load of passengers. Consequently, engineers have been able to design soar-

FIG. 1



A - RACING PLANE WITH LOW ASPECT RATIO OF 5
B - AVERAGE PLANE WITH ASPECT RATIO OF 7
C - SOARER WITH HIGH ASPECT RATIO OF 20

FIG. 2



A - REVERSAL OF CONTROL, WING GOES DOWN, NOT UP
B - DIVERGENCE IN WHICH WING TWISTS OFF
C - FLUTTER IN WHICH WING OSCILLATES OFF

ing airfoils with aspect ratios as high as 20 (see figure 1) as compared with the usual commercial airplane with an aspect ratio of 7 or 8, and the racing plane with its stubby little wings of a ratio of 4 to 5. In a soaring glider, a high aspect ratio enables the craft to take advantage of the slightest up-currents and ride them for

Long, slim wings mean better climb, ceiling, load capacity. How they have been achieved by an amazing new invention is told in this valuable article.

by Calvin Block

hundreds of miles without benefit of a motor.

Naturally, a commercial ship with its heavy motor and payload would not be able to use such a high-aspect ratio wing, but if a strongly built happy medium could be reached, a great increase in distance and ceiling would be possible with the present efficient power plants.

The reason why such a wing needs absolute rigidity

opposite stick, which is frowned upon in the pilot's Emily Post book of "do's and don't's."

At B in the same sketch we see the second annoying habit of a long, non-rigid wing. This is called divergence by the text books and a variety of stronger things by pilots experiencing it. In this instance the wing merely turns down completely and then continues right on around until it twists off completely.

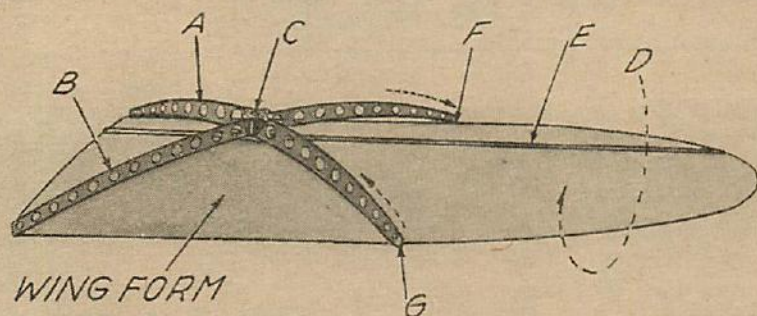
The last trick of this type of wing, shown at C, is what is known as oscillation or "flutter." You will remember, when you were small, tying a string to the end of a thin piece of board and whirling it about your head to hear the "bull roar." If you missed this one back in those days, try it now; you will see what happens to the wing at C. The wing starts to oscillate, increasing its flutter until the structure collapses and the wing breaks up in the air.

If some one could develop a wing of comparatively high aspect ratio that was strong enough to withstand strains and aerodynamic stresses, these three problems would, in a great measure, be solved.

This wing structure, however, would have to be light in weight, or it would defeat its own purpose right from the start. It would have to be aerodynamically adaptable to aircraft of various types and purposes.

Such a wing apparently has been designed and built. The inventor of this astounding airfoil is Mr. Barnes

FIG. 3



A-GEODETIC LINE STRIP.
B-SECOND STRIP, SET AT
RIGHT ANGLES TO "A".
C-JUNCTION UNIT OF
THE GEODETIC LINES.
D-TWISTING STRESS.
E-SHEAR BEAM SPAR.

THE STRESS AT "D" TENDS TO BEND STRIP "B" DOWN AT "F", PUTTING "B" UNDER TENSION. THIS SAME STRESS FORCES STRIP "A" UP AT "G" PUTTING "A" UNDER COMPRESSION. AS COMPRESSION STRENGTH OF "A" EQUALS THE TENSION OF "B" WING REMAINS RIGID AND NO TWISTING CAN TAKE PLACE.

and utmost strength is shown in figure 2. The high-aspect ratio wing, unless rigid, usually does one of the three things illustrated during the test flight.

At A, we see one of the wing's favorite habits, known as reversal of control. When the aileron on the right wing is lowered to raise that wing for a left bank, or to correct a right bank, the center of pressure travels toward the trailing edge and the wing, not rigid enough to resist, bends downward along the leading edge. The wing thus has applied wash-out to itself and at once goes still farther down, instead of rising. The same thing happens at the same time to the left wing, except that the front of the wing, or leading edge, rises or twists up, applying wash-in, and that raises the wing still higher. More than one test pilot has gotten out of this embarrassing situation by deliberately applying

Neville Wallis, of England. Formerly connected with the Airship Guarantee Co., Ltd., builders of the R-100 and R-101 dirigibles, he went to Vickers (Aviation) Ltd., with an idea for a wing developed from a form of netting used in the construction of his giant airships. This idea was to employ a geodetic curve for strength.

A geodetic curve is the shortest distance between two points along the surface of a sphere or a tube. Take a ball, for instance, or a section of pipe, and place two pins or marks anywhere upon the surface. Stretch a string between them and the resulting line is a geodetic line or curve. Lindbergh flew a geodetic line; in navigation such a course is known as a "great circle" route.

In the new Wallis wing construction, metal strips

bent edgewise in geodetic curves wind in opposite directions about the outlines of the wing form, meeting each other at right angles every so often in such a fashion that in looking down upon it from the top, the thing resembles a wing-shaped section of very coarse mesh wire fence. It is as if you had enfolded a plane's wing with this wire fence—with the points of the square openings in the mesh facing the leading edge, the trailing edge, and the root and tip of the wing—and then withdrawn the wing, leaving the wire mesh molded in its form.

That's just the rough idea. The difference would be in the mathematical exactness with which the curves and joints had been designed for greatest strength, as well as the fact that the geodetic lines that run around the wing are light strips of metal with their thin edges facing vertically, rather than the round, flexible wires used in the fence.

Beside me as I write this I have a crude miniature wing of this construction—probably the first model made in this country—which I built as an experiment. I made it of flexible braided copper picture wire. Of course, this wire cord bends in all directions, while the Wallis geodetic strips will bend only to the sides of the curve, and not up or down in such a way as to flatten or shorten the curve of the arc. My crude imitation was wound about a wooden wing shape, and then at every place where a cord crossed another at right angles it was soldered. The result was a rather pathetic imitation of what in the Wallis construction is a triumph of engineering perfection, but at the same time the strength of this wire-mesh model is astounding.

Another and possibly simpler way of understanding the appearance of the Wallis wing is to imagine the following procedure. Take a full-size wing and the Wallis geodetic strip. Starting at the root or fuselage end of the wing, wind the strip, held on edge, diagonally across and around it, advancing each turn several inches so that the wing has a barber-pole appearance when you reach the tip. Now start back, crossing the first layer at right angles so that perfect, open squares are formed. You retrace the whole distance, so that you have a maypole effect when you end up at the root of the wing again.

Of course, in the actual wing the strips do not overlap, because they are not in one continuous piece. The squares are formed of four strip segments joined together with a special junction shown in figure 4. Each corner of each square joins two other strip segments which form part of neighboring squares.

The Wallis construction produces an absolutely hollow wing. No deep spars, compression struts, anti-drag wires, ribs or bulkheads are needed, as the basketlike structure spreads all stress and strain evenly in such a way that every bit of the construction absorbs the same amount of strain without too much of it falling upon any one individual member, or strip segment, to carry.

This is accomplished by the crossing of the geodetic lines at right angles. When one of the arcs is subjected to compression or tension, the strain is automatically counteracted by the opposite reaction in the line which is crossed at right angles. This puts twisting tendencies in a deadlock and results in unbelievable rigidity in the entire structure. This action is shown in simple, skeletonized form in figure 3. In this sketch, to make the action clear, only one of the geodetic lines of each opposite set is shown. In the real wing these two strips that cross are paralleled on both sides, on top and bottom of the wing, by many more all crossing to form perfect squares set at a 45-degree angle to the span and chord of the wing.

Besides the mesh itself, only a thin tubular spar is used. Running out beneath the upper surface of the geodetic web, it shares the shear, or bending, stress imposed on the wing.

One great advantage of the Wallis construction is that any pitch may be decided upon and the geodetic members adjusted accordingly. Another is that the wing may be built up in convenient sections that can be joined together.

The chief virtue, without question, that comes from the open-work, hollow geodetic construction is the great saving in weight.

This weight saving can be used in three ways. Wings of the normal dimensions can be made much lighter. A given normal weight of material can be used to produce a larger wing in the same proportion. Or the wing can be elongated to achieve the much-desired high aspect ratio.

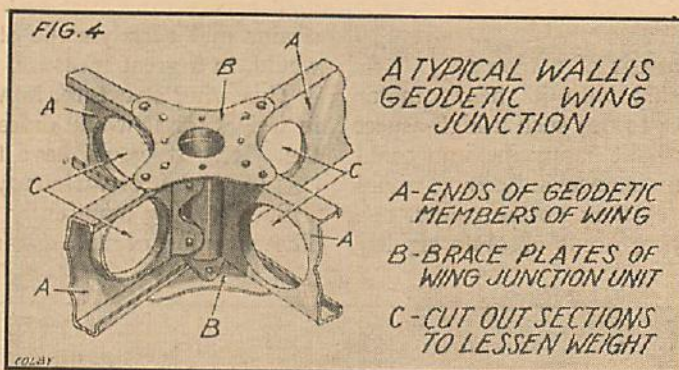
The hollow wing provides much additional room for carrying fuel, cargo, bombs, or in large enough ships, passengers. Imagine what a tremendous bearing this will have upon the payload of both commercial and military planes.

The covering of the wing is open to personal preference, as either a metal skin, a plywood, or a fabric covering may be used. This covering is attached either to the geodetic web itself or to stringers running beneath the skin and fastened to the mesh.

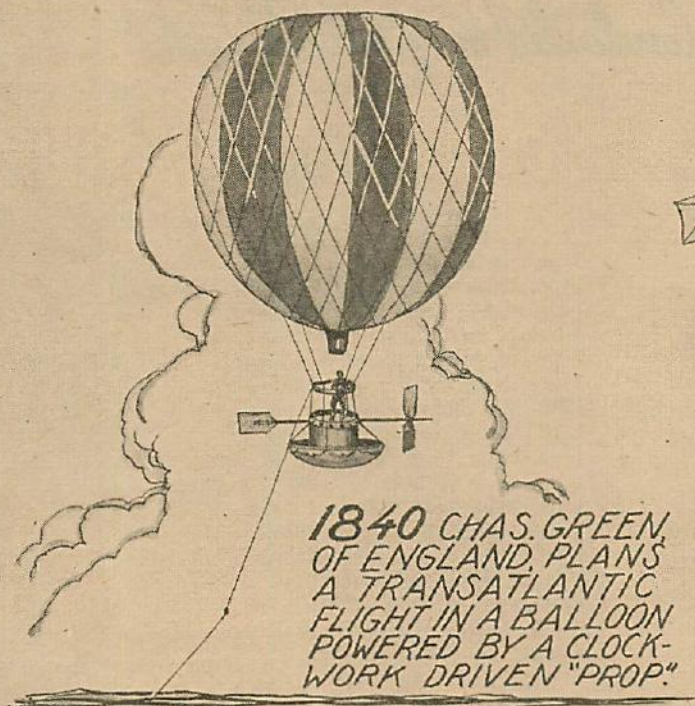
The Wallis geodetic structure may be used to form fuselages as well as wings.

The first airplane with complete geodetic construction is the Vickers Wellesley, a low-wing military monoplane with an unusually high aspect ratio and a performance that has amazed officials and scientists who observed its tests. The high aspect ratio makes the Wellesley somewhat less maneuverable than the stubby-winged pursuit ships, but on the other hand greatly improves the ceiling, rate of climb, landing speed, and range. These are all important factors in military craft and in long-distance weight-carrying transports.

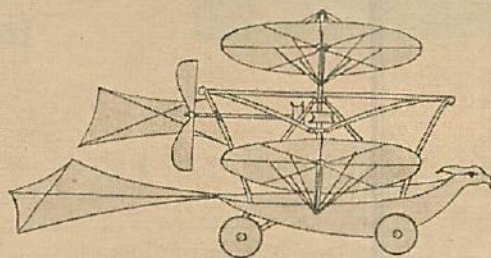
The Wellesley's span is 73 feet 7 inches, and its length 38 feet 6 inches. Exact specifications are not available, but its wing aspect ratio is probably between 9 and 10. It has retractable landing wheels that fit into special cavities in the geodetic web on the



Pictorial History of Man in the Air

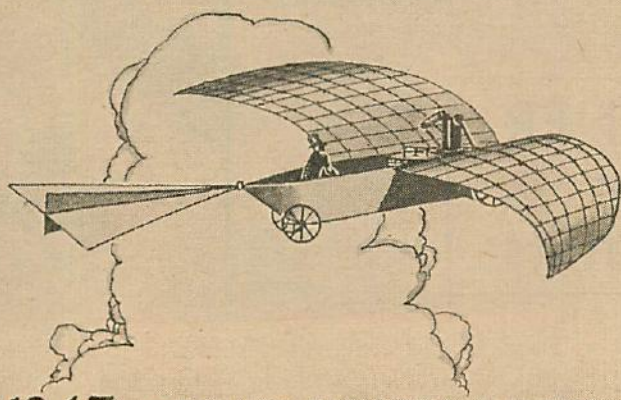
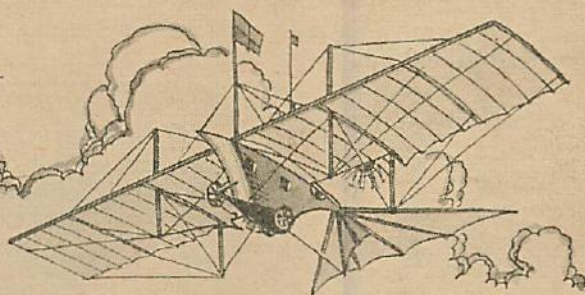


1840 CHAS. GREEN, OF ENGLAND, PLANS A TRANSATLANTIC FLIGHT IN A BALLOON POWERED BY A CLOCK-WORK DRIVEN "PROP."

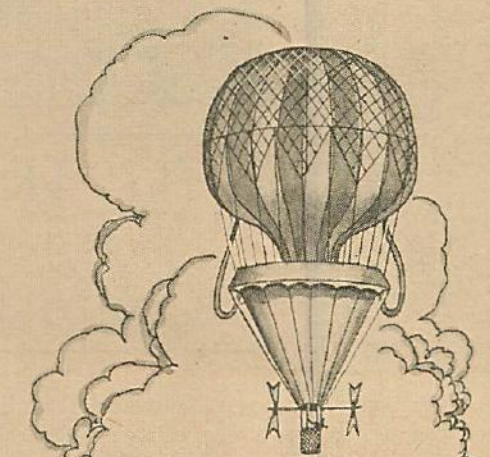


1843 SIR GEORGE CAYLEY, OF ENGLAND, DESIGNED A COMBINATION HELICOPTER AND PLANE. HAD HE BUILT A MODEL IT MIGHT HAVE FLOWN, AS RECENT TESTS PROVE THE CORRECTNESS OF HIS DESIGN.

1842 WILLIAM SAMUEL HENSON, OF ENGLAND, PROPOSES FIRST MONOPLANE "AERIAL CARRIAGE." THE FIRST "AERIAL TRANSIT CO." IN THE WORLD WAS ORGANIZED BY HENSON ALSO DURING THIS YEAR.



1847 WERNER SIEMENS, A GERMAN ARMY OFFICER, DESIGNS THE FIRST ROCKET PLANE TO BE PROPELLED BY GUN POWDER. NOTE WARPED WINGS



1838 FRANCESCO ORLANDI, OF ITALY, COMBINES A HOT-AIR AND HYDROGEN SHIP!



The MODEL WORKSHOP

Conducted by Gordon S. Light

THE TRAINER is the type of model I like to call a utility ship. That is to say, it's a job that can be flown day in and day out, always delivering a pleasing flight and requiring little in the line of maintenance or adjustment. It is this type of model that really teaches model flying.

If you were actually learning to fly, you would spend a great many hours in a training ship—some kind of job with a low landing speed, ample control surfaces, and all-around ruggedness that would enable the plane to take all the bumps an amateur would be certain to give it. It is the same with models.

All expert model builders were trained with utility models. Their log books would show hundreds of hours of experience flying models of sound design and simple construction. These models flew despite incorrect adjustments inflicted on them by well-meaning beginners.

But gradually the beginners learned to make good adjustments—little tricks hardly visible to the untrained eye—that add many seconds to the flight. Only after you have a full bag of tricks can you get the most out of tricky and temperamental contest models.

The Trainer differs in some respects from other cabin fuselage models given in this department. The rubber motor runs through the fuselage and is attached to the front and rear of the fuselage instead of being mounted to a motor stick. With such an arrangement, the fuselage itself must stand the strain of the wound motor. Naturally, this distorts the fuselage and makes the safety of the model dubious when the rubber is tightly wound. But an 8-strand motor, as used in the Trainer, will not cause too much trouble. At least it will show you the advantages of using a motor stick!

Another feature of this model, new to AIR TRAILS followers, is the wire landing gear. Its chief claim to glory is its flexibility. We still favor bamboo for landing gears. Let's see what you think.

CONSTRUCTION

The following materials are used:

- 8 pcs. balsa $3/32 \times 3/32 \times 24$ " for fuselage
- 1 pc. balsa $1/2 \times 1 1/4 \times 1 1/2$ " for nose plug
- 1 pr. of $1 1/2$ " celluloid or balsa wheels
- 4 feet of medium piano wire
- 1 pc. of tubing about $1/2$ " length
- 3 pcs. balsa $1/16 \times 1/8 \times 24$ " for wing and elevator
- $1/32$ " flat balsa for wing ribs
- $1/16$ " flat balsa for tail ribs
- 1 pc. balsa $1/4 \times 1/4 \times 30$ " for leading edge of wing
- 1 pc. balsa $3/32 \times 1/4 \times 30$ " for wing spar
- 1 pc. balsa $1/16 \times 1/8 \times 15$ " for elevator spar
- 1 balsa block $1 \times 1 3/8 \times 12$ " for propeller
- $1/16$ " sheet balsa for tail and wing tips
- 2 large sheets of tissue
- 14 feet of $1/8$ " flat rubber
- Small bottles of cement and banana oil
- 1 sheet of cellophane

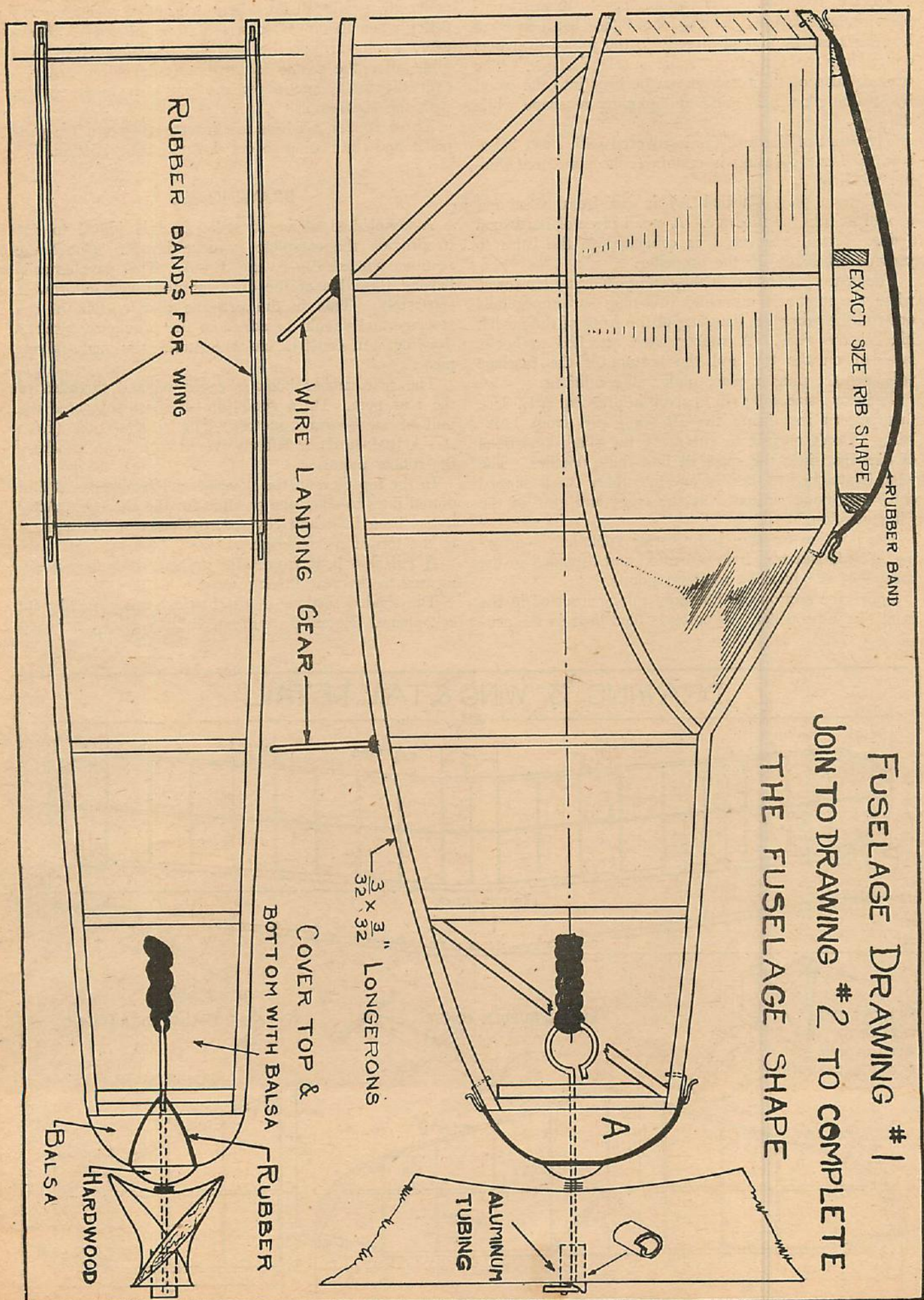


The TRAINER
and some
Contest Hints

Four drawings will supply you with details and dimensions. Rather than discuss an itemized building procedure (since modelers are prone to use their own procedure anyway) we'll discuss each drawing, pointing out the features of the Trainer.

DRAWING #1

Here the front half of the fuselage is shown with top and side views. Drawing #1 is joined to drawing #2



—you can use tracings, if you prefer—to form a complete fuselage layout. The $3/32 \times 3/32$ " balsa fuselage longerons can be pinned directly to the joined drawings or tracings to insure an exact fuselage shape. The curved parts of the fuselage can be bent into the wood by steaming or moistening and pinning in shape while drying.

The front of the fuselage is covered with sheet balsa, since a tissue covering is certain to be punctured during winding.

The nose plug (labeled A) is cut from balsa and should fit into the fuselage. A small piece of hardwood (pine, spruce, bass, etc.) is cemented to the balsa to provide a bearing for the propeller.

The nose plug should fit the nosing snugly. However, when the motor is unwound this plug sometimes falls out and the propeller, dangling at the front of the model, hinders the glide. A rubber band attached to hooks fastened on the top and the bottom of the fuselage will keep the plug in place under all conditions.

The exact-size wing rib is given in drawing #1. Use this pattern in cutting the 19 wing ribs from $1/32$ " balsa. Don't neglect to cut away the shaded portions of the ribs, since the spars fit into these notches. The wing is attached to the fuselage by rubber bands slipped onto wire hooks fastened at the front and rear of the wing position.

The position for the landing gear (detailed in drawing #4) is shown. It is cemented and threaded to the bottom of the fuselage at these points.

Notice the section of aluminum tubing inserted in the front of the propeller. A notch is filed in it so the pro-

peller shaft will fall into the notch and revolve the propeller when turning clockwise (from the rear). However, when turning the opposite direction during the glide after the motor is unwound, the shaft will slip over the notch and allow the propeller to free-wheel with the airstream.

Three copper washers are inserted between the propeller and the nosing to cut down bearing friction.

DRAWING #2

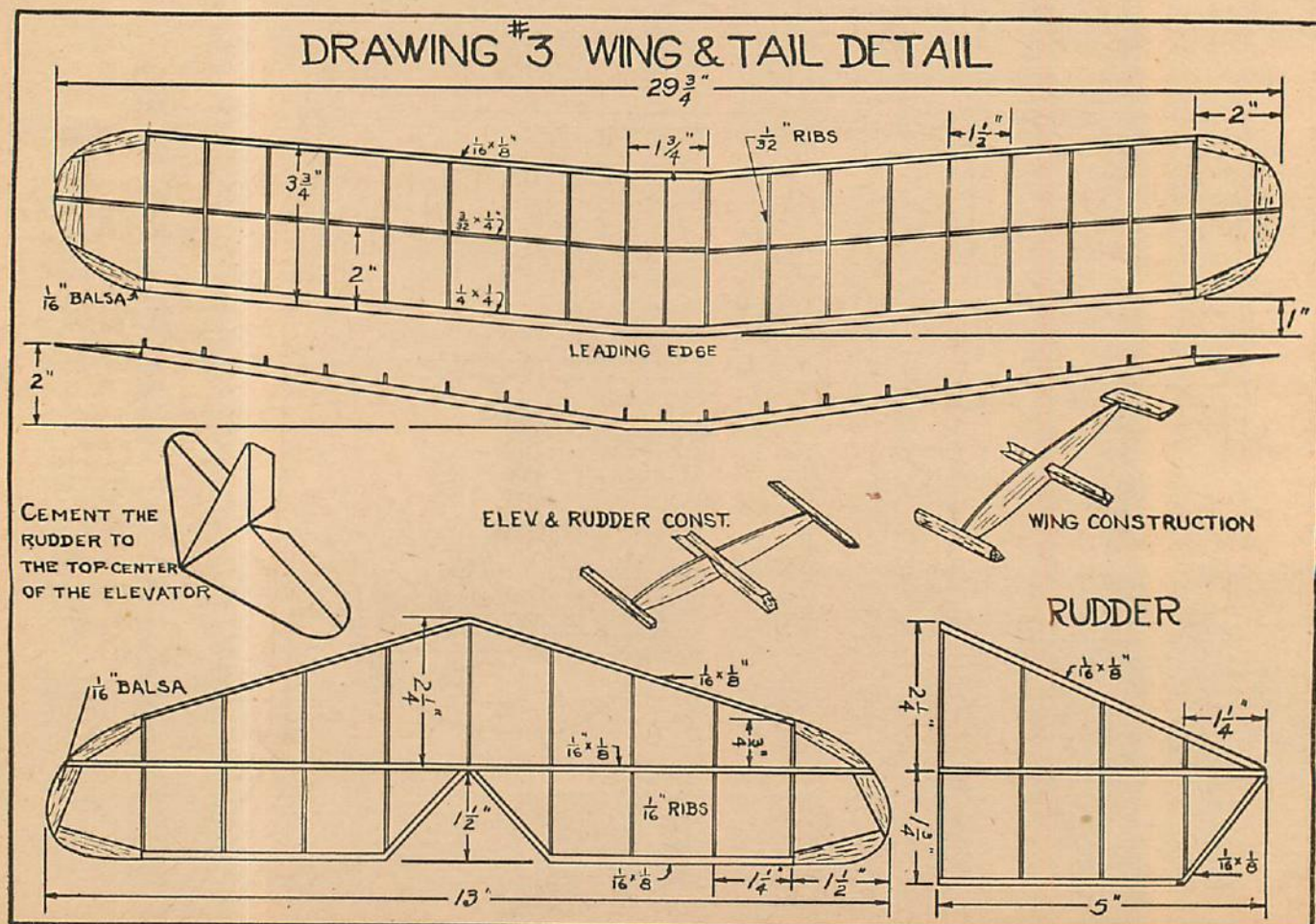
As explained above, drawing #2 is joined to #1 to provide the complete fuselage layout. Notice the sections labeled A—A and B—B. This part extends beyond the edge of the drawing, so I had to draw it separately. This is the extreme rear section of the fuselage and should be added to the completed fuselage drawing. In construction, the fuselage is made in one piece.

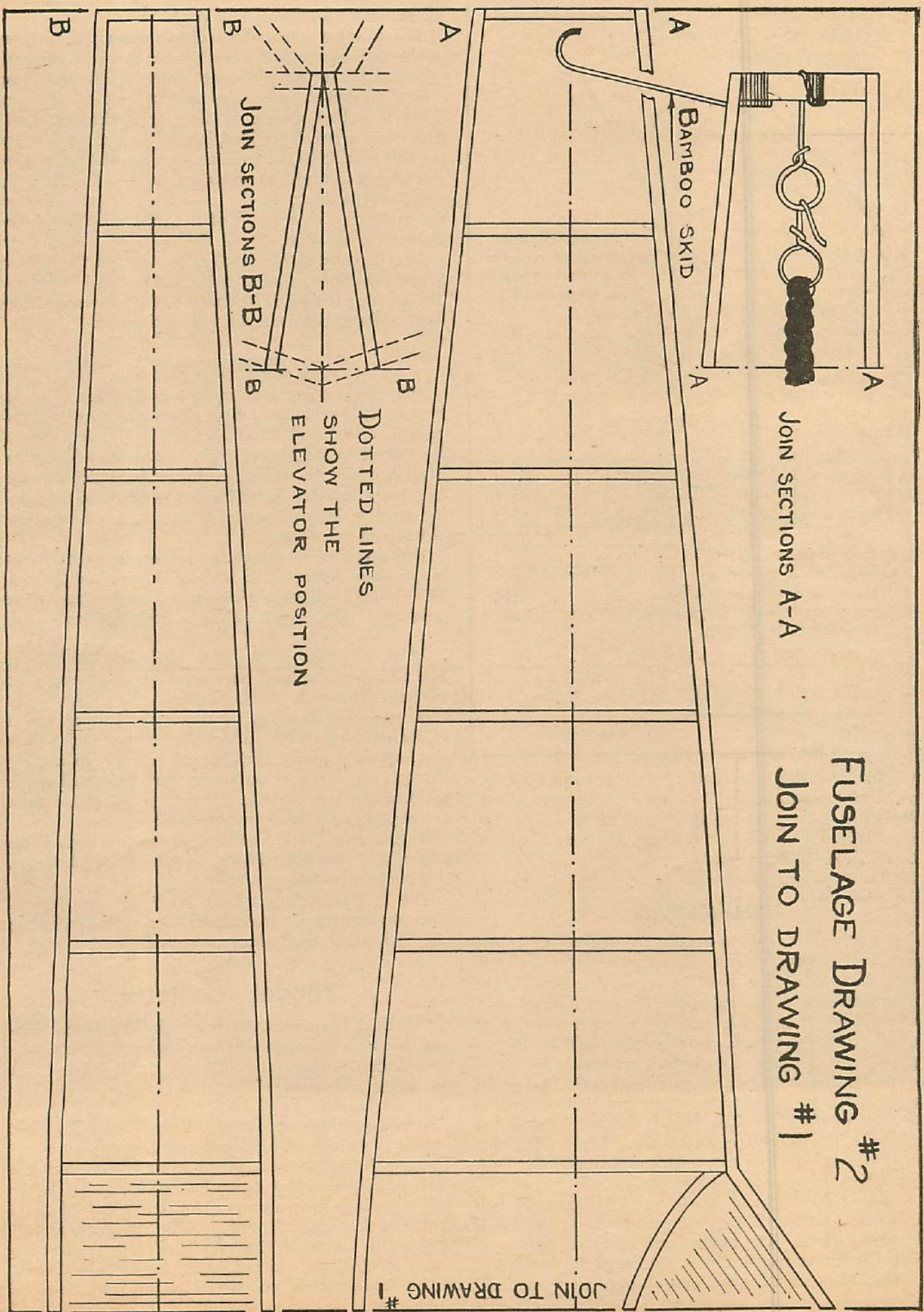
The rear rubber hook is cemented and threaded to the rear post. Do a good job—it must withstand the pull of an 8-strand motor. The rear section (from A—A backward) is left uncovered to help in attaching the rubber motor.

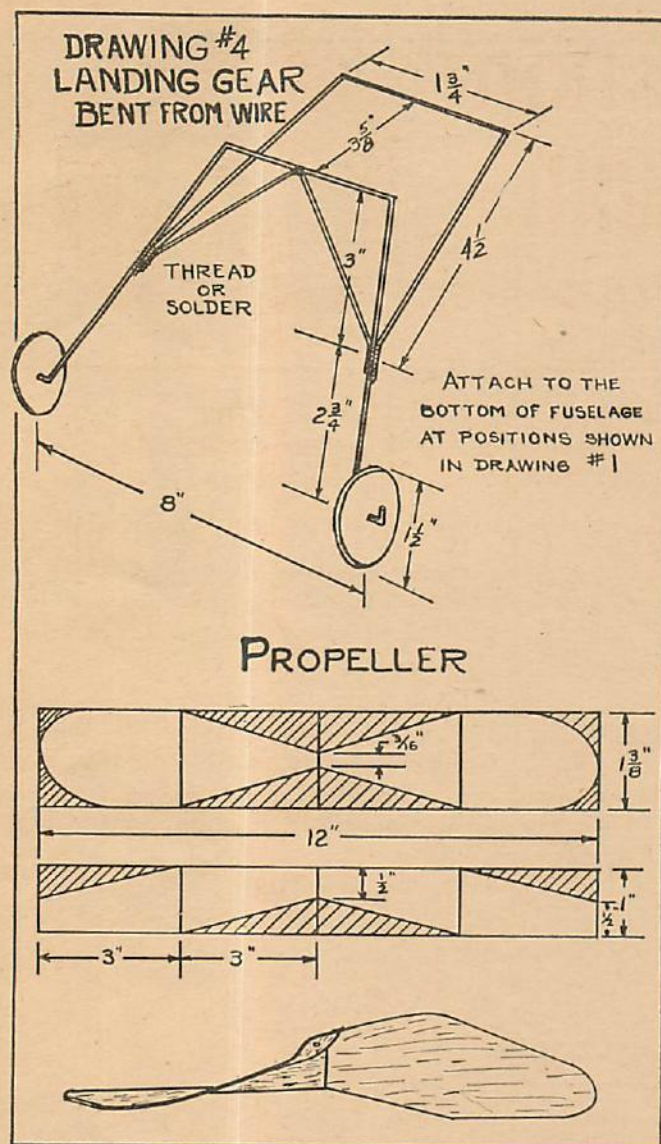
In the top view of the fuselage end section you'll find dotted lines to show the position for the elevator. After it has been built and covered, the elevator is cemented to the top of the fuselage.

A tail skid bent from wire or heated bamboo is cemented to the rear fuselage post.

The shaded sections of the fuselage are covered with cellophane. Recently we discovered a variety that won't







wrinkle or shrink when moist. It is a worthwhile improvement, since the shrinking variety will warp a fuselage after it has been on the model for a while. The wrinkle-free type is lightweight and makes an ideal imitation for cabin windows.

DRAWING #3

The wing is drawn in greatly reduced scale. If you prefer a full-sized drawing as an aid to good construction, make one on a sheet of paper according to the dimensions given or, better yet, draw it directly on a smooth, flat board. Or paste your paper drawing to the board, if you wish. In this way you'll be able to pin your wing frame directly to the drawing.

The leading edge of the wing is $\frac{1}{4} \times \frac{1}{4}$ " balsa, cut and sanded to semicircular shape and butt-jointed to the tips of the ribs. The spar is $\frac{3}{32} \times \frac{1}{4}$ " inserted edgewise into the bottom of the ribs. The trailing edge is $\frac{1}{16} \times \frac{1}{8}$ " cut to a triangular cross section and butt-jointed to the rear tips of the ribs.

Sweepback of 1" and dihedral of 2" is given to each half of the wing. These features are an aid to stability and balance. The center section of the wing ($1\frac{3}{4}$ " wide) is flat, to rest firmly on the top of the fuselage.

The tips of the wing are built up from pieces of $\frac{1}{16}$ " sheet balsa cemented as shown. This should be a wel-

come feature for those builders who have trouble making bamboo take the desired shape.

The elevator construction differs from the wing in one respect—the elevator ribs are cut in two pieces and the center spar passes between them. This procedure must be followed since the ribs are not of sufficient depth to permit a spar to be inserted through them. The rib is a streamlined section—that is, the top curve is just the same as the bottom. Cut the ribs to the general shape pictured in drawing #4, in the different lengths required to fit the proportions of the elevator and rudder. Construction of the rudder is identical to that of the elevator.

After construction and covering, cement the rudder to the top center of the elevator as the sketch indicates. The elevator in turn is cemented to the top-rear of fuselage as described in drawing #2 procedure.

DRAWING #4

The wire landing gear is bent to the dimensions as shown. It is made from three pieces, joined with solder or with thread and cement. Balsa or celluloid wheels are slipped on the landing gear axles. There is another advantage of wire landing gears we've overlooked—the fact that wire axles do not have to be added to the landing struts. Merely bend the ends of the wire struts and slip on the wheels.

The propeller is designed to give plenty of thrust rather than duration. Shape the block as illustrated. The shaded portions are cut away and then the blades are shaped. The propeller shaft is shown in drawing #1.

THE MODEL ready to fly weighed 1.70 ounces. The wing was mounted flat on top of the fuselage—no incidence required. Eight strands of $\frac{1}{8}$ " black rubbers were used as power. The model balanced about 1" forward from the trailing edge of the wing. In altering the balance of your model for best individual flying performance, you must add weight to either the front or rear, since the wing cannot be moved.

No negative thrust was used in the propeller. This might be a valuable addition to your model, however, if it shows a stalling tendency.

The Trainer has a fast flying speed and a good climb. The duration ranged from 40 to 70 seconds, depending on the weather conditions.

Model Contests

SPRING is traditionally house-cleaning time. Diligent housewives polish windows, sweep rugs, and perform a dozen other tasks that put the house in order for spring and summer days.

Model builders may snicker at the idea of house-cleaning and think this annual disruption of household routine is an unnecessary inconvenience. Spring house-cleaning should be our signal to do some model airplane "house-cleaning"—that is, dust off the old models and get them ready for the coming contest season. Not only do the models need attention, but the accessories as well. The winder should be cleaned and oiled, model carrying boxes repaired and painted, and a new supply of balsa, tissue, rubber, wire, etc., should be put into the model workshop.

(Turn to page 77)

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: Why are the world's fastest planes seaplanes? I thought that the pontoons, because of their weight and air resistance, made seaplanes slower than land planes. J. M., St. Louis, Missouri.

Answer: Ordinarily, what you say is true. Floats are a drag on the speed of almost any plane. But for fast ships like the Macchi-Castoldi and the Schneider racers, they're a necessity. Here's why:

High speed requires a reduced wing area, because small wings have little drag. However, they also possess little lift. Therefore, the small-wing plane has to keep traveling at high speed in order to avoid stalling and crashing. They can't land at a normal slow-gliding angle; they have to descend in a very shallow power glide, at speed sufficient to maintain the wing's lifting effect. Now the only surface smooth, level and long enough to permit an extremely high-speed landing is water, and quiet water, at that. Hence the seaplane design.

Perhaps some day new wheel gear, or high-lift devices such as improved flaps operated to slow down landing speeds, will enable land planes to beat present seaplane records. They ought to be able to, being cleaner in design and more efficient fliers.

Question: I have heard that "there is no such animal" as an air pocket. What can you tell me regarding the truth of that statement? T. L. D., La Grange, Illinois.

Answer: I thought myself that "air pockets" had become extinct, like the mythical hoop snake. But errors have a way of lingering on. An air pocket, in the sense of empty space surrounded by air, is as impossible as a hole in water. If by some unexplained miracle any such pocket ever existed, it would disappear within a fraction of a second by the in-rush of the air around it.

What were sometimes called pockets are known to be downward air currents. Flying into one results in a rapid loss of altitude much like a free fall.

Question: If I join the navy, can I get assigned to an aircraft carrier? H. R., Cleveland, Ohio.

Answer: The navy takes enlistments only for general service. No promise or assurance can be given the recruit that he will be assigned to any particular duty. He has to take his chance that if he misses his

desired job at first, he may be able to get transferred later.

Question: What is a ground loop? C. H. Q., Salt Lake City, Utah.

Answer: When a plane that's rolling or taxiing on the ground makes a sudden fast turn out of a straight path, that's a ground loop. It's usually brought about by poor control in a cross wind or the obstruction of one landing wheel, which causes the plane to swing around. If not immediately corrected or guided, the movement may tip the plane so that a wing tip scrapes, or the plane may nose down or all the way over on its back, with unpleasant results for machine and pilot. On a good field, it's easy enough to avoid ground loops if you keep firm control, or, as the instructor sometimes says, keep "flying" your plane until it stops.

Question: What is dead reckoning? Y. S., New Westminster, British Columbia.

Answer: There are several methods of guiding a craft from one point to another chosen point. There's pilotage, which means recognizing the physical characteristics of the earth's surface along your course—known landmarks such as shore lines, mountains, beacon lights, etc. Then there's the astronomical method of using the stars, sun, or other heavenly bodies as guides. And then there's dead reckoning. The last two methods make up navigation, referring to the sea, or aviation, referring to the air.

Dead reckoning means calculating your position and your route simply by checking direction and speed from your point of departure, and the factors that affect these two things. You don't need to see the land or sea beneath you, or the skies above. It's a matter solely of mathematical reckoning. Knowing your compass course and the normal speed of your craft, your figure in compass error or deviation, winds or tides, sideways drift, or any other necessary factors. Allowing for their effect on your course, you can calculate pretty exactly where you are at any time, and you correct your actual path accordingly.

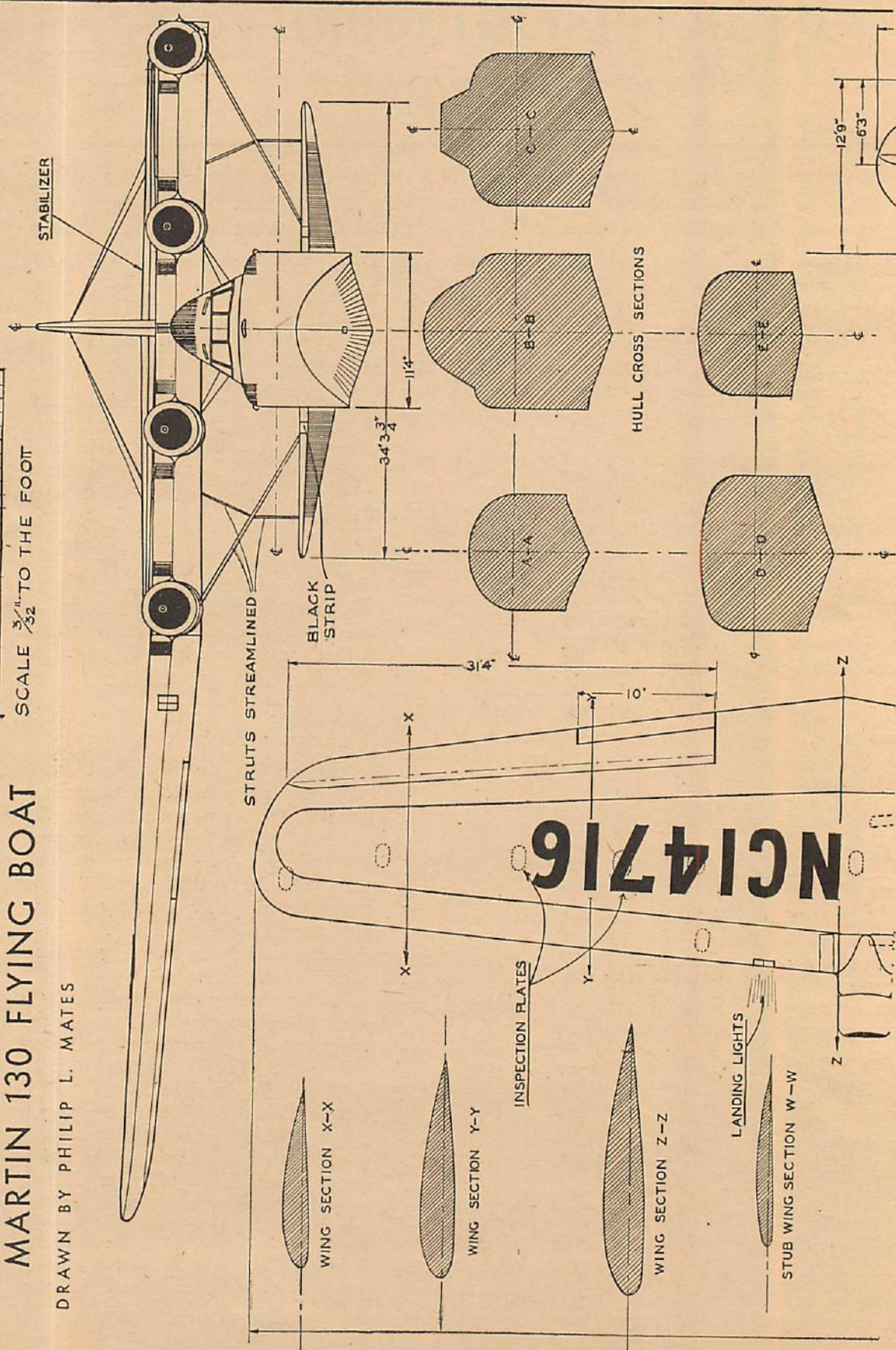
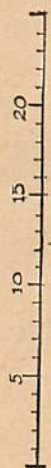
Flying by instruments alone—without the aid of radio instruments, however, which might be considered a ground aid permitting pilotage—is a form of dead reckoning.

BUILD A MODEL OF

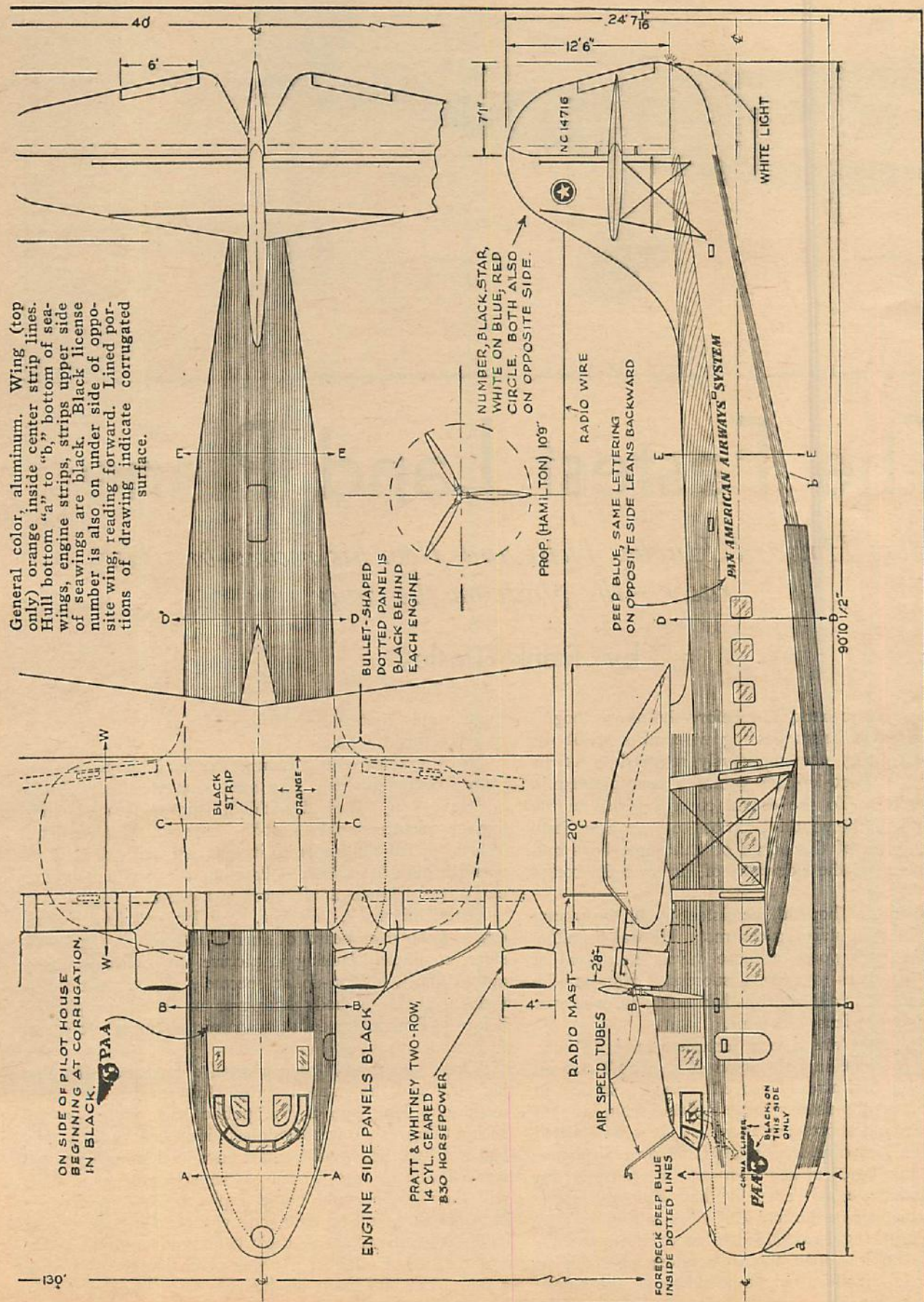
THE CHINA CLIPPER MARTIN 130 FLYING BOAT

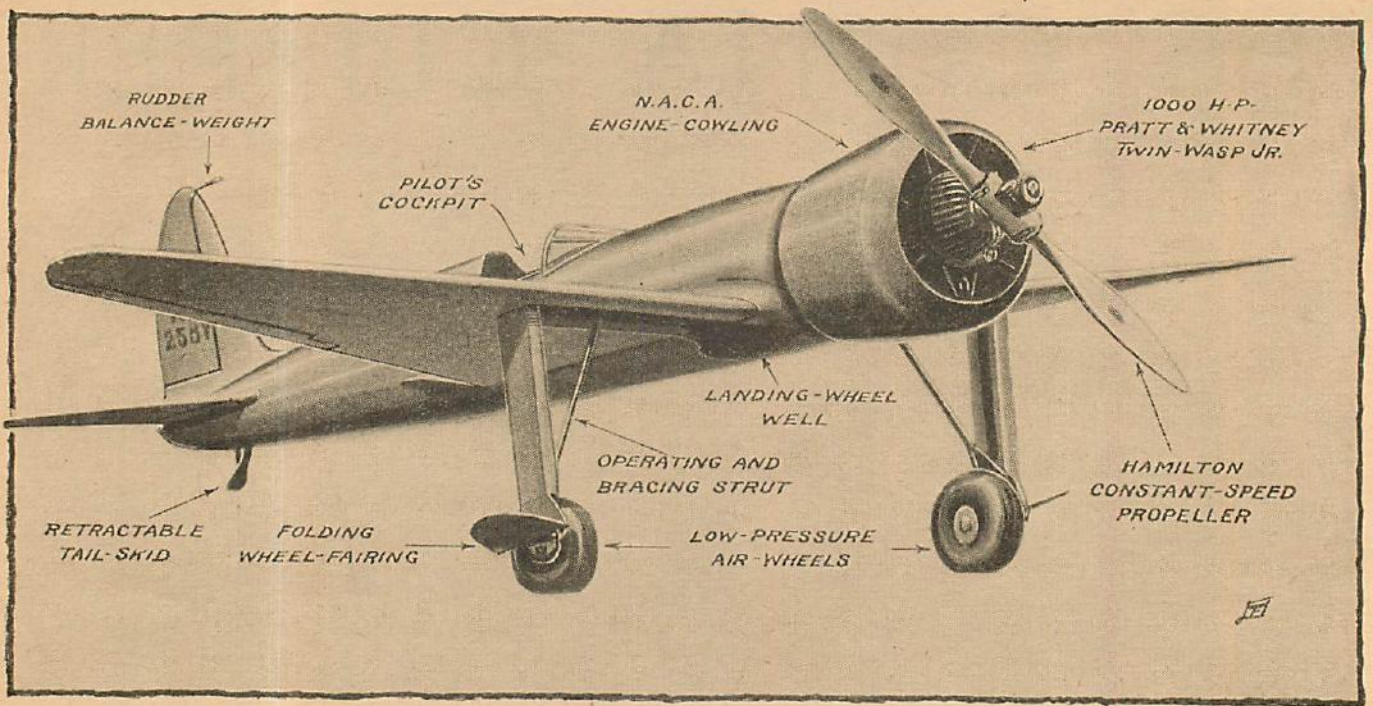
DRAWN BY PHILIP L. MATES

SCALE $\frac{3}{32}$ " TO THE FOOT



THE CHINA CLIPPER





The Fastest Land Plane

How Howard Hughes built and flew his record-breaking racer—the plane on the cover.

by Frank Tinsley

SEVERAL years back, just before the movie moguls of Hollywood began passing wisecracks about the innovation they contemptuously referred to as the "squawkies," a good-looking young Texan arrived in the film capital. To the casual observer wise in the ways of filmdom, the youthful son of the Lone Star State was just another of the horde of handsome boys and girls who pounded the sidewalks of Hollywood's boulevards.

But against that hopeful, persistent mob, the young Texan stood out in startling contrast. He was a unique figure in the Hollywood of those days. Possessed of everything that goes to make a successful film star, he alone of all the celluloid pilgrims had no desire whatever to strut before the lenses of fame.

Howard Hughes was a very fortunate man. Young, wealthy, he was not only the scion of a great Texas oil fortune, but he had already proved himself a success in his own right. An unusually acute business man, Hughes was an all-around sportsman as well. He rode spirited horses, drove fast cars, and piloted his own airplanes. Having become bored at last with what he considered a humdrum existence in Texas, he had gone to Hollywood to try a flyer in the movies.

For Howard Hughes intended to produce a great flying picture—no less than the tremendous spectacle of the war in the air that had flamed through the battle-torn skies of Europe a decade before. This was the

mighty epic that the ambitious young Texan dreamed of recreating on film.

Movie executives to whom he confided his plans were openly contemptuous. The man was crazy.

"Have you," they demanded, "any notion of what such a picture would cost?" Howard Hughes had. When he calmly informed them that he expected to spend around a million dollars on the production, the executives became a bit more respectful.

Behind his back, however, they laughed louder than ever. Who ever heard of such a thing? A rank outsider, completely lacking in picture experience, starting out to film a million-dollar spectacle! And an air picture, at that. Nobody had ever made an air picture before. The public didn't want air pictures. It stood to reason.

"Don't you think," they pointed out with a patronizing air, "that the smart boys of Hollywood would have made one long ago if the public had really wanted such a thing?" Howard Hughes didn't believe that. He had watched the way the smart boys of the movie colony worked, and he hadn't been particularly impressed. He still thought he could make a picture that the people of America would be willing to pay good money to see.

The executives shook their bald heads sadly. What was the use of talking? It was plain that the man was a fool. Let him learn his lesson. He'd blow in a million bucks shooting a worthless film and end up with

a couple of cans full of unsalable junk. Just another sucker ripe for a trimming.

Howard Hughes paid no attention to the Jeremiahs of Hollywood. He went ahead calmly and methodically, building up a producing organization. He hired a staff of screen writers and set them to the task of preparing a suitable script.

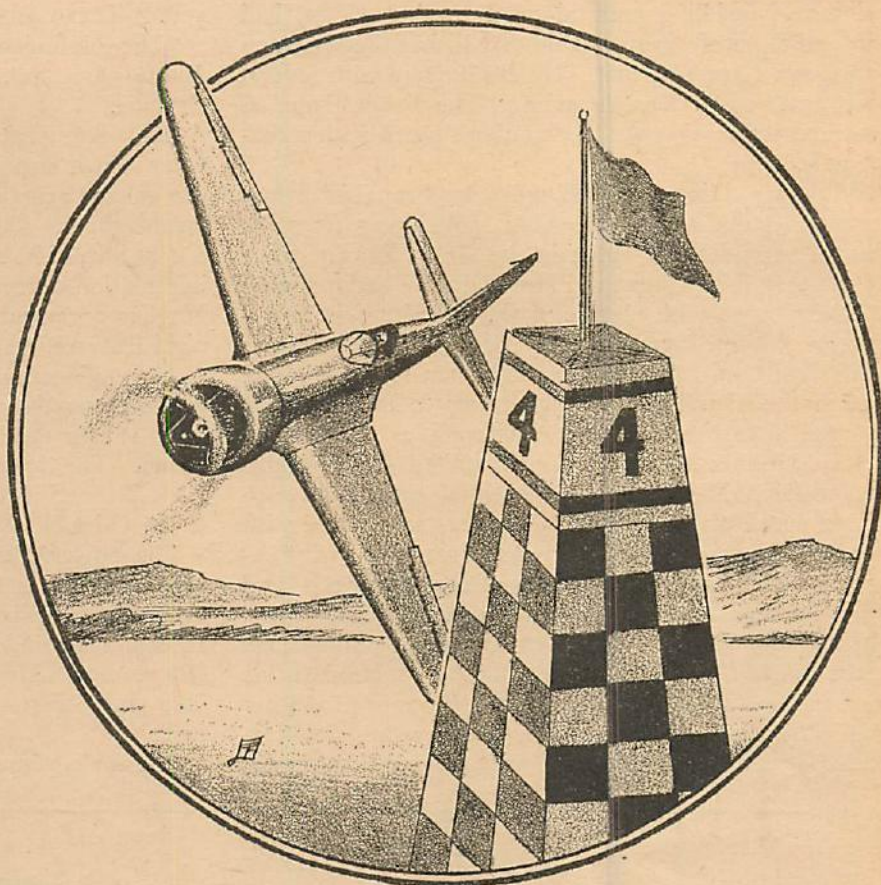
A corps of agents, both here and abroad, began buying up genuine war-time planes and shipping them to California. Hughes assembled a mechanical staff that put the ships in good flying condition as fast as they arrived. Engines were overhauled or replaced. Camels, Nieuports and Fokkers were tested, re-rigged, and, where necessary, even rebuilt. A replica of a raiding Zeppelin was constructed, and a huge, bi-motored Sikorsky was altered into the likeness of a Gotha bomber. Wartime air-dromes, complete in every detail, were established in suitable locations. Ruined French villages suddenly appeared on peaceful California hillsides.

When the cast was assembled and all was in readiness, Howard Hughes gave the word and the cameras began to grind.

The picture seemed to be hoodooed from the very beginning. Trouble developed with the planes and pilots. Players balked at the unusual risks, and cameramen ran into unexpected difficulties. The tricks of action photography in the air had to be learned one by one. Exasperating and expensive delays occurred constantly.

Finally, when the shooting was almost finished, Hughes looked over the results in rough-cut form and decided that they were unsatisfactory. Certain of the players were very evidently not up to the job of interpreting their roles. He announced that the film would be scrapped.

Replacements were made in the cast and the shooting began all over again. This time the production moved more swiftly. The Hughes technicians had profited by their early mistakes. Now they had learned their jobs thoroughly, and the raw film rolled steadily past the lenses. One million dollars had been tossed into the



Official average, 352.46 miles an hour—almost 6 miles a minute!

pot, and the expenses were still mounting. But the end was in sight. Another couple of months would see the picture cut and edited.

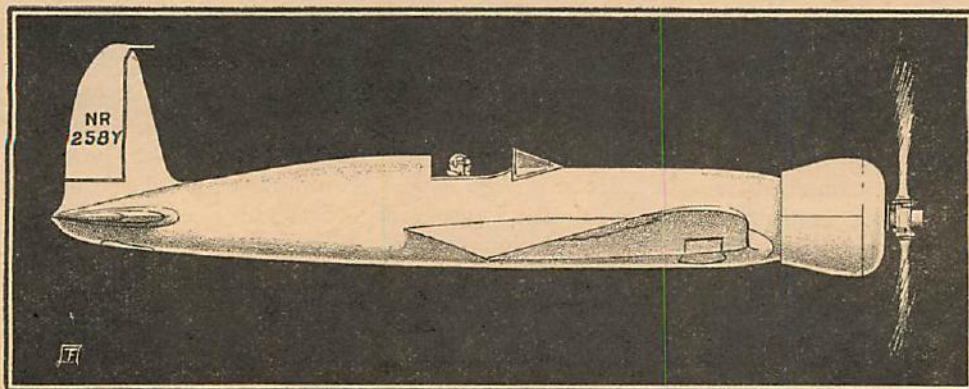
Then came the blow that shook all Hollywood to its foundations. The "talkies" arrived. Al Jolson's "Jazz Singer" had taken the public by storm. Exhibitors, eagerly eyeing the box-office returns of the Jolson picture, demanded talkies and more talkies. The silent screen was doomed.

Howard Hughes sat and surveyed the wreck of his project. Over two million dollars' worth of picture in the film cans, and no chance of getting back more than a fraction of the money invested. Had the wise boys of Hollywood been right after all? Was he really the sucker they said he was?

Hughes set his jaw, called in his assistants and issued as nervy an order as the film industry had ever heard. The picture would be started afresh for the third time.

The few available sound cameras were to be hired before the other studios recovered from their daze. The cast would be voice-tested and necessary substitutions made. The show would go on!

It did. "Hell's Angels" was finally completed at a cost of over three million dollars. And were the faces of his critics red when the box-office returns came in! Howard Hughes, the sucker from Texas, who didn't know his nose from his ear about the



Side view, showing the beautiful streamlines that made possible a record speed.

business of peddling entertainment to the masses, had produced a picture so profitable that it was the sensation of the year. Not only that. He did it again with several subsequent productions, including "The Front Page," a story that the regular studios wouldn't touch with a ten-foot pole.

All during this period, Hughes kept up his flying. Every moment he could possibly spare away from his business ventures was spent in the air. His confidence and piloting ability improved steadily. He became more and more bored with picture work. His interest in flying grew more absorbing every day.

The keen brain that had carried them so successfully through the vicissitudes of producing "Hell's Angels" was applied to the problems of aeronautics. The great oil-born Hughes fortune made unlimited experimentation possible. His interest concentrated on the development of speed planes. Howard Hughes was seized with his second great dream. He would create, out of nothing, a racing plane faster than anything on wheels, and in it he would break the world speed record!

The young Texan went about his self-appointed task in the same thorough manner that characterized his movie career. Again, as in the first stages of producing "Hell's Angels," Hughes quietly built up an organization. He assembled designers, draftsmen and consulting

young Texan smiled his satisfaction.

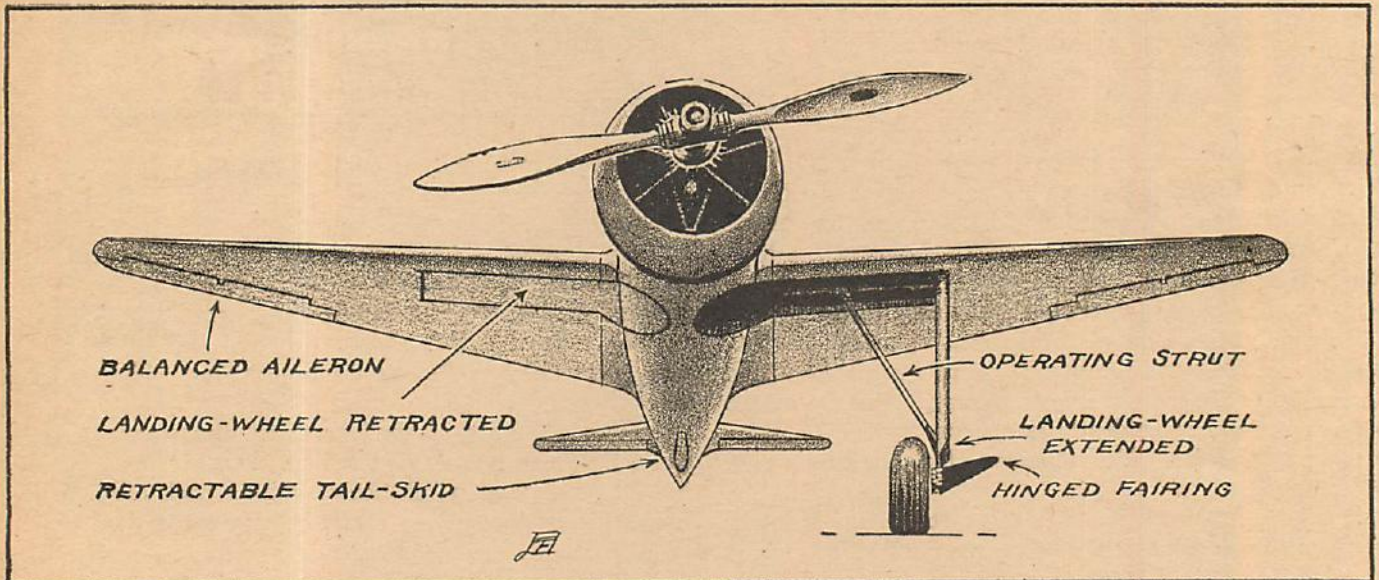
"The preliminary job is finished," he informed his faithful assistants; "to-morrow we begin building an airplane."

Let's see what kind of a ship this record-breaking racer which cost over \$100,000 turned out to be. You can get the general layout of the plane from the painting on the cover. The sketches illustrating this article give a faint idea of its superb streamlines. Very little detailed information concerning the ship has been released by the Hughes organization. Below are listed what few technical features we have been able to corral for you.

The engineering and construction of the plane required eighteen months of intensive work. It was built in the Babb hangar at Grand Central Terminal, Glendale, California. The design and engineering were supervised by Dick Palmer and the shop work and construction by G. E. Odekirk.

The power plant of the Hughes racer consists of a specially designed Pratt & Whitney Twin Wasp, Jr., supercharged to deliver 1,000 h.p. under racing conditions. It is a 14-cylinder engine of 3.2 gear ratio, weighing 994 pounds. The two-bladed metal propeller is a Hamilton Standard of the constant speed, controllable pitch type.

The little plane measures a scant 27 feet from stem



Flush retraction of the landing gear leaves a smooth, frictionless surface.

experts. Preliminary sketches were drawn up, dissected, rejected. Bit by bit, part by part, acceptable features of the racer were incorporated into rough designs. Wind tunnel models were painstakingly carved from hardwood blocks by skilled craftsmen. The elaborate testing equipment of the California Institute of Technology was called into action. More changes were made.

At last, after months of patient thought and labor, the final model emerged. Howard Hughes examined it critically through the tiny window of the Institute's smoke tunnel. The swiftly moving vapor flowed smoothly over the highly polished hardwood surfaces. There was little turbulence evident. The few visible smoke eddies were due entirely to the inescapable requirements of airplane construction. Hughes looked over the official data. The wind tunnel tests showed the model to be capable of a top speed of 365 m.p.h. The

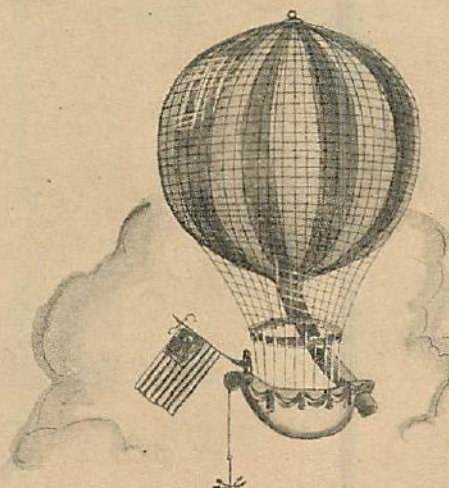
to stern, and has a wing span of 25 feet. The fuselage is of true monocoque design, constructed entirely of dural with a surface finish of highly polished flat plates, flush riveted. The pilot's cockpit is placed just aft of the trailing edge of the wing, and is furnished with a single adjustable seat. The instrument panel is mounted in rubber to reduce vibration, and boasts a complete set of clocks and gauges. An adjustable windshield protects the pilot from the six-mile-a-minute gale. The ship is equipped with four separate fuel tanks, each furnished with a quick-dump valve. Filled to the caps, they hold a total of 250 gallons.

Like those of all racers, the wings of the Hughes plane are comparatively small, having a total area of only 140 square feet. They are of the monocoque type, sharply tapered, and combine both wood and metal in their construction. The large dihedral angle (Turn to page 77)

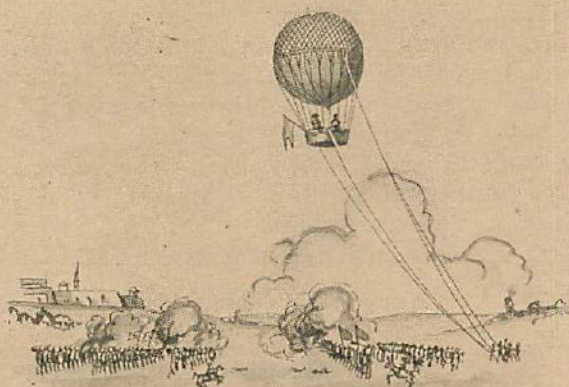
Famous Firsts



THE FIRST ASCENSION
IN SPAIN WAS MADE BY
VINCENT LUNARDI, WHO
FLEW OVER MADRID ON
THE 12TH OF AUG. 1792.



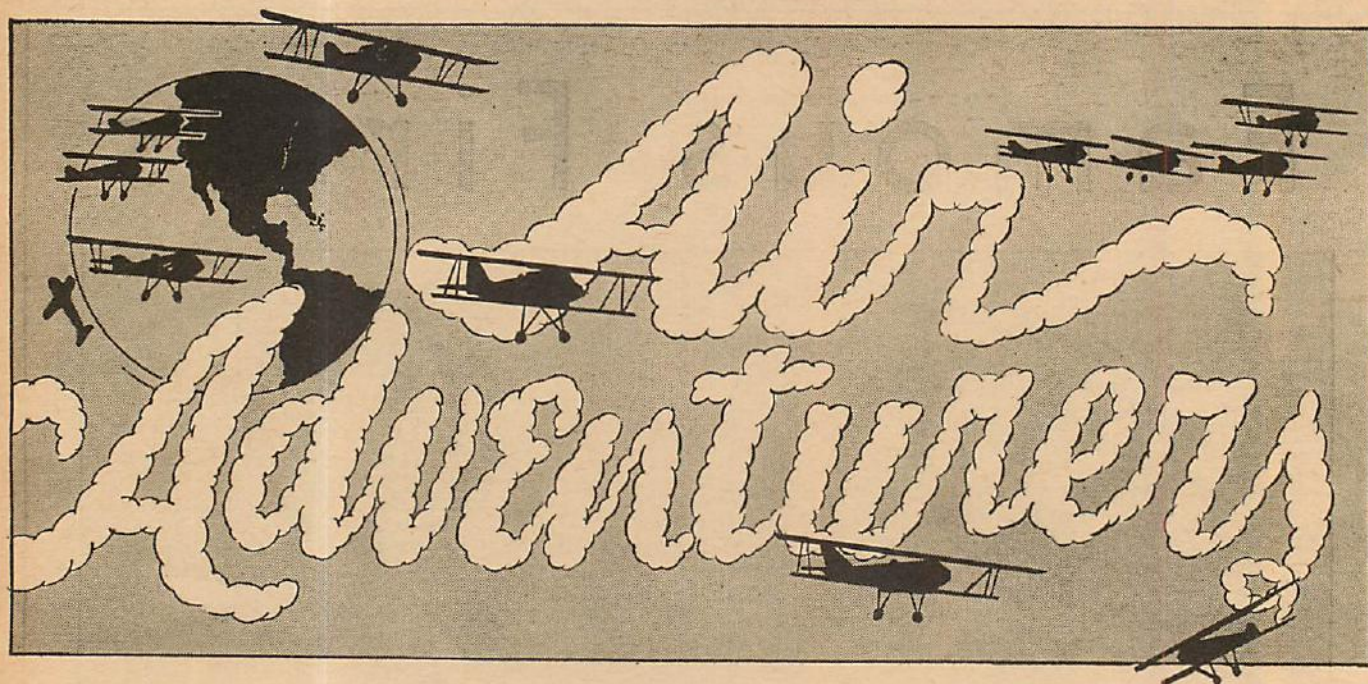
THE FIRST ASCENT FROM
AMERICAN SOIL WAS AT
PHILADELPHIA, JAN. 9, 1793.
BLANCHARD, THE FRENCH
AERONAUT, PILOTED IT.



THE FIRST BALLOON USED
IN WARFARE WAS FLOWN
BY CAPT. J. M. J. COUTELLE,
AT BATTLE OF FLEURUS,
IN BELGIUM, JUNE 26, 1794



THE FIRST PARACHUTE
DESCENT WAS MADE BY
ANDRE J. GARNERIN, ON
OCT. 22, 1797, IN PARIS. HE
DROPPED 3,000^{ft} UNHURT.



What's Our Course?

WE live in an age of glittering modern machinery, of towering buildings, of miraculous communication through space by word or picture, and of sleek, speedy vehicles that annihilate distance.

When we consider that our grandfathers, as young men, knew none of these marvels, we realize how lucky we are. Although thousands of years have rolled past since these things first began to be dreamed of, they have all appeared at once within the memory of living man.

Yet there are those people who tell us that, as a result, romance is dead. By romance I mean adventure, glamour, excitement, thrills, daring—qualities that have the power to captivate men's minds and hearts.

They would have us believe, these mourners for romance, that life was more stirring and colorful in the days when roads were muddy lanes for horses to walk—when the early steam trains rocketed through once a day at breath-taking speeds all the way up to a mile a minute—when the sky was marred by nothing more restless than an occasional kite on a string.

But after you have finally got them to admit that aviation, at least, brought new romance to man's earth-bound existence, they end at the World War. What's left to-day, they claim, is the dregs of a glorious air spree that was romance's last fling.

Well, let's take a look first at the airplanes of those days—almost a fifth of a century ago, remember, about twenty years back, before many of us were born. We see frail stick-and-wire ships, prone to spin and burn, that served well enough for that particular war, but were good for little else. Is it more romantic to fly a Sopwith Camel than a Grumman fighter? Aside from the needless risk to life and limb, I can't see why.

Let's take a look at the wartime fliers. They were fine, brave fellows. They were dumped into cockpits, given some hurried rule-of-thumb training, and sent into battle. If they lived, they became good fliers. But the superbly trained present-day pilot could probably fly rings around them. And how many of them could

operate even the simplest modern multi-motored transport?

The war did much for aviation, and its pilots and planes and fights will never be forgotten. But the romance of flying did not end with the war. That was only a start.

Bill Barnes himself typifies the modern spirit. We are flying faster, higher, and farther to-day than ever before. Better technique and equipment are enabling us to meet greater adventure in the realm of the sky. And—most important of all—aviation is expanding so that more of us are getting into the air.

Fellow Air Adventurers know these things. Other readers can best share in our ideal—the advancement of aviation—by joining with us. If you can honestly promise yourself to uphold our seven-point Creed of Self-Reliance, Courage, Initiative, Independence, Loyalty, Integrity and Obedience, I invite you to send in the application below. If it is approved, you will be entitled to wear our winged badge.

Let's set our course, not back, but ahead!

Your Flight Commander,

Albert J. Carlson

(MEMBERSHIP COUPON)

To the Flight Commander, Air Adventurers,
79-89 Seventh Avenue,
New York, N. Y.

I am interested in aviation and its future developments. To the best of my ability I pledge myself to support the principles and ideals of AIR ADVENTURERS and will do all in my power to further the advance of aviation.

Please enroll me as a member of AIR ADVENTURERS and send me my certificate and badge. I enclose ten cents to cover postage.

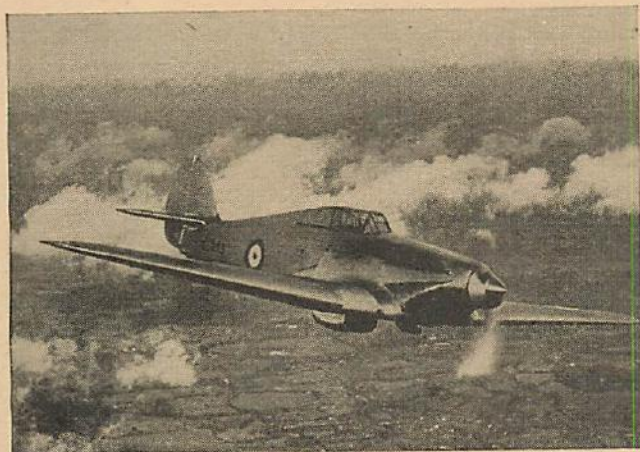
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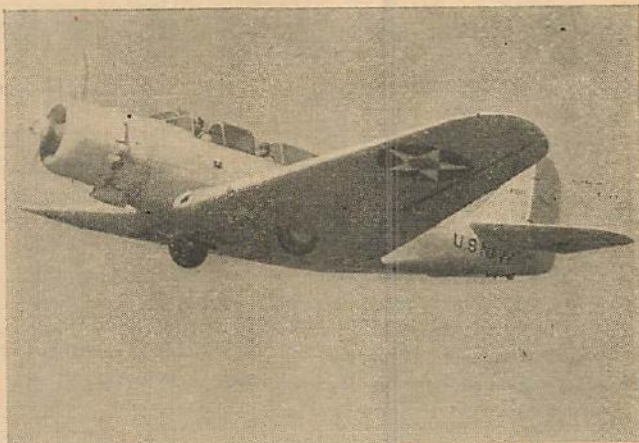
☐ Check here if interested in model building.

AIR TRAILS GALLERY

A Picture Page of Modern Planes for the Collector

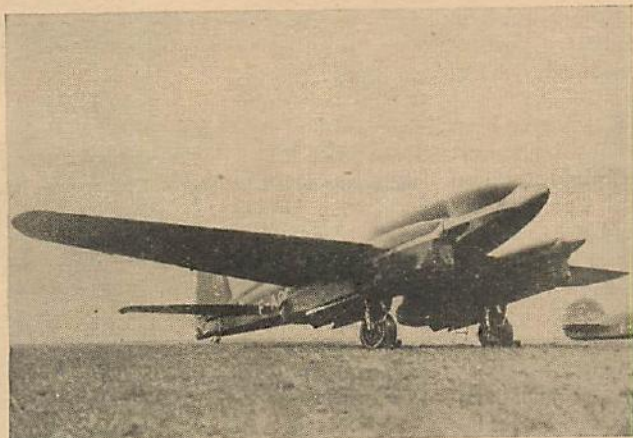


HAWKER single-seat fighter for British R. A. F., with new Rolls Royce Merlin engine cooled by radiator beneath, is reported to do 300 m.p.h.

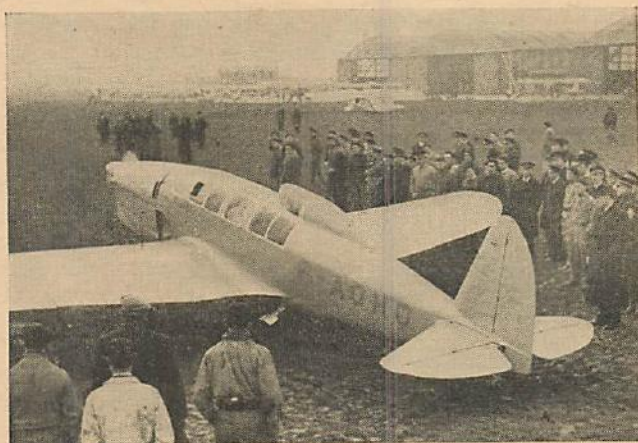


U. S. Navy official photo.

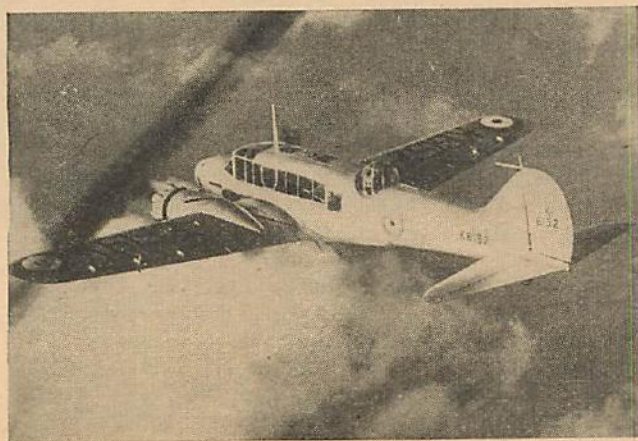
DOUGLAS XTBD-1 torpedo bomber, Twin Wasp engine, has unusual retracting gear and rumored high speed. Navy has ordered 114 for carriers.



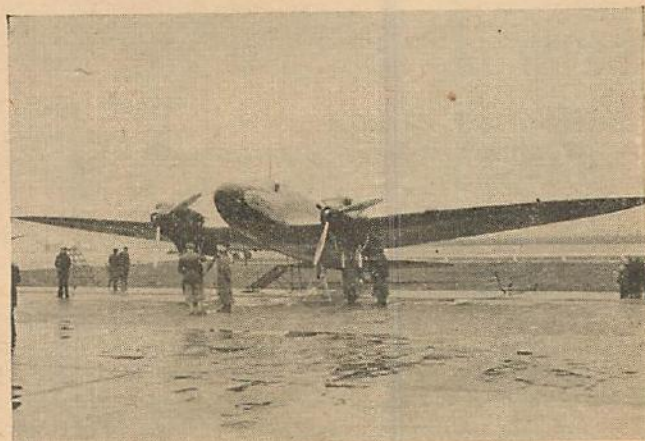
CAUDRON Typhoon, 2 Renault 200 h.p. engines, doing 248 m.p.h., is being groomed for 48-hour Paris-New York round trip flight this summer.



MAILLET 20 3-seater of wood construction, powered by 200 h.p. Regnier, is new French popular design. Pilot sits under the raised hood.



AVRO Anson coast reconnaissance-bomber, also on page 4, has gun turret. Engines are 200 h.p. Cheetah IXs. Britain is buying 175.



HEINKEL new He111 transport of Germany, claimed fastest, driven by 660 h.p. V engines, carries 10 passengers at 254 miles top, 217 cruising.

THE MAN WHO FELL FROM THE SKIES

(Continued from page 18)

"Did the old boy want to make me a colonel?" he asked innocently enough.

Bill snorted. "Wasting your time, as usual," he replied. "What are you reading that you want to hide?"

"Nothing," Sandy said. "That is, nothing you would understand."

Bill glared at him and pulled the drawer open. A thick volume titled: "The Science and Art of Polemics" greeted his gaze.

"What in the name of—"

"I told you you wouldn't understand," Sandy said airily. "I'm brushing up on the art of disputation. I'm learning how to answer those two flat-eared apes when they want to start an argument."

Bill's face lighted up with a wide grin. He knew "those two flat-eared apes" referred to Shorty Hassfurth and Red Gleason. He knew that they spent most of their spare time trying to ride Sandy.

"All right," Bill said. "But before you go on with your studies, get me Ann Blackstone on the telephone."

"O. K., Bill. I—"

The telephone on Sandy's desk interrupted his words. He picked it up and spoke into the mouthpiece.

"Yeah. He's here, Tony. Who wants him?"

Sandy's eyes spread wide in surprise as he listened to Tony.

"Who is it, kid?" Bill asked impatiently.

"It's Ann Blackstone," Sandy said, handing him the instrument.

"Bill! Bill! Is that you? Is that you, Bill?" Ann Blackstone's frantic voice came over the line.

"Just a minute, Ann," Bill said. "Take it easy. Take it easy. This is Bill—yes, this is Bill!"

Bill's eyes narrowed and the muscles in his face bulged as he listened to the torrent of words that were loosed in his ear. Finally he stopped her.

"Listen, Ann!" he said sharply. "I can't make sense of what you're saying. Begin at the beginning. Pull yourself together."

"You listen, Bill!" she answered. "I have a letter from David! Do you hear, Bill? Do you hear?"

"Where did you get it? How did you get it?" Bill asked.

"A man brought it. A man who said he was a South American. It's in Dave's handwriting, Bill. It asks me to turn all of Dave's papers over to this man, Cortez, who brought the letter. He says David was injured and has been very sick for five years. It's just a short note—hardly anything in it, nothing about where he is. There is something strange and indefinite about it. Yet I'm sure it's David's writing. It is weak and

faint, as though he had been sick for ages. It—"

"Wait a minute, Ann," Bill said. "Where is the man who brought it?"

"He's gone. He's coming back in the morning."

"Did you tell him you would give him the papers?"

"I'm afraid I didn't tell him anything, Bill. I was too upset. I didn't know what was going on. I couldn't do anything but cry. He went away and said he would be back later."

"Did you tell him you were going to get in touch with me?" Bill asked.

"I don't think so, Bill. I don't know what I told him."

"You're sure the letter was written by Dave?"

"I'm almost certain, Bill."

"Where—"

"Bill!" Ann Blackstone's voice came over the wire like a scream. Ice crept up Bill's spine as he listened to her high-pitched, unnatural voice.

"Bill!" she repeated. "He was wearing Dave's wrist watch—the watch you gave him! I'm sure of that. You remember it had the wings and propellers engraved on the front. It—"

"O. K., Ann," Bill said, trying to keep his voice steady. "What about that landing field at those training stables in the valley near you? Can you get them on the telephone and tell them I'm going to land there? Have 'em turn on their beacons. I'll use my landing lights."

"How soon can you come?"

"I'll be there in a couple of hours, Ann. If that bird comes back, hold him there. Hold him there if you have to knock him over the head!"

Bill slapped the instrument on its rack and swung toward Sandy. He gazed at him for a moment as though he didn't see him.

"Coincidence?" he asked himself. "If it isn't, what's the tie-up? Robertshaw wouldn't have had time to communicate with any one."

"What's that, Bill?" Sandy asked. "Were you talking to me?"

"No!" Bill roared. "Pack yourself a bag and throw it in the back of the Stormer. Get it warmed up. Have Scotty check it. We're going to Baltimore."

THE SCARLET STORMER droned southward over the storm-lashed coast of New Jersey. The bumpy air was slapping Bill and Sandy back and forth against the cowlings and their safety belts. As the lights of Atlantic City gleamed dully through the cold night air, Bill kicked the rudder of the Stormer and laid his course almost due west.

"Cold, kid?" Bill said into the inter-cockpit telephone.

"Colder than the north pole," Sandy chattered.

Bill ignored that remark. "Do you know what General Robertshaw wanted this afternoon?" he asked Sandy.

"How would I know?"

"You wouldn't," Bill answered. "He wants the secret of the Scarlet Stormer for the army." Bill could hear Sandy's gasp.

"You're not going to give it to him?" he shouted.

"I think so," Bill answered. "It all depends. He wants a rear armament of some kind worked into it. That would take out the seat where you're sitting."

"Is he nuts?" Sandy asked.

"No. It's possible. But I only know of one man who ever had any success with such an idea. That's what's funny about all this. Dave Blackstone told me about a rear armament he was developing the night he hopped to South America. That was before you came with us, kid—before I had the present gang together. Dave Blackstone died on that trip."

"To-day Robertshaw asked about a rear armament, and I told him about Dave Blackstone. He asked me to check up Dave's papers and try to find out what kind of an idea he had in mind. I said I would do it. Then Ann Blackstone called me and said a man had come to her with a letter from Dave to-day. The letter requested her to give his papers to the bearer. There's something screwy about it. Robertshaw didn't know about Blackstone's work until I told him. He didn't have an opportunity to send some one to Ann between the time he left me and I heard from Ann."

"If General Robertshaw had an idea about putting a rear armament in the Scarlet Stormer, some one else might have the same idea—I mean, might have the idea of putting guns in the back of a single-seater," Sandy said.

"A lot of guys have had such an idea," Bill said. "But they never got anywhere with it."

"Was Blackstone's idea any good?"

"I don't know," Bill answered. "What gets me is that these two things should happen simultaneously. Do you get what I mean?"

"I get it, Bill," Sandy replied. "What are you going to do about it?"

"Get some sense!" Bill shouted. "If I knew what I was going to do, I wouldn't be talking about it; I'd be doing it!"

Bill peered down over the side of the Stormer as he circled above the floodlights that had been turned on at the

private field of one of America's wealthy breeders of thoroughbred horses. The low, rolling hills of the Worthington Valley showed white beneath them. Bill brought the Stormer to a halt and killed the two supercharged Barnes engines in the nose. A man came running toward them through the snow from the hangar.

"Mr. Barnes?" he panted.

"Right!" Bill snapped.

The man's face was twisted with suppressed excitement. "You'd better hurry over to Mrs. Blackstone," he said. "I'm Herman, the man who works on the plane. I brought the car over to get you. Mrs. Blackstone just phoned to say that something terrible has happened."

"What?" Bill asked. He began to run toward the car parked beside the hangar.

"I don't know," Herman panted.

Bill swung open the left front door of the closed car and threw himself into the driver's seat. Sandy piled in beside him while Herman climbed in the back. Bill kicked the starter and raced the engine.

"Which way?" he asked.

"Out the drive there and to the right. I'll tell you."

Bill turned to the right at the end of the drive on two wheels. The car slithered halfway into a ditch, righted itself and gained momentum.

"Left here!" Herman shouted as they came toward a crossroad. "Left again up here about three hundred yards. That's the drive into our place."

Bill grunted and sawed the wheel back and forth to keep the car from going over. The lights of a house broke the night ahead as they swung into the drive. They clattered over a wooden bridge and came to a slithering halt before the house.

A small woman appeared in the doorway as they piled out of the car. Something bright glistened in her right hand as she put it to her mouth to stifle the scream that leaped to her lips.

Bill went up the steps three at a time as the woman's screams continued to pierce the night air. He grabbed the hatless and coatless woman who stood there and roughly pushed her back into the house.

"On the porch there, Bill!" Ann Blackstone said. "That's the way I found him."

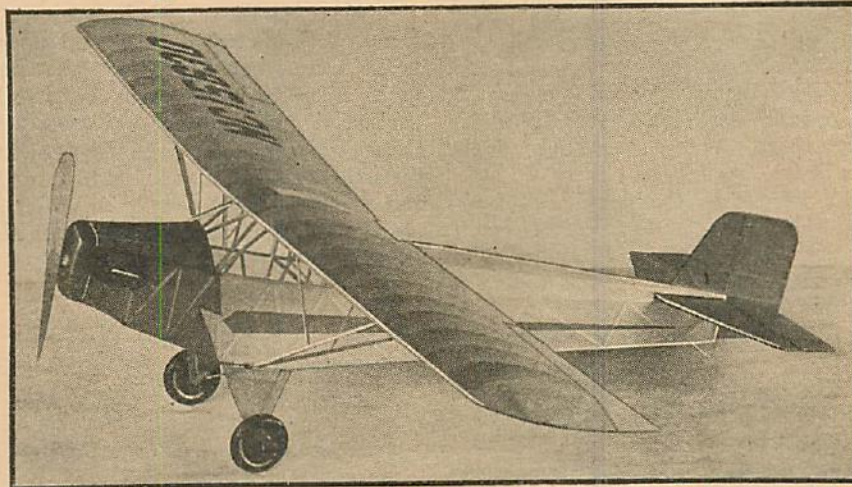
"Stay with her, Sandy," Bill said, and closed the door behind him as he went out on the porch.

It wasn't hard for him to find the thing she had called "him" in the glare of the bright porch light. Bill was careful not to move the body of the man who laid there in a widening circle of blood, with a knife sticking out of his back.

The man's face was a deep-brown, in spite of the pallor of death. His lips

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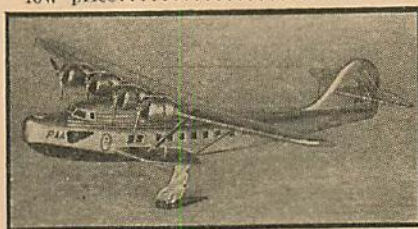
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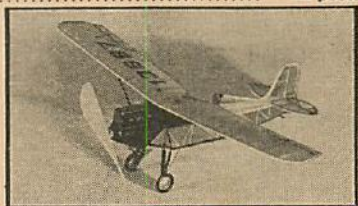


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	3/16x3/16 6 for .05	Large or Small 2 for .05	
	1/4x1/4 3 for .05	Steel Beads	
	1/2x1/2 2 for .05	Per doz. .03	
	1/2x1 1 for .05	Washers	
18" Sheets	1/64x2 2 for .10	1/4" dia. per doz. .03	
	1/32x2 3 for .10	1/2" dia. per doz. .05	
	1/16x2 4 for .10	3/4" dia. per doz. .05	
	1/8x2 3 for .10	Jap Tissue	
	3/16x2 2 for .10	White 2 for .05	
	1/4x2 2 for .10	Colored each .05	
18" Planks	1x1 1 for .05	Black, Orange, Red, Yellow, Green, Brown, (new) Silver .05	
	1x2 1 for .15	Rubber Motors	
	2x2 1 for .20	1/16" q. 25 for .10	
	2x3 1 for .30	1/32x1/16 20 for .10	
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	1/8" 1 for .07	Muscle Wire	
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	.01 .12 for .10	National Cement	
Machine Cut Propellers	5" 3 for .10	Tube 1.0	
	6" 1 for .05	1 oz. bot. .75	
	8" 1 for .10	Clear Dope	
	10" 1 for .10	1 oz. .10	
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	6" .12	Colored Dope	
	7" .20	1 oz. White, Black, Orange, Brown, Olive, Blue Gray, Red, Green, Yellow, 4x5" .03	
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were drawn back over snow-white teeth. A cheap hat that was too small for him was still jammed on his head. He wore a cheap suit of clothes, and a cheap pair of shoes. His overcoat was saturated with blood.

Bill knelt and went through the man's pockets. He found a few papers printed in what he imagined was Spanish or Portuguese, a long, dangerous-looking knife, a little money and a package of what appeared to be dried leaves. He put them all back and felt for the man's pulse again. There wasn't any doubt that he was dead.

Bill went into the house and beckoned to the white-faced Herman. "Where's the telephone?" he asked.

Herman told him.

A few minutes later he had the chief of police of the local village on the telephone.

"You'd better come right away," he said, among other things. "It's murder, all right."

He went back into the room where Sandy was trying to soothe the shattered nerves of the blue-eyed, tear-streaked girl who was twisting a handkerchief in her hands and trying to stifle her sobs.

"Tell me about it, Ann," he said simply after they had shaken hands.

"There isn't anything to tell, Bill. It's so horrible. It's—"

"Take it easy, Ann," Bill said soothingly. "I want to hear about it before the police get here. They'll be here soon."

"I was waiting for you," Ann Blackstone said. "I sent Herman over to get you. Then something made me afraid. Every little noise startled me. I was sitting here trying to read when I heard a noise on the porch. Then I heard a horrible noise—" She stopped and buried her face in her wet handkerchief. "It was the most horrible noise I've ever heard. Have you ever heard a horse scream in agony?"

Bill nodded.

"That's the way it sounded. It ended as quickly as it began. Then everything was still—just the faint sway of the pines in the breeze. I was afraid to go out near the door at first. Finally I got up my courage. I opened the door. I had decided by then that it was one of the animals in the stables I had heard."

"Then I saw it! I saw it and I didn't know what it was at first. Then I saw the blood and the hands, and I knew it was a man. I tried to go back into the house and I couldn't move. I couldn't take my eyes off it. Then I saw the piece of paper in his hand and I took it out."

"What piece of paper?" Bill said quickly. He was on his feet now, and his eyes were gleaming with excitement.

"It's over there on the table," she

said. "I put it there and didn't dare touch it again."

Bill was across the room in two jumps. He picked up the folded piece of dirty paper and spread it out before him on the table. Then he picked it up and moved directly under an inverted floor lamp.

Suddenly he drew in his breath with a hiss as the scribbled words on the paper began to take form before his eyes. The paper trembled in his hands as he realized that it was a message from the dead. He closed his eyes tightly, then opened them and studied the handwriting again. There wasn't any doubt about it—it had been written by David Blackstone. It read:

Dear Ann:

Did you get the other messages I have tried to get out to you? As I told you, I am very ill. But I will get out some way. I don't know where I am—some place in the jungle near the Paraguay River. No one can get to me. I am being held here.

I was forced to write a letter asking you to give my papers and plans to a man named Cortez. Do not give them to him. Give the bearer of this message what money you can and try to find out from him where I am. I will come back. May not be able to get this out. All my love, Ann, Dave.

"Let me see it, Bill," Ann Blackstone said.

He handed it to her without a word. Her face became even whiter as she read it. Bill had to half carry her back to the chair she had been sitting in.

"Where is the other note you told me about? The one this man Cortez brought to-day?" he asked her.

"In my room upstairs."

"Say nothing to the police about this note or the other one," Bill ordered her. "Talk as little as possible. I'll get in touch with some people who can take care of things for us. Let me do most of the talking."

IV—COMBAT

BECAUSE of Bill Barnes' influence, very few of the details surrounding the murder of the man found on the porch of Ann Blackstone's home got into the newspapers.

He suppressed the inherent curiosity of reporters with the aid of James Morton, chief of the Bureau of Criminal Investigation of the United States. They were given to understand that the incident was one in which the government was interested, and it was to receive no publicity. Bill's name was not mentioned in connection with the investigation.

He was constantly at Ann Blackstone's side during the investigation to take the burden of questioning from her shoulders.

Cortez, the dashing, cultivated South American who had called on Ann with the note from Dave Blackstone had disappeared. Detectives scoured the country for him. Airports, steamship lines, railroad terminals were constantly watched, but the man could not be found.

Bill studied the note he had left with Ann. It told him nothing other than the fact that some one wanted to secure access to Blackstone's papers and the secrets that might be hidden there.

The note was, as Ann had told him, indefinite:

Dear Ann:

You will be surprised to know that I am still alive. I am much too ill to explain the things that have happened now.

It is important to me that you give the bearer, Carlos Cortez, all of my papers, plans, and specifications—and access to the things on which I was working.

Do not question his credentials or make things difficult for him.

By helping him you will expedite my return to you. All of my love, David.

What, Bill asked himself, over and over, had the man been looking for? He went over Blackstone's papers with a fine-tooth comb to solve that question. But he did not find the answer. Most of his plans and specifications had to do with things that were obsolete in aviation science now. There was nothing that supplied a clue to the rear-ammunition equipment Blackstone had been trying to develop.

Major General Robertshaw assured him that he had talked to no one about his securing the secret of the Scarlet Stormer for the United States army. He aided Bill in every way possible in his investigation.

An ethnologist who examined the body of the murdered man convinced Bill that the man was a South American Indian of the Toba tribe, who inhabited the terrible swamps and thickets along the Pilcomayo River. He identified the broad face and projecting forehead, the wide-nostriled nose, large mouth and splendid teeth. The condition of the teeth he explained came from chewing the dried leaves of the coca bush, a South American shrub. The hair was straight and black, like the hair of all American aborigines, and his ears and eyes were small.

When Bill studied maps of South America he could not reconcile himself to the idea that Blackstone was in the Toba region of the Chaco. It was too

far south. The amphibian he had been flying on that fateful trip would not have carried him that far, unless he had equipped it with special tanks when he arrived in South America. It could be done, but—he threw up his hands in consternation.

"One thing is certain," he said to Ann Blackstone, "some one did not want that Indian to reach you. Another thing is quite sure: the Indian did not have that note in his hand when he was killed. He must have had it concealed about his person in some way. When he was sure that he would not live and sure that the man who stabbed him had gone, he brought that note out of hiding and died with it in his hand, so that you would find it."

Ann Blackstone nodded her head. But she did not speak. She could not speak. She could only sit and stare with tortured eyes that drove Bill to the point of insanity. He paced the house for those two days trying to make up his mind what he ought to do.

When the ethnologist had convinced him beyond a doubt that the bearer of the message from David Blackstone came from a certain area of South America, he made up his mind with a finality characteristic of him.

He called Scotty MacCloskey at Barnes Field and gave him certain orders. Then he got in touch with General Robertshaw.

"What are you going to do?" Robertshaw asked.

"Do?" Bill said. "Do? I'm going down there to get Blackstone!"

BILL BARNES threw a medium-sized leather bag in the back of the cabin of the Scarlet Stormer and said to young Sandy, "Keep your eye on that, kid. It has most of Dave Blackstone's papers inside. I'm going to bury it in my vault to keep them safe."

He gazed across the snow-covered field, glistening like silver and gold under the rays of a winter sun, while Sandy warmed up the two twelve-hundred-horse-power motors in the nose of the Stormer. He wondered if Ann Blackstone would be safe there at Willow Glen Farm alone. Suppose Cortez, the man who had killed, or had engineered the killing, of the Toba Indian, came back for Dave's papers? The local police had promised him they would keep an eye on the place. He decided he would ask James Morton to send a couple of men over from Washington—just in case.

Bill glanced at the extension-charging handles of the twin, fifty-caliber machine guns, and the circular dials of the automatic ammunition counters on either side of the cockpit as he settled into the pilot's seat. Something warned him, that curious instinct for caution that had saved his life a hundred times, to be

ready for trouble. He shrugged his shoulders, trying to throw off his feeling of apprehension at the same time he let off his wheel brakes. He jazzed the engines until the two three-bladed propellers became indistinct blurs in their frantic journeys in opposite directions.

"Button on your ear muffs, kid," he said to Sandy, and kicked the ship around into the wind. He took the Stormer off in a long, low climb to level off at ten thousand feet. Then he locked the controls and pulled out his map rack. He traced a course with his finger down the Atlantic seaboard to Miami, the place he had last seen David Blackstone. His finger kept moving along the route of the Pan American Airways system to Kingston, Jamaica, and Barranquilla, Colombia. There, he decided he would take that hazardous hop Blackstone had undertaken, across the mountains and jungles and swamps of Venezuela, and the reaches of the upper Amazon to Manaos. He would then—

"Hey, Bill!" Sandy shouted in his ear. "Have you noticed the dun-colored, low-winged monoplane a couple of thousand feet above us?"

"No," he said impatiently. "What about it?"

"Nothing," Sandy said. "She looks a little like an army job, without the markings."

"I'm busy," Bill answered. "Shut up!"

"All right. I was just telling you."



Cortez

You're always telling me to keep my eyes open."

"All right, yourself," Bill said. "Keep 'em open and keep your mouth shut."

Sandy kept silent for at least thirty seconds.

"Say, Bill," he said after that long silence.

"What?"

"I go along to South America, don't I?"

"I'll see. I—"

"Bill!" Sandy's voice was high-pitched and tense now.

"Will you shut up?"

"That plane, Bill. It's—"

Bill couldn't hear the rest of Sandy's words because of the roar of another airplane motor above their heads and the staccato bark of a pair of machine guns that were pouring lead into the tail of the Stormer. He felt the Stormer lurch and stagger under the impact of that hail of lead. His face turned white beneath its tan as tracer smoke curled above his head.

He slapped the control column of the Stormer forward with all his strength and opened his throttles. The big ship thundered into a power dive, then zoomed vertically upward. He cursed as he saw that a hundred bullets had drummed through the dural skin of his left wing to puncture the radiators there.

Bill kicked his rudder as he came up in a climbing turn to an approximate stall, and raced away in the opposite direction. The dun-colored ship had come up in the first half of a normal loop to roll level at the top in an Immelmann turn, and was again on Bill's tail.

Again bullets drummed into the tail of the Scarlet Stormer. Bill glanced up and over his shoulder in amazement as he sideslipped out of range of that second hail of lead.

"You have speed and you act as though you knew what you were trying to do," he said between clenched teeth.

"Shall I break out the swivel gun?" Sandy panted in his ear.

"Leave it alone!" Bill snapped. "I want this bird alive if I can get him."

The low-winged monoplane came out of its dive and chandelled upward as Bill pulled the Stormer level and threw the throttle wide. The two ships roared toward one another as Bill nosed the Stormer down to meet the enemy craft. His fingers clamped down on his gun trips. His guns chattered their song of death as fire raced out of the wing stubs. He saw his bullets tear through the leading edge of the monoplane's right wing and saw it stagger under the impact of his powerful 50-caliber bullets. Then it slid sidewise, away from its center of curvature as it began to turn, and away from Bill's deadly line of fire.

Then began a vicious, slashing duel such as young Sandy had never seen before. The red-lacquered Stormer raced and tumbled through the sky with the dun-colored monoplane slipping and skidding, zooming and diving in lightning maneuvers to escape the deadly fire.

The air above those desolate regions along the Susquehanna River, near Conowingo Dam, was alive with flaming lead and roaring motors. Down and down they fought—from ten thousand feet to eight, and five. Each was trying, with desperate zooms and climbing turns, to

gain that altitude that would give them an advantage.

Bill knew that he could shoot the monoplane down or run away from it, almost at will. But that was not what he wanted. He had caught a glimpse of the flashing white teeth and swarthy countenance of the man who was piloting the dun ship and he knew from the description Ann Blackstone had given him that it must be the man, Cortez, who had come to her with a letter from David Blackstone.

The whole thing dovetailed. Cortez had disappeared. But he had learned in some way that Bill was taking Blackstone's papers back to Barnes Field. And he wanted those papers badly enough to commit murder to get them.

Bill's eyes were as sharp and deadly as the eyes of an eagle swooping down on its prey as he matched move for move with the skillful pilot of the monoplane. He had to use every bit of strategy at his command to avoid those deadly onslaughts of the enemy ship.

Minutes, that seem like hours in air combat, ticked away. The pilot of the monoplane was shooting to kill, while Bill was trying to maneuver the dun ship into a position where he could drive a round from his guns into the engine block of the monoplane. If he could set fire to the other ship and compel the pilot to bail out, he could make a landing and force him to talk—force him to tell the secret of Dave Blackstone's death—or life.

Then he had the dun ship's nose across his sights for that fleeting second that is enough. His fingers clamped down on his trips. His bullets crept along the fuselage toward the nose. Then the monoplane swept out of range. Apparently it was unharmed as it came slashing back in a fast Immelmann, head-on.

Bill opened his throttle wide and stuck the nose of the Stormer down toward the great boulders that made up the bed of the Susquehanna. He pulled back on the stick until the whole structure of the Stormer screamed in protest. He intended to come up and over on his back, center his controls and open his guns on the monoplane from an inverted position.

But the dun-colored ship did not wait for him to come up and over. Instead of sweeping back to the fight, it stuck its nose due west, toward the flat farm lands of southern Pennsylvania. It was streaking away from the fight with a speed that made Bill's eyes bulge as he half rolled the Stormer to a level position.

A curse tore from his lips as he opened his throttles wide again and started in pursuit, then another curse as his eyes swept his instrument panel. His engines were overheating because of the water lost from his punctured wing radiators!

He half closed his throttles and threw a string of epithets at the tail of the fast-disappearing monoplane.

"You'll see more of me, baby!" he said as he kicked the Stormer around and stuck the nose upward. He wondered if he could get back to Barnes Field without being forced to land. He realized only too well that he had thrown away an opportunity he would not have again.

Now he would have to comb the jungles of South America with the same prospects as the man who combed the proverbial haystack for a needle.

"Are you going to quit, Bill?" Sandy's voice came over the telephone.

Bill cursed. "Look at that thermometer, half-wit!" he grated between clenched teeth.

Sandy looked. Then he exhaled and his shoulders slumped.

"Gee, Bill," he said, "that was a lulu of a fight. That baby knew his stuff. Who was he?"

"He forgot to tell me, kid," Bill growled.

"Well, he didn't have a date with a dentist, judging by the way he went away from here," Sandy said.

V—THE START

BILL BARNES felt a distinct surge of pride warm his brain and body as he stood beside his desk in the living room of his quarters on Barnes Field. It was a feeling that always came to him when he had his little squadron of aces assembled.

Shorty Hassfurther's broad, Pennsylvania-Dutch face was beaming and his blue eyes were crinkled at the corners as he joined the carrot-topped Red Gleason in riding young Sandy.

Sandy's face was flushed and his eyes were snapping as he tried to outthink and outtalk the two veteran fliers. They were making statements to Sandy in one breath and contradicting them in the next, to get him so tangled up in his own reasoning that he couldn't extricate himself. And, as usual, he fell back on his last weapon in a verbal argument with them.

"Nuts to both of you!" he finished, and stalked away.

Bev Bates' brown eyes were gleaming with amusement as he listened to the leather-faced Cy Hawkins drawl forth a eulogy of his home State—Texas. Scotty MacCloskey and the bright-eyed Tony Lamport were content to straddle a couple of straight-backed chairs and listen to the riding Shorty and Red were giving Sandy.

"All right, Sandy, pipe down!" Bill said, as Sandy turned to answer a last gibe of Shorty's.

They all turned attentive faces toward him, their expressions varying according to their temperaments.

"I want to tell you what's happening and hear what you think about it," Bill said. His bronzed face was relaxed now. His blue eyes were smiling. He told them about the visit of Major General Robertshaw, his trip to Baltimore with Sandy, and the attack of the dun-colored monoplane.

They listened to Bill's recital of his talks with General Robertshaw in silence. Whatever they thought about his turning the secret of the Scarlet Stormer over to the United States army they kept to themselves.

"I've been working on a new ship for some time," Bill said. "You all know that."

"But that has nothing to do with the situation confronting me now. I feel that I must go and find Blackstone—or make sure that he is not alive. I'm going to shove off to-morrow morning at dawn. And I'm going to take Shorty and Red with me, each flying a Snorter. I'll fly the Stormer. I'm going to trace down all the rumors that have come out of South America since Blackstone disappeared in 1930. I'll know the truth before we come back."

"Listen, Bill," Sandy broke in, his eyes flashing. "I think it's a dirty trick if you don't take me along. I was in at the start of this thing. I—"

"I spend about half of my time," Bill said angrily, "telling you to shut up. But it doesn't seem to do any good. I'm going to take you along. You're going to get all the taking along you want. I'm going to take you to do extra duty with the Stormer over the jungles of South America. After you've flown over a few thousand square miles of jungle you'll wish you hadn't been so eager to go."

Sandy didn't say anything to that; he knew better.

"I'm going to leave the rest of you here to take care of anything that may come up. I don't know how long I'll be gone. But I'll be in touch with you, Tony, all the time."

"What about this tail defense of Blackstone's, Bill?" Red Gleason asked. "Do you think there is anything to it?"

"There must be," Bill answered grimly, "or this Cortez wouldn't go around trying to kill people in order to get his hands on Blackstone's papers."

"But you said you couldn't find anything among his papers that would help you," Shorty said.

"I may not know where to look for it," Bill said. "Dave Blackstone had a curious way of doing things."

"I know a swell name for a ship with a tail armament," Sandy said.

"All right," Bill said, "I'll bite. What is it?"

"When we were down in the West Indies, when Saul Cox was alive, he took me fishing one time," Sandy said. "I caught a funny-looking thing that was

called a sting-ray. It had a long, whip-like tail with barbs in it. It could give you a mean cut if it caught you right."

"Well?" Bill said.

"The Stingaree," Sandy said. "How do you like that for a name?"

"Awful!" Shorty and Red Gleason said in unison.

THE wall chronometer in Bill Barnes' quarters registered five o'clock when he pulled a heavy leather overall over his whipcord breeches, flannel shirt and boots. He stuck a heavy white helmet on his head and picked up the roll of maps and charts he had been working on the night before.

The goggled, white-helmeted heads of Red Gleason and Shorty Hassfurth stuck above the rim of their two scarlet Snorters as he joined Scotty MacCloskey on the apron. A half dozen mechanics were making last-minute adjustments on the Scarlet Stormer. The props of the three ships ticked over slowly in the dim morning light.

"Tell Tony to pick me up if he has any soupy weather reports, or anything important happens," Bill said to Scotty MacCloskey. "I'm going to hop over Washington, Raleigh, Charleston and Jacksonville, to check up on that monoplane that jumped me yesterday. If Cortez finds out I'm heading toward South America he'll probably do the same thing, and I may pick up some trace of him.

"From Miami we'll cut across Cuba to Kingston, Jamaica. From there to Barranquilla. Have Tony make arrangements for refueling at Miami and Barranquilla. You can reach me at Pan American airports if the weather gets too thick to make contact by radio. But I'll keep you informed. You might make a report to General Robertshaw at Langley Field occasionally."

"Boy," old Scotty said, "you don't sound very enthusiastic about this trip. What's on your mind?"

"I'm not very enthusiastic, Scotty," Bill said slowly. "I'm afraid of what I'll find. In spite of myself, I've half shared Mrs. Blackstone's belief that Dave is still alive. I'm afraid I'll find out he isn't—or—that he's worse than dead!"

As Shorty's Snorter bellowed forth a full-throated roar, Bill stepped toward the small door of the Stormer and threw it wide. His face became a thundercloud as he peered into the rear of the small cabin and saw that Sandy was not yet aboard. He flipped the switch on the radio and spoke to Tony Lamport in the administration building.

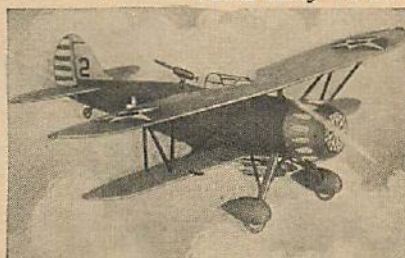
"Tell Sandy," he said, "that if he isn't out here in sixty seconds he stays home."

Twenty seconds later young Sandy came running around the corner of the administration building with a bag in one hand while he tried to hold up his breeches with the other. His white hel-

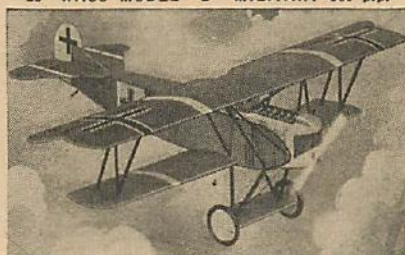
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met was shoved back and was half buried by his uncombed hair.

"Where's your chute and your overalls?" Bill snapped.

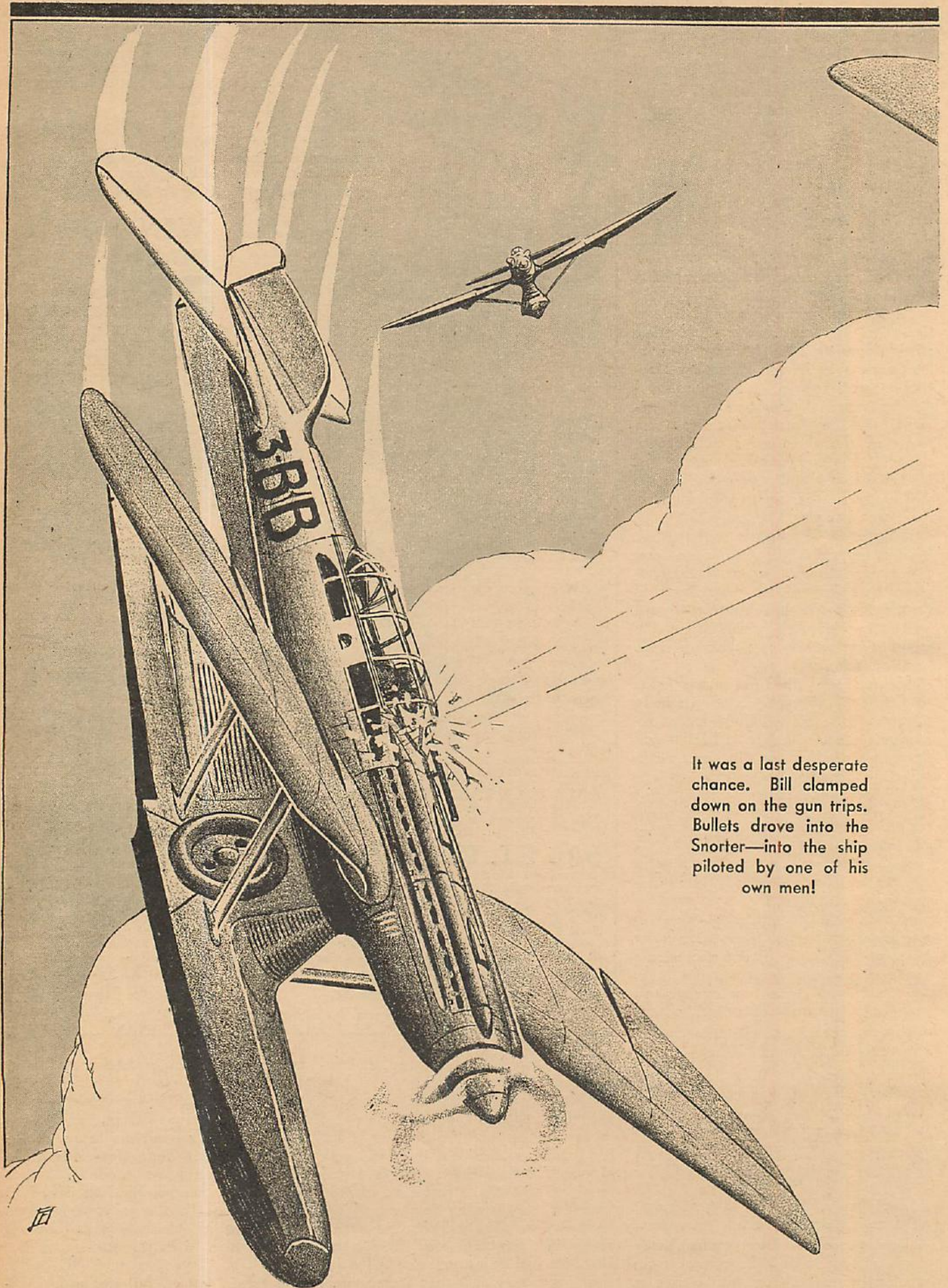
"In the back of the Stormer, Bill," Sandy said as clearly as he could with his mouth full of toast. As he started to climb into the Stormer he glanced toward the two idling Snorters. What he saw caused him to choke on his toast as his face went crimson. Shorty and Red both had their arms stretched above their heads and their four thumbs were pointing down. That signal means "something wrong" to any pilot in the

world. And Sandy knew that they meant him.

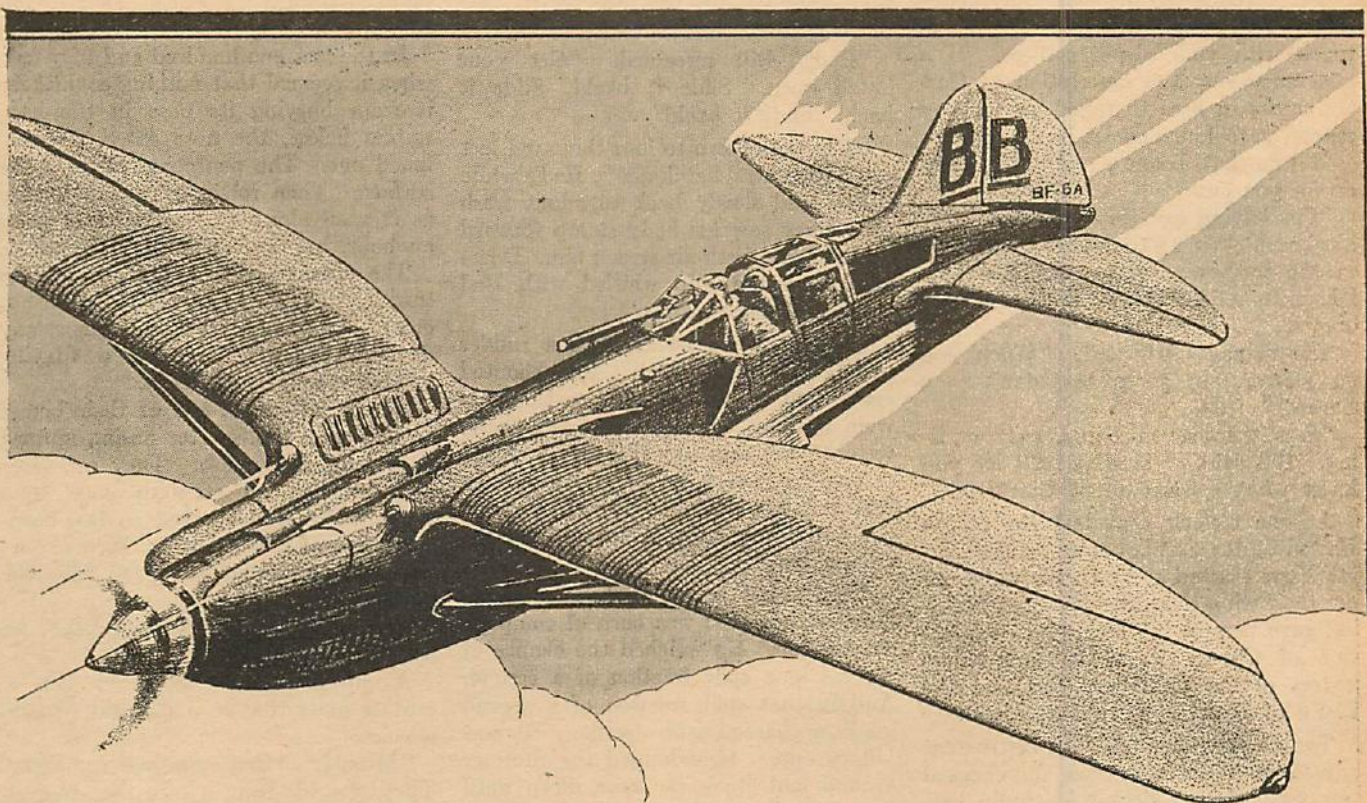
As he let go of the top of his breeches to thumb his nose at them, the breeches slipped down around his knees, exposing a pair of skinny legs incased in shorts. When he dropped his bag to pull up the breeches Bill roared at him. At the same time a mechanic scooped up a handful of snow and threw it against Sandy's bare legs.

"Get in there, you ape!" Bill cried.

Sandy dived in the door and disappeared. This was one of the rare times he knew enough to keep his mouth shut.



It was a last desperate chance. Bill clamped down on the gun trips. Bullets drove into the Snorter—into the ship piloted by one of his own men!



Bill's hand came up above his head. The dispatch tower acknowledged. Shorty's Snorter rolled slowly forward as he released his brakes.

Tony Lamport's voice came through the ear phones of the three pilots: "Clear ahead, Shorty. Nine-mile northwest wind. Nothing north or east of you."

"O. K., Tony," Shorty's voice came back. "Keep your ears dry."

The sleek Snorter sped down the runway. The flaps came down. The tail lifted and the fast fighter hurtled into the air like a thing possessed.

A few seconds later Red Gleason's Snorter was below its tail as it spiraled upward. The twin motors of the Scarlet Stormer thundered. The wheels of the long, stream-lined pontoons gathered momentum. The powerful ship left the concrete with the speed and grace of a monster sea gull. The amphibian gear rose smoothly to cuddle itself into the belly of the long fuselage, as Bill whipped the ship upward in fast, tight spirals.

At ten thousand feet he threw his radio key and spoke into the microphone. "We'll cruise at two hundred," he said. "Southwest over Philadelphia and Washington. We have a slight tail wind here. Take a position on each side of me. Tony says we may strike a cross wind south of Washington. Clear and cold until we hit Raleigh. Take it easy and keep your eyes open. Signing off."

The winter sun stuck its nose above the rim of the horizon to the east as they switched off their running lights. The bridges across the East River, and

the Washington Bridge across the Hudson, looked like huge planks laid across small streams. Smoke belched forth from the tall stacks of industrial plants in New Jersey. Tiny specks that were ships moved sluggishly up through the Narrows toward New York Harbor. Two mail and transport planes circled the Newark airport with their cargoes.

Bill Barnes' forehead was furrowed and his eyes were thoughtful as he probed the clear air ahead. He was thinking of his half-made promise to Robertshaw. His fingers gripped the control column until his knuckles showed white. Through his mind flitted a thousand pictures, pictures of the Scarlet Stormer slashing its way through insuperable odds. Never had it failed him. It was the greatest plane of its kind in the world. The possession of its secrets by the United States army would make the United States the premier air force of the world.

That, Bill told himself, is the thing that counts. He could keep the Stormer's plans for himself, but the nation needed it. With new ships being tested daily all over the world, the United States might suddenly find itself in grave danger of attack from the air. The army needed a ship that could meet that attack and drive it back. They needed a ship that could get into the air fast and meet the enemy before they reached their objective and annihilated it.

"There isn't any use in kidding myself," Bill said aloud. "They need planes like the Stormer—they need a thousand of them to guard our coasts."

VI—NARROW ESCAPES

AT a few minutes before twelve o'clock, that same morning, Bill stuck the nose of the Scarlet Stormer down through a hole in the clouds as Biscayne Bay flashed beneath his wings.

He taxied the Stormer toward the sea wall before the North-South American Airways hangars, with a Snorter thundering on each side of him.

"This," he told himself, "is the proper place to start a search for Dave Blackstone. This is where I last saw him." He gazed out across the waters of the bay with eyes that were unaware of the glaring sun. He pictured Dave Blackstone kicking his powerful amphibian around into the wind and taking it off the water. He remembered how he had stood at the water's edge until the sound of Dave's motor had faded in the distance and his running lights had been erased by the night.

Ten minutes later he was talking to the manager of the airport in his private office. They talked about David Blackstone for some minutes before Bill asked him about the South American, Cortez.

"You got the warning I sent you about a South American calling himself Cortez, with a dun-colored, low-winged monoplane?" he asked.

"We got the warning, all right," the manager said. "But we've seen nothing of him or his plane. Does he have anything to do with the Blackstone matter?"

"I don't know," Bill said grimly. "At least I'm not sure. But I want him held if he shows around here. I'm going to

South America to run down the stories about Blackstone myself. I'll be in touch with your airports there. If a man answering the description of Cortez comes in here to refuel, or for any reason, grab him and let me know."

"I'll do that, Barnes. Anything I can do for you now?"

"I'm having my ships refueled," Bill answered. "Going to get some luncheon in the mezzanine restaurant and hop. I hope to be in Barranquilla to-night for dinner."

The manager whistled. "When you go places, you go places, don't you, Barnes?"

"Less than seven hours, easy cruising," Bill said. "Thanks. I'll let you know what I learn about Blackstone."

At one o'clock that last tip of the United States that is known as the Florida Keys slanted away to the right under their wing tips. The Straits of Florida gave way to the lush, green vegetation of Cuba. Then the deep-indigo waters of the Caribbean Sea and the island of Jamaica, in mid-afternoon.

The chronometer on Bill's instrument panel read five o'clock when Bill checked his bearings and flipped his radio key. The three ships were boring through the sun-tortured air above the Caribbean at ten thousand feet. Sandy was sleeping with his head sunk forward on his chest when Bill spoke into his microphone.

"Two more hours and we sit down at Barranquilla," he said.

"Check," Shorty said. "I can stand it."

"How are you riding, Red?" Bill asked. "We're going to run into a tropical squall in a few minutes. Thunderheads gathering ahead of us." He waited for Red to answer. But no answer came from Red. It was Shorty's voice that sounded in his ears—a voice that was high-pitched and tense.

"Red's in a spin, Bill!" he shouted.

Bill's whole body froze as he glanced up and back over his left shoulder. There wasn't any doubt about it. Red's Snorter was plunging around and down at a terrifying speed.

Bill's voice became a roar as he belted into the microphone.

"Red! Come out of it, fellah! Red!" He gripped the control column of the Scarlet Stormer until the blood drained from his hand. Then a sigh that was half a groan and half a sob escaped his lips as Red's voice mumbled faintly in his ear. He couldn't understand what Red was trying to say, but he knew his voice had penetrated Red's consciousness. He screamed into the microphone with all the power of his lungs, repeating Red's name over and over again. At the same time he swung the Stormer around and nosed down above the whirling Snorter.

"It's fumes, Bill!" Sandy cried in his

ear. "He has his overhead hatch battered down."

"Red!" Bill screamed. "Get your hatch open. Slide it back! Slide it back! Slide it back!"

They were down to four thousand feet as the overhead hatch above Red's white helmet slid slowly back to admit fresh air. They saw his body slump forward again as the fresh air struck him. Down and down the ship whirled with Red helpless at the controls.

"Get both your feet on one rudder pedal and push, Red!" Bill shouted again and again. A million thoughts were flashing through his mind as he watched the ship plunging to its death. A terrible rage lashed him because he was helpless. There was nothing he could do but keep shouting into the microphone.

Then a last desperate hope came to him—a hope that was born of complete desperation. He weighed the chance of success in a split fraction of a second. And in that split fraction of a second made a characteristic decision. It was kill or cure. He whipped the Stormer around and stuck the nose down until it was pointed directly at the pilot's cockpit of the whirling Snorter. He knew the chance he was taking. But he knew that Red would die when his ship crashed. If he—

Bill got the frame of the windshield, before Red's slumped figure, under his hair sights for an instant. In that instant his finger clamped down on his gun trips. Fire and smoke belched from his two powerful .50-caliber guns. Bullets drove into the instrument panel of the Snorter. Red's body jerked convulsively and slewed to the right as Bill zoomed the Stormer upward, his pontoons barely clearing the tail of the spinning Snorter.

Perspiration dripped from Bill's strained, tense face as he brought the Stormer around in a vertical bank. Then he began to shout into the microphone again. He had seen that Red's head was up now and he had one hand wrapped around the stick of the Snorter.

"Blast your engine and hold her on right rudder!" he screamed over and over as he circled above. He saw Red's body fall back against the pilot's seat to give him leverage on the rudder. The ship was only a thousand feet above the water now. Eight hundred! Five hundred! Bill's heart was in his mouth and he was sick as he had never been sick before. Only a miracle could save Red's life.

Then Bill heard Sandy's breath suck in through his lips as the Snorter wavered on one of its spins. His whole body trembled as suddenly, the ship came out of its spin and began to dive, only four hundred feet above the water. They held their breath while the plane

plunged toward the Caribbean at a terrific speed.

In the last one hundred and fifty feet, when it seemed that nothing could keep it from burying its nose in the hard waters below, the nose eased up, flattened out. The pontoons skimmed the surface. Then rolled from side to side as it sped along at two hundred miles an hour, barely five feet off the water.

The suspense of those few seconds was terrific. They knew that Red was not out of danger yet. A bump, almost any deviation from the course he was trying to hold would mean death.

The breath went out of their bodies as they saw the Snorter nosing upward in a long, low climb. They sat weak and helpless, all strength gone from them, while Red climbed to two thousand feet and leveled off. It was then that Bill managed to speak into the microphone.

"Are you all right now, fellah?" he asked.

A gurgling noise answered him—a gurgling noise that in a moment became a voice.

"Minute," Red moaned. "Sick." They saw his face, a face that was almost as white as his helmet. He spoke into the microphone again. "Fumes," he said. "I closed my hatch to lessen the heat from the sun. Thought it might help. Fumes put me to sleep. I was almost out when you shouted at me."

"You're all right now?" Bill asked, his voice strained and tense.

"All right in a few minutes," Red answered. "You creased me along the shoulder with one of your bullets. I can—"

"Is it bad?" Bill shouted. "We'll sit down and patch you up. It's like a mill pond down below."

"No," Red answered. "That crease brought me to. That took guts, Bill."

"I nearly killed you," Bill said slowly.

"You kept me from killing myself. I'm all right now. How long to Barranquilla?"

"Two hours."

"O. K. Put your nose on it," Red managed a weak laugh.

"Get up to ten thousand!" Bill shouted. The horizon had become inky-black. The clouds ahead were racing to meet them. Yellow stabs of lightning flashed in the oncoming clouds. Bill altered the pitch of his propellers and eased down the wing flaps. "Maybe we can get above it."

The three ships rode from daylight into darkness, as they stuck their noses into the storm. Lightning flashed all about them in jagged welts. Rain beat down on their hatches with the force of machine-gun bullets. They reeled and skidded as they fought their controls. Perspiration streamed down their faces.

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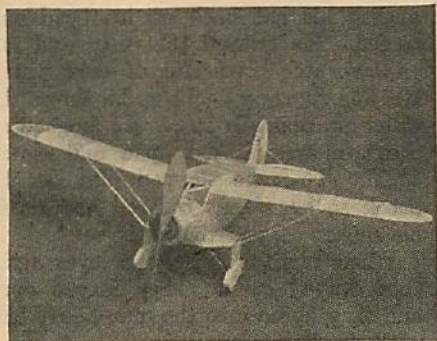
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A head wind beat at them with a ferocious fury.

Bill eased the control column forward as his altimeter read ten thousand feet. "We may as well ride through it here," he said into his microphone. Shorty and Red gave him the all-clear signal. For twenty minutes the three ships rocked and plunged and dived, as the wind and rain beat at them.

Then, without any warning, the storm disappeared as quickly as it had been kicked up. One moment they were in the center of it and the next moment it was gone. An angry bank of clouds sped away from them to the west.

The sun was edging toward the horizon to the west as Bill checked his instruments again and gave Shorty and Red their position.

"Another hour does it," he said. "We'll make Barranquilla just before dark."

The snow-capped peak of Pico Cristobal was swathed in purple shadows as they circled above the Barranquilla airport at dusk. Spiraling down they got the direction of the wind and slapped the three ships down, side by side, on the apron.

Red Gleason's face was still white and strained as they stepped into a taxi and told the driver to take them to the Hotel Paz. And there was a splotch of

red around the tear in the right shoulder of his overall.

"We'll get you into bed, fellah," Bill said to him. "You'll feel all right to-morrow."

"I'm all right now," Red said wearily. "But I can stand a little shut-eye. What is the dope for to-morrow?"

"I've got to figure that out to-night," Bill answered slowly. "I'm not just sure."

They had their dinner served in Red's room and all turned in at a little after eleven. Bill sat on the edge of his bed for a few minutes before he turned off his light. He was thinking about the South American, Cortez, who had attacked him. It was certainly peculiar the way the man had disappeared. At least it was peculiar that he could hide his plane so effectively. He wondered if Cortez had been seized with cold feet. Perhaps he had decided to give up his attempt to get Blackstone's papers after the murder of one man. He may have found the going too tough for him.

Bill shrugged his shoulders, yawned, and reached for the light beside his bed. To-morrow he would have to plot his course of action if he ever expected to find Blackstone.

THERE WASN'T the faintest sound or rustle to disturb the quiet of the

room when Bill opened his eyes. It was as black as the darkest dungeon, except for a slanting ray of light from the open window.

Yet, Bill knew instantly that there was, or had been, some one in the room. He could feel the presence of another person. He could feel it in the little shiver that crept up his spine and tingled the base of his skull. He didn't move, in spite of an almost overwhelming desire to roll over and out of the way of that hidden danger. He tried to control his breathing, as though he was still asleep. At the same time he strained his ears to catch the slightest movement or sound.

Time stood still while he lay there, clothed in perspiration. His nerves screamed for action. The very silence was terrifying. His stomach writhed as he dug his nails into the palms of his hands and forced himself to lie rigidly quiet. He didn't try to reach the automatic under his pillow. He knew he could get to that fast enough when the time came. He wanted that something in the room to give itself away by a movement or the drawing of a deep breath—any sound that would locate its position.

Finally, when he felt the slightest breeze fan his face, he went into action. He did three things at one and the same

time. He opened his mouth and shouted at the same time he jabbed his hand under his pillow and fastened it around the butt of his automatic. With the same movement he threw his feet high in the air and lunged out of the bed and across the room.

As his body came up against the wall he slipped to the floor. Lying perfectly still he listened for the slightest sound. After a moment he reached out to his right and tapped the floor lightly with the automatic. At the same time he rolled to the left. Again he strained to catch a movement or a sound. None came.

He began to crawl around the room. His eyes were becoming accustomed to the darkness. He picked out the various objects in the room. As he came near the door he reached upward and snapped on the light. His eyes grew wide with amazement as light flooded the room.

There was no one there! He could tell with a glance that his bags had been searched, but the room was empty except for himself. He stood in the center of the room and scrutinized every detail of it. He inspected the lock on the door. The spring lock had been sprung back. He couldn't remember whether he had locked it before he went to bed.

An examination of his bags showed that nothing had been taken. All his papers were there. Whatever they had been looking for they had not found.

As he stood in the center of the room again, gazing about him, his eyes suddenly widened with horror. He moved toward the things that were arranged, like upturned tacks, beside his bed. They looked like tacks. But they weren't tacks. He recognized them for what they were.

They were placed like uneven hurdles alongside his bed—a dozen, or more of them. They were about an inch long, with a sharp point and a wide base so that they would stand upright and not topple over easily.

He picked one of them up gingerly and inspected it under the light. The sharpened, wooden point was covered with a darkish red substance—probably a vegetable poison—the kind of deadly compound known to South American savages, with which they smeared their arrowheads.

Bill shuddered as the thought came to him that only luck had kept him from stepping out of the bed and onto the things with his bare feet. It would have meant certain death—an agonizing death that wouldn't have been pleasant. His hands trembled as he picked up the rest of the poisoned darts and carefully dropped them into a handkerchief.

When he had finished he placed them on a bureau and sat down to gaze at them. A thousand thoughts rushed through his mind. Thoughts that had

to do with the dead Indian on Ann Blackstone's porch, and the South American, Cortez.

There wasn't any doubt that Cortez had managed to get his plane out of the States with himself at the controls. He was there. He was in Barranquilla. And he knew where Bill was going and why.

Bill wished he knew where he was going. Some place in those great jungles and swamps and marshes to the south was David Blackstone. This Cortez knew where.

Bill got to his feet, crossed to the window and gazed out into the dawn that was creeping out of the east.

"This job," he said, aloud, "isn't going to be any set-up. Blackstone might be anywhere. And while I try to find him I'll have an invisible enemy-picking at me from the dark!"

VII—INFORMATION

WHEN Shorty Hassfurth awakened that same morning, the dawn was just creeping through his window. He opened one eye and gazed at the vaguely familiar things in the room. The bureau, the chairs, the table beside the window all had taken on grotesque shapes in the early morning light. The cluster of lights that hung from the ceiling had the bent, gnarled form of a tree gone mad. He grunted, closed his eye, and shifted his form in the bed. He was tired and wanted to go back to sleep. But something seemed to be pressing against his brain—something that kept him awake.

He shifted to a new position and grumbled audibly. It was then that the lights in the room flashed on. He opened his eyes and stared at them for a fraction of a second before he saw the man who stood beside his bed.

When he started to throw back the bedclothes, the man said, "Take it easy!"

Shorty saw that he was smiling, but it wasn't the kind of smile that gave him any comfort. It was more of a sneer than a smile. It twisted the man's copper face so that his white teeth gleamed below eyes that were mere slits in his face. He wore a soft hat jammed over his sleek, black hair and his right hand was wrapped around the butt of an automatic. Shorty noticed that the nose of the automatic was the largest one he had ever seen. The gaping hole in the end seemed to be large enough to drive a truck through. He raised himself on one elbow and glared.

"What's the idea?" he asked.

"Just a friendly visit," the man said. At the same instant he shifted the gun in his hand so that it was flat in his palm and struck Shorty on the side of the head. For the brief instant while Shorty saw the room running around and around before his eyes the man

slipped his hand under Shorty's pillow and took the gun that was there.

The cry of painful rage that came from Shorty's lips was accompanied by a move that was instinctive. Having been born without a sense of fear he lashed out with one of his feet, in spite of the two guns that were pointed at his head. His foot caught the man a glancing blow that merely infuriated him. He brought the flat side of his automatic down on Shorty's head three times, in rapid succession. Shorty was already unconscious when he received the third blow. He slumped back on his pillow, his head streaming blood.

"You asked for it," the copper-skinned man above him growled deep in his throat. He flicked Shorty's eyelids back and grunted. Then he placed the two guns on the bureau and made a systematic search of Shorty's belongings. When he had finished he stood up, pushed his hat back on his head and cursed. He crossed the room and ran an ice-water pitcherful of cold water. He was sneering again as he threw the water on Shorty's face. He laughed as Shorty's eyes flicked open and closed again. Then he slapped him on the cheek so hard that the red imprint of his fingers stayed there.

When Shorty opened his eyes again they stayed open. They stayed open and they bored into the man above him with deadly malevolence.

"You'd better kill me," Shorty managed to say through twisted lips. "You'd better kill me if you want to go on living yourself."

"I'll come to that," the man said. "First, I want you to talk. I want to know where I can find Blackstone's papers. I've been through Barnes' stuff. He doesn't have them. And you don't have them. Where are they?"

Shorty regarded the man through narrowed eyes. He studied the man as he would have studied a new airplane before he took it into the air. A thousand thoughts flashed through his mind. He knew he must stall. He must find the man's weak point and play to it. He asked the first logical question that came into his head.

"What good will Blackstone's papers do you?" he asked. "If you had them they wouldn't do you any good."

"I'll judge that," the South American said. "Where are they?" He lighted a cigarette and held the match so close to the back of his hand that Shorty could smell the hairs on his hand burning. He laughed as he turned the back of his hand toward Shorty.

"You get the idea?" he asked.

"I get the idea," Shorty said grimly.

"You talk?"

"Sure. What do you want me to say?"

"I——" He stopped talking as a knock sounded on Shorty's door. He

pushed the two guns in his hands out in front of him as he whirled.

The knock sounded again.

"Hi, Shorty!" Bill Barnes' voice came from outside the door.

The man made a motion with one of the guns. Shorty understood it and nodded his head. He opened his mouth and yawned as though he had just awakened.

"O. K., Bill," he said. "I'm still in bed."

"Hit the deck, guy," Bill answered. "We'll be shoving off in a few hours."

Shorty grinned as he made an answer—an answer that he hoped Bill would understand.

"I'm in a corkscrew turn, Bill," he said. "I'll try to get out of it."

There was a silence that stretched out interminably outside the door. Shorty watched the narrowed eyes of the man bending above him while it lasted.

Finally, Bill spoke again. "Right, fellah," he said. "Fight the old controls."

That was all. They heard Bill's footsteps disappearing down the corridor. The coppery-skinned man grinned evilly and nodded.

"You have sense," he said.

"More than you'd think," Shorty answered. He knew that he must stall

for time now. Again he asked the first question that popped into his head.

"Who wants Blackstone's papers?" he asked. "Where is Blackstone? Is he still alive?"

"He is alive," the man answered. "I tell you because you will not be alive to tell any one else. Blackstone is a god of the savages in the most lawless part of South America. He has been a cripple since he fell from the skies five years ago. The savages believe it is the white god who ruled them centuries ago—the white god, who, according to the old legends, disappeared into the skies. They believe that he returned when Blackstone crashed in the jungle five years ago."

"They are the Toba Indians of the Matto Grosso. The land where they live is owned by Carlos Cortez, my boss. He has been able to control them by using Blackstone. He learned of Blackstone's idea for a tail armament and he has interested an Eastern power in it. They are willing to pay a great deal of money for the idea. You see? Now you know. Where are Blackstone's papers?"

The man was scowling as he asked that last question. He was scowling as though he was annoyed at himself for having talked so much.

Shorty laughed softly. He leaned over

and picked a cigarette off the table beside his bed and lighted it. He was sure he had the man now. If he could just keep him talking until Bill pulled him out of the corkscrew turn.

"The Matto Grosso, eh? Down at the tail of Brazil, east of the Chaco? Bad country, they tell me. Every man is his own policeman."

"Police do not dare go into the province of Matto Grosso," the man answered.

"Descendants of the Portuguese settlers, silver-spurred *Gauchos*, Syrian hucksters, Japanese coffee planters, and savage Indians," Shorty said. "I've heard about 'em. I knew a couple of fellows who were fighting for Bolivia over the Chaco. They told me the Matto Grosso is tough country."

"They did not tell you enough," the man growled. "Ten shillings is the price for murder. But the jungle, it is more dangerous than the men who live there. It is always waiting for you. It looks sweet and green and cool, virginal. But it is a vampire. It will torture you and then kill you."

"Nice place," Shorty agreed. His eyes flickered toward the door for a fraction of a second. He saw the door-knob turning slowly. "Where is Blackstone? What part of the Matto Grosso? It's a big place."



As he rolled level, Bill heard the rat-tat-tat of Sandy's swivel gun behind him.

"Near Cuyaba," the man growled. His eyes were becoming suspicious now. He was studying Shorty's face with a new intentness.

"You talk too much," he went on. "Where can I find Blackstone's papers?"

"Oh, sure," Shorty said. He saw the door open slowly and silently. "They're up North. They're in a vault on our air field on Long Island. Ever been in the States?"

"Many times. Are all the papers up there?"

"Nice going, guy," Shorty said as Bill Barnes stuck a gun into the back of the man standing over Shorty.

"Drop those guns!" Bill said in the man's ear.

But the South American didn't drop his guns. He pulled both the triggers as he jumped to one side and whirled. The shots crashed harmlessly into the floor as Shorty Hassfurther came off his bed. He came off his bed with the speed and agility of a lioness protecting her young. His fist exploded on the South American's head, just behind his ear. The man's guns barked once more as he fell. He slumped forward to his knees and scraped his face on the floor as he slithered across it.

"He won't bother you again for a few minutes," Bill said.

"I wish he could get up," Shorty said viciously as he touched his head with the tips of his fingers. "He slapped me unconscious with the flat of his gun."

"That corkscrew turn crack of yours was a bright remark," Bill said. "I knew what you meant."

"I thought you would," Shorty said.

For an instant they both thought about those several times when they had identified themselves to the other in the air when they were flying strange planes. They remembered how one would stick the nose of his ship into a screaming power dive, only to come out and stick the nose straight at the heavens. At the peak he had jammed down on the rudder and thrown the stick over until his ship corkscrewed around and around like a whirling dervish, gone mad.

In that way they had told the other who it was at the controls of the strange plane. Only a handful of pilots could duplicate the trick. The real danger came when the tail began to slide off toward the earth. It was an understood signal between them. It had saved Shorty's life before. And it had saved it now.

"This fellow told me where we can find Dave Blackstone," Shorty said quietly.

Bill's mouth dropped open and his eyes widened as he stared at Shorty. "He's alive?"

"He's alive," Shorty repeated. "He crashed down in the Matto Grosso province of Brazil and is being held there by a bird named Cortez. The natives

think he is a legendary god that disappeared into the skies centuries ago, and came back the same way. Cortez is able to control the natives through Blackstone. Cortez learned Blackstone's idea about a tail armament. He has peddled it to some Far East power who is willing to pay him a lot of money for it. That's the set-up."

"That is the only way I could figure it," Bill said slowly. "Anyway, we know where to look for Blackstone. We'll hop for Manaos this morning. The Matto Grosso is a big country. Did he tell you what part?"

"He even did that," Shorty said. "Near Cuyaba."

"There's an airport at Cuyaba," Bill said. "We'll turn this bird over to the police. I think I can fix it so that we won't be held up here because of him. I'm sorry he slapped you unconscious, fellah. But he saved us a lot of time. Maybe we can get Blackstone out alive."

"We're going to have trouble, Bill," Shorty said. "This man Cortez sounds tough."

"We'll try to take it out of him," Bill said evenly. "He has kept Dave Blackstone a prisoner for five years. We owe him something for that."

"We'll keep that in mind," Shorty said grimly. "I'll get Red and Sandy out of bed. Keep an eye on that baby."

"Tell 'em we'll clear in an hour," Bill said.

VIII—ATTACK

THE SCARLET STORMER and the two Snorters labored above that great fever-stricken thicket that is the jungle of Brazil. To the north and west curled those festering, miasmatic rivers that make up the headwaters of the Amazon. A perpetual haze that gave an illusion of cool, green forests hung over the horrible swamps below them. That siren that is the jungle seemed to be calling, inviting the three planes to rest in the coolness of its bosom.

"Boy," Sandy said into the inter-cockpit telephone to Bill Barnes, "I'd like to sit the Stormer down on that river and go for a swim. This heat is terrible."

"It would be your last swim," Bill answered. "It looks cool and inviting. That is the deadly thing about the jungle. It looks full of beauty and security and calm loveliness. But it isn't. It's full of death in a thousand forms."

"To-morrow we'll be down in the Matto Grosso, where the River Paraguay runs out of Brazil. It looks cool and inviting, too. But in it is the most dangerous thing in South America."

"Crocodiles?" Sandy asked, his eyes wide.

"Piranha!" Bill answered. "They're more dangerous than a jungleful of tigers. It's a man-eating fish. They

herd together in great swarms. They can smell blood. A man with an open wound might as well cut his throat as step into the river. A thousand of them would tear him to pieces before he could save himself. Cattlemen expect to lose at least one steer at each ford. They feed on any sort of flesh. They can chew through wood with their sharp teeth."

"I think I'll stick to the bathtub," Sandy said.

"You'll be lucky to have one after to-night," Bill answered. He threw a key on the radio panel as a light gleamed red.

"Manaos two points off the port bow," Shorty's voice came over the radio. "I can stand it. So can the Snorter. She's puffing."

Five minutes later they set the three ships down on the Rio Negro before the port city of Manaos, in the heart of the jungle of Brazil.

"Bill," young Sandy said at dawn the next morning as Bill kicked the Scarlet Stormer into the wind and took it into the air, "you started to tell me about this Matto Grosso, where we're going, yesterday. What is it?"

"It's a sleeping giant," Bill said. "It's five hundred and seventy thousand square miles of unknown terror. It's the fourth largest State in Brazil—twice as large as the State of Texas. Colonel Fawcett, a British explorer, who was looking for a tribe of white, blue-eyed Indians, was swallowed up in the jungle of Matto Grosso fifteen years ago. He disappeared as Dave Blackstone disappeared."

"It's a vast, trackless jungle broken only by patches of cattle country and a few native villages along the rivers. There are diamonds and rich deposits of gold there, if any one can take them out. Every man is a law unto himself. He enforces it with the automatic slung on his hip. Even the president of Brazil is afraid to send police into the Matto Grosso. He knows they would never come out."

"Most of the settlers are descendants of the Portuguese settlers of the sixteenth century. The cattlemen are the descendants of African slaves who were brought here in slave ships. They are the picturesque, silver-spurred *Gauchos* you read about. They can cut a man to pieces with the whips they carry. There are Syrian hucksters, Japanese coffee planters and Americans who fled here to escape the law back home."

"They discourage theft by shooting the thieves and leaving them for the vultures. There are nearly six hundred tribes of Indians fitting through the jungles. Most of them have not even been identified. They use barbed and poisoned arrows that are fatal to a white man."

"But the real danger is in the jungle

itself—lack of water, insects that won't let you sleep, fever. Some one called it the hell hole of creation."

"It sounds pleasant," Sandy said. "Just the kind of a place to spend your vacation."

"It's no joke, kid," Bill said grimly. "Dave Blackstone has been bottled up in there for five years. Five years is a long time."

"It's a very long time," Sandy said, with all of the wisdom of his seventeen years. "Why is this man Cortez holding him?"

"I figure that Cortez is what we would call a bandit politician back home," Bill said. "He probably controls cattle ranches and coffee plantations, perhaps some mining country. He probably controls the native Indians by using Blackstone as the god who fell from the skies. He is a flier and learned Blackstone's secret. He is trying to steal it to sell to some Far Eastern power, as the man told Shorty. If it's a good idea, it's worth a fortune. Our own government will pay Blackstone a fortune for it. That, I think, is the set-up."

"We'll have to find this fellow Blackstone," Sandy said.

"That's what we're here for," Bill said grimly.

Miles of steaming jungle and wooded cattle plains spread out beneath them. On and on it marched, as far as the eye would reach. On the rivers were small, wooden buildings made of palm poles and thatched roofs with long chutes that hung over the river. Cowboys in leather aprons and colored scarves were drying meat in the sun. They were manufacturing *charqui*, the staple food of South America.

"Watch," Bill said, as he stuck the nose of the Scarlet Stormer down. He pointed at the chute leading from the little building to the river. Below the mouth of the chute the river boiled with a mass of silver fish.

"Piranha," Bill said. The cowboys waved their knives and threw chunks of meat into the water. They disappeared in a swirl of fins. Bill and Sandy could see the mass of struggling, blunt-nosed fish beneath the water. They were all fighting to get to a position beneath the chute. They were like a herd of tigers who had smelled and tasted blood.

Alligators dozed in the sun on the sand banks. Brilliantly colored river birds rose from the treetops and flitted deeper into the jungle. Urubu, the great vultures of the tropics, swept high into the heavens on their eternal quest for carrion.

Wild cattle browsed in the clumps of brittle spear grass. Tiny deer scuttled across the dry, drab plains. The sun poured its terrific rays on the countryside, burning with the fierce heat of an

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open furnace door, withering all that lay beneath it. Not a breath of air stirred the grass or treetops. The sun played across the landscape with the steady intensity of a mad fakir fingering his flute. The whole world seemed to pant for release.

"It looks cool and quiet and safe," Sandy said.

"You can't see what it hides," Bill growled. He flipped the radio key and checked his position with Red and Shorty.

"We ought to sight Cuyaba within an hour," he told them. "We'll have to locate this fellow Cortez if we can. He'll probably make plenty of trouble for us if he is here. He'll have all the odds on his side."

"How large is Cuyaba?" Red asked. "Can we find it?"

"It's near the head of the Paraguay River. It will be just a spot in the jungle, but I think we can find it."

The three ships sped along at eight thousand feet above the humid, enervating air that rose from the vast stretches of marshy, unwholesome swamps.

Bill Barnes' eyes were half closed when he heard the drone of many engines five thousand feet above him. For a moment he could not believe his ears. He shook his head irritably, thinking they were an illusion. It was young Sandy's gasping words that made him realize that they were not an illusion.

"Six planes, Bill!" Sandy screamed. "Four of those dun-colored monoplanes, and two biplanes!"

At the same instant Bill's radio light gleamed red. He threw the key and heard both Shorty and Red shouting his name. He glanced back over his shoulder as Sandy broke out the swivel gun in the after cockpit. He felt the drum of machine-gun bullets on the tail surfaces of the Stormer as he pulled the stick back and zoomed upward.

"Take 'em any way you can!" he shouted into the microphone as he saw Shorty skidding his Snorter out of range of the bullets that were licking across his left wing.

One of the dun-colored ships and the two biplanes zoomed upward out of their dive as Bill chandelled around to attack. The three of them tried to converge their fire on him as he sped toward them. But they did not, or could not, estimate the terrific speed of the Stormer as Bill opened his throttles. The powerful ship bellowed like a tortured bull while Bill stuck the nose vertically upward, then kicked it around again. His fingers clamped down on his firing trips as a dun monoplane tore across his hair sights.

His guns stuttered two streams of death. He saw the ship slide off and stagger upward in a drunken zoom. The next instant its nose came down. Smoke and fire poured out of the engine housing. As the flames crept back along the sides of the fuselage, the ship began a dizzy descent toward the marshes below.

Bill heard the *rat-tat-tat* of Sandy's swivel gun as he came up and rolled level in a flashing Immelmann turn. He saw Red Gleason roll his Snorter away from the fire of a dun monoplane and take it skyward in fast, tight spirals.

Fire raged out of the two machine guns mounted along the engine housing of a biplane that came roaring toward Bill again. But the pilot was firing long before he was within range. Bill waited until the bullets began to cut through his port wing. Then he pulled the stick back and let the enemy race beneath him.

He was still partially stupefied with amazement. If it hadn't been for the series of holes along his wing and the bark of machine guns and the roar of motors, he would not have believed that

those six ships had sprung from nowhere to attack him.

Four of them were the same type of plane Cortez had flown when he attacked Bill over the Conowingo Dam in Maryland. The other two were fast military designs. But how could six fighting planes be hidden away in the jungles of the Matto Grosso? How far did the power of this man Cortez reach? What would they find waiting for them when they set their ships down at Cuyaba?—if they ever set them down.

It occurred to him in those few seconds of thought that Cortez might be using the ships to carry gold and diamonds out of the Matto Grosso. Perhaps that was why he used Blackstone to control the natives. But how did he control Blackstone? That thought brought a wave of nausea. He had seen men controlled by men like Cortez before. He had seen the mental and physical torture they had used. Something boiled within him at the thought—the thought that Dave Blackstone had been a slave of Cortez for five long years—five long years of torture, perhaps.

Bill's hand gripped the control column of the Scarlet Stormer until the muscles knotted on the back of his hand. His mouth became an ugly slash across his face as his eyes narrowed to mere slits.

"You asked for it!" he said between clenched teeth. He whipped the Scarlet Stormer through the air in a series of Immelmann turns to throw two ships off his tail as he went to the aid of Shorty Hassfurth. There was something akin to murder in his heart as he hurled himself into the battle again.

The skies above that stretch of marsh and swamp and jungle became a madhouse of flaming guns and roaring motors. Animals slithered out of clumps of bushes to race, with fear in their hearts, to safety from that awful din of battle. The jungle below smiled into the skies waiting to greet the death on which it was nurtured, waiting to fold to its bosom the rotting life on which it lived.

Bill drove a dun-colored monoplane off Shorty's tail as Shorty fainted and stabbed at another ship for an advantage. Then he was under the dun belly, raking it with one long burst of lead. The pilot writhed up and over the cowl as the monoplane began its death spin downward.

Red Gleason raced in to follow a biplane that had pounced on him from above. He tore in with a reckless abandon characteristic of him. His fingers jammed down on his trips as the plane came under his sights. White streamers laced the air as his tracers cut above the head of the pilot. Then the ship slipped out of range as Red whipped his Snorter

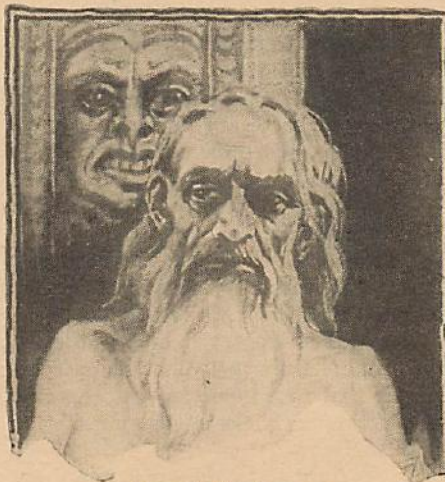
straight up on its nose and half rolled it level.

Then a dun-colored monoplane roared upward, came over on its back, rolled level and dived at the Scarlet Stormer. Watching that Immelmann, Bill knew that there was a man who could fly a fighting plane. The blood raced through his body like fire as the twin guns along the engine housing of the enemy ship spewed lead. He threw his ship out of the line of fire as his own guns chattered a song of death.

The two ships streaked and tumbled through the air, firing burst after burst from their guns. Bill's teeth were tightly clenched as the pilot of the dun ship slipped away from every trap he laid for him. He realized that the man was a master pilot. His skill was uncanny.

A bright, searing fire seemed to be burning Bill's whole body as he settled down to the task of getting this man who seemed to be laughing at his attempts to shoot him down. A dozen times Bill thought he had him in a position from which there was no escape. But when he clamped down on his firing trips, the plane disappeared from under his sights as though some unseen hand had flicked it out of danger.

He saw Shorty Hassfurth send a burst of lead into one of the dun planes beneath him. He saw the ship burst into flame and careen drunkenly toward the rotting jungle below. He saw an-



David Blackstone

other ship running away from the series of lightning acrobatics Red Gleason was turning up in his face. All those things he saw while he tried to get the dun ship under his sights.

It came to him that the man opposed to him might be Cortez—the man he had come four thousand miles to combat.

There was no mercy in his heart as he saw the remaining dun ship and the biplanes streaking away to the south, and saw that Red and Shorty were coming to aid him. It was not mercy that prompted him to flip his radio key and speak into the microphone.

"Let him go," he said to Red and Shorty as the dun ship stuck its nose toward the earth in a terrific power dive. "Let him go. I think we'll want him alive later on. What about the pilots of those other ships—the ones we knocked down?"

"None of them bailed out, Bill," Red answered. "They rode their ships down. I don't think they could have bailed out."

"Hold your course for Cuyaba," Bill said. "I'm going to check our position. I'll make contact again in a couple of minutes."

"Who were they, Bill?" Sandy asked, his voice high-pitched and excited. "That bird who was fighting you knew what to do with his stick. That bird could fly."

"That," Bill said, "was Cortez—at least, I think it was. We'll know more about that within an hour. Be sure to stick a gun in your pocket when we land. You're more than a little apt to need it."

IX—ARREST

THE white buildings of Cuyaba burned beneath the glare of the tropical sun as Bill and his men set their ships down on the field. Heat danced off the yellow earth with the intensity of a thing alive. A horrible stillness settled over them as they killed their motors and sat gasping for breath beneath the vicious tropic sun.

Bill Barnes pushed his white helmet back on his head and wiped his forehead. Red Gleason and Shorty climbed over the sides of their ships and came toward him. Their faces were dripping with perspiration.

"If this is a sample let's—" Shorty began, and stopped talking as he followed Bill's intent gaze.

A man was running toward them from the small office at the end of the single hangar. He was a tall, angular man with a mop of blond hair that had been bleached by the sun. His clothing was soaked with perspiration as he stopped, ran his blue eyes over the Scarlet Stormer and spoke to Bill.

"You're Bill Barnes?" he asked.

"Right," Bill said. "You're the North-South Airways representative?"

"That's right," the man gasped. "Listen to me. You don't have time to talk. You'd better get your ships out of here, Barnes. You're on the spot. I just got word that you are to be arrested the moment you land. You—"

"Listen!" Bill said grimly. "My papers are in order. I have the government's permission to fly over and land any place I—"

"Not the permission of the governor of Matto Grosso," the man said. "There are orders out to throw you in the jug. They don't need a reason out here,

Barnes. This country isn't like the rest of Brazil. Some one wants you out of here. That some one has enough drag to have you thrown in prison. You'll rot there."

"What about the United States consul?" Bill asked. "He—"

"He can't do anything for you. It's in the bag, Barnes. You'll be lucky to get out of here alive if you go now. The United States can't help you. It won't do you much good if you're dead when the government of Brazil makes apologies to the government of the United States."

"You're talking a lot of hokey, fellah," Shorty broke in. "Bill Barnes can't disappear. The whole country would be up in arms. It couldn't happen."

The blond man grinned and shook his head, impatiently.

"My name's Tyler, Hassfurth. I'm an old war pilot myself. I know about you—and about Gleason there. I know how you feel about this thing. But I'm telling you—you'd better scram while there is time. Bill Barnes doesn't mean anything to the people of the Matto Grosso. They make their own laws down here."

"I know why you came. You're looking for Blackstone. I think he's up there in the jungle some place. But you'll never get to him. If the United States consul got you out of jail and you tried to get into the interior, you'd never get out again. I know your reputation, Barnes. I know what you've done. I know you're good. But you're not good enough to fight the things you'll have to fight down here. You don't know what this country can do to a man."

The man was pleading now. Behind the compassion in his eyes there was terror—terror of something he could not put into words. His face was twisted and his forehead puckered as he put his hands out in front of him in an impassioned appeal.

"They'll charge you with murder, Barnes. I got word of your air fight a little bit ago. Don't ask me how. My life wouldn't be worth a nickel if Cortez knew that I knew. That's the man you're up against. He's the strongest man in the province of Matto Grosso. He lives on murder and mayhem and torture, Barnes. Your ships are armed. So were his. But he has the privilege of flying armed ships to bring his metals out of the interior. He'd frame you if you were the President of the United States. He—"

Tyler's hands dropped to his sides as a truck loaded with men in khaki uniforms came speeding through the gates and across the field.

"It's too late now," he said. "I'll report to the consul and do what I can. I'll try to get a radio message through to our offices in Barranquilla. That's all I can do."

The truck came to a dusty halt a few feet in front of the Scarlet Stormer. A dozen men piled out of it carrying rifles, with bayonets attached. A lieutenant climbed off the driver's seat. Tyler tried to talk to him in his native tongue. The man shrugged and waved his arms as he talked.

"He doesn't want to see your papers," Tyler said to Bill. "He doesn't want to see anything or hear any explanations. He wants you to get in the truck with Gleason and Hassfurth. You're going to jail. And Heaven help you!" His eyes flitted over the two Snorters and the Scarlet Stormer. "Where is young Sanders?" he asked. "I thought he was with you."

Not a muscle in Bill's face changed as his eyes circled the little group. He shook his head and smiled.

"They only get three of us," he said.

He supposed that Sandy was hiding in the after cockpit of the Stormer. He couldn't see what good that would do. But it might help if one of them was on the outside of the jail. He walked over to the truck and climbed into the back, as the soldiers formed a half circle around them.

"I'll hold you responsible for my ships, Tyler," he said.

Tyler laughed. "A lot of good that will do you," he said. "I'll do what I can."

A half hour later the iron door of the hottest and most evil-smelling hole Bill and his men had ever encountered, clanged shut behind them. They were placed in three small cells that were empty except for stacks of straw that were crawling with vermin. A single small window admitted light and air. Two armed guards patrolled the corridor outside their cells.

Shorty Hassfurth threw back his head and began to laugh as the iron door clanged shut behind him. He laughed until his voice rose to what sounded like hysteria.

"Take it easy, fellah!" Bill shouted at him.

"I'm all right," Shorty answered. "I'm laughing because it's funny. We come four thousand miles to get thrown in a lousy, stinking thing they call a jail. There's a grim element of humor in that, guy." Suddenly his voice sobered. "Do you suppose those two yellow apes in the corridor can speak, or understand, English?"

"Try 'em," Red Gleason suggested.

"Hey, monkey face!" Shorty shouted through the little iron grille at the top of his cell door. "You, with the face of a dead donkey!"

The guard turned, spat in Shorty's direction, and continued to pace back and forth in the corridor.

"He doesn't," Shorty said. "What happened to Sandy?"

"He ducked," Bill answered. "He

was doing something in the back of the Stormer when we landed. He got the drift of Tyler's warning and kept out of sight."

"Sometimes that boy is bright," Red said.

"What about Tyler?" Shorty asked. "Do you think he'll be able to help us?"

"No," Bill answered. "This man Cortez seems to be an iron-fisted dictator in Matto Grosso. They have 'em down here. We're going to turn up among the missing if Sandy doesn't help us."

Raucous voices and snatches of a song came from a wine shop across the way as the tropical night settled down on the sweltering town of Cuyaba. Within the confines of the fetid jail, Bill and his men panted and cursed. The light of the moon crept through the tiny windows at the tops of their cells and threw weird shadows across the rooms.

They sat on the bare stone floors with perspiration streaming down their bodies. When he could stand it no longer Shorty shouted at the guard and asked for water. They were each given a gourd of warm, greasy-tasting water that might have been taken out of a cesspool. Bill's demands to talk with some one in authority were ignored. They settled down for a night of agony.

It was past midnight when Bill awakened from a doze. Light from the moon streamed in the narrow, barred window. A soft, stealthy movement on the base of the window attracted his attention. Something that was small and black nestled there. For a moment Bill thought it was some kind of a furry animal, something that might be compared to the gray squirrel of North America.

Then, as it half reared on its back legs and stuck feelers into the air, he knew it for what it was. He knew it for one of the most venomous things that moves in the tropics: a tarantula!

He watched the thing slip over the edge of the window and glide down the side of the whitewashed wall, without moving. His eyes were glued to the thing as it stuck its feelers into the mass of matted straw beneath the window. It was not fear; it was fascination that held him spellbound—the thought of the deadly poison that the thing could inject with its sting.

He waited until the thing began to move across the floor. Then he flattened it on the floor with his boot. It twisted convulsively, trying to drive its feelers home, then died under the stamping of his boot.

A guard called through the door. Bill growled at him and settled back on the floor. But he couldn't take his eyes off that little block of moonlight that was a window. The thought that another tarantula might follow the first one kept him awake.

The next time he came out of a doze

his eyes traveled to the window automatically. What he saw there caused his heart to pound against his breast. He recognized the shock of blond hair first. Then the contour of Sandy's head took shape. He got to his feet quietly and reached for the edge of the window. Sandy's face was pressed against the bars as he pulled himself up to a level with the window.

"Talk fast," he said. "I can't hold on here long. There are two guards in the corridor outside."

"I know it," Sandy said. "I'm going to jump them in a minute. They are the only two left on duty. I'm going to knock them cold and get you out of there."

"Then what?" Bill whispered.

"Tyler and I have worked that out. He's helping me. Be ready in a couple of minutes."

Sandy's head disappeared. Bill dropped back to the stone floor and crossed the tiny cell to glue his ear against the iron door.

He heard the rustle of a person moving in the corridor. Then he heard a quick, sharp blow that was followed by the thud of a falling body. An instant later the same two sounds came to his ears again. He heard the rattle of keys and saw the door of his cell swinging open.

"That you, Bill?" Sandy's voice came.

"O. K., kid," Bill said. "Red and Shorty are in the next cells." He took the keys out of Sandy's hand and unlocked the iron doors next to him. Both Shorty and Red were sleeping on the floor. He shook them awake. They crept out into the corridor where Sandy was gagging and binding the two guards.

"We'll have to slip out of here easy," Sandy whispered. "The town is asleep except for a couple of policemen."

"Where do we go?" Bill asked.

"To the airport," Sandy whispered. "Tyler is waiting for us there. He knows where they are holding Blackstone, approximately. We'll have to lock the gates of the airport and knock out Tyler while we warm up our ships. Then we hop about a hundred miles northwest and make a landing on a small lake. From there it's up to us."

"Is Tyler going with us?"

"No. He says that would be a giveaway. We've got to bang him up a little and tie him up."

"How far is the airport?"

"Less than half a mile," Sandy answered. "I'll lead the way. We've got to slip down a couple of stinking alleys."

"They'll smell like perfume compared to this place," Shorty said.

Bending low, taking advantage of every shadow, they passed through the deserted, silent streets. If any one saw them they did as they had done in the past, kept silent. To see dark, still forms stealing through the streets of

Cuyaba at night was nothing new. To report them might mean death.

Tyler, the representative of North-South Airways, was sitting behind his desk when Sandy led them into his office. He was sitting behind his desk looking at a map. The map was a map of Matto Grosso. He raised his eyes and smiled at them as they came into the room. His face was white and drawn, and terror still lurked in the depth of his blue eyes.

"Sanders," he said, "is a handy kid to have around."

"Handy, but a little——" Shorty began.

"Dumb!" Red Gleason supplied.

"See!" Sandy said. "I should have left them where they were."

"Shut up!" Bill growled. "What about your part in this, Tyler? Won't you have to take the rap for helping us?"

"I'll take things you never heard of if they pin it on me," Tyler said. "Now listen! I said that this afternoon and you wouldn't listen—this time, you must. I'm giving the orders until you get your ships off the field. I'm going to let you divide up the fun. Hassfurth and Gleason must go out with Sandy to warm up your ships. You locked the gates when you came in?"

"I locked 'em," Sandy said.

"Fine. But before Hassfurth and Gleason go they must lay one on my schnozzle, as the fellow said. I want a black eye—a good black eye—and I want a nose that is nearly broken. You can pick your spots."

"Say, Tyler," Sandy began. "I don't see why——"

"O. K., kid. I'm giving the orders now," Tyler snapped. "If I don't look as though I'd been practically killed they won't believe my story. All right, Shorty. I'll lean into it. The right eye is your bet."

They all held their breaths as Shorty hit him. His lips were pressed tightly together and his eyes were filled with agony as he did it. He drew back a fist that was the size of a small ham and drove it into Tyler's right eye. Tyler staggered back three or four steps and began to grin.

"That eye," he said, "won't be open for four days."

"Listen, Tyler——" Bill said.

"You're doing the listening now," Tyler snapped. "On the old bugle, Gleason. And see that something snaps."

Red's face was white as he stepped into the blow. His right fist drove out straight and landed on Tyler's nose. They could hear the bones give as his fist crashed. Tyler nearly fell as he came up against the wall. He shook his head and managed a smile.

"That," he said, "was a lulu! If they believe I took that for fun, they're crazy."

He sat down at his desk while he shook the cobwebs out of his head.

"Listen, again," he said. "Here's a map of Matto Grosso. When your planes are ready, plot a course to Lake Gallegos. It will be dawn by the time you get there. Set them down in a cove and leave one man to guard them. I've traced a route you must take to get where you'll find Blackstone. I'm not sure he is there. But from all the things I've heard, he is. And remember this! Don't be afraid to shoot if you have to shoot. But don't shoot unless you have to. Do you get what I mean?"

"We understand, Tyler," Bill said.

"It will be your job to find Blackstone. I can't do anything more for you. You're going to find tough going through the jungle. You'll have to find friendly natives to help you or you'll never get Blackstone. If you know how to handle them they'll help you."

Tyler stopped talking and daubed at his bleeding nose for a moment. Then he laughed.

"All right, you two tough guys," he said. "Go out and get those ships warm. Sandy, too. Barnes, the rest is up to you."

Bill knew what Tyler meant, but he shuddered as Tyler spoke. He knew that he must leave Tyler bound and gagged and unconscious in his office. He tried to smile as Shorty and Red and Sandy silently shook Tyler's hand.

When they had gone he said: "Isn't there some other way we can do this, Tyler?"

"No way, in the world," Tyler said. "I can take it if you can give it to me. I'm going to stand up and fight back while I last. They tell me you hold a can of dynamite in each fist. Use it!"

Tyler got to his feet and stood a bare three feet away from Bill Barnes. He gave no warning as he curved his right fist up in a vicious uppercut. It landed on Bill's chin with a force that snapped his head back. It went back again as Tyler's left crossed a second later.

Bill's instincts were the instincts of an ancestor ten thousand years dead. He shook his head to clear it as he ducked another right. Then he went to work.

His fists landed with the steady precision of pile drivers. Every blow he struck wrenched his heart. But he knew that in doing the thing he was doing he might save Tyler's life. That thought alone kept him at the task before him. It was a blow that traveled a bare eight inches that brought insensibility to Tyler. He was leaning forward trying to land a left when it happened. The combined weights of their bodies did the trick. His knees buckled and he slid to the floor, a bloody, battered wreck of what had been a blond-haired, blue-eyed man a few minutes before.

There were tears in the eyes of Bill Barnes as he strapped Tyler's arms behind his back with his belt and tied his ankles together.

"I'll be back to get you, guy," he half sobbed, as he closed the door behind him. "You're the kind of man I need."

He heard shots and shrill cries at the gates of the airport as he pounded across the apron toward the three roaring planes. He could tell by the sound of the motors that they had enough revolutions to take them off the ground.

"All right!" he bellowed, as a truck loomed out of the darkness. "Red! Then Shorty! I'll follow!"

Red Gleason and Shorty Hassfurth took their two Snorters into the air with speed and daring. Bill spiraled the Stormer upward on their tails.

And while they spiraled, young Sandy saw something he had never seen before. He saw Bill Barnes' shoulders shaking as though they were shaken by intermittent chills. He leaned forward and put his hand on Bill's shoulder.

"You all right, Bill?" he asked.

"I'm all right, kid," Bill said, and Sandy knew without seeing his face that there were tears in his eyes. "I'm all right. I'm thinking about Tyler. If you ever grow up to be the man that Tyler is, kid, you'll be a man!"

X—THE JUNGLE

BILL BARNES opened the map Tyler had given him and spread it out on his map rack. He checked his instruments and then flipped the radio key and gave Shorty and Red their true course.

"Throttle down," he said. "We only have a little over a hundred miles to go and we've got to have daylight to find the place."

Dawn was creeping out of the east as the three ships held a true course north-northwest. The jungle became a thing alive as the night slipped into the west and the rising sun tinted the low-hanging cirrus clouds with color.

Young Sandy, with a pair of glasses glued to his eyes, spotted the choppy surface of Lake Gallegos.

"You'll have to ride in there easy, Bill," he said. "The waves are two or three feet high."

Bill studied the surface of the little lake while he circled above it. He saw a cove that was almost entirely surrounded by jungle. He flipped his radio key and spoke to Shorty and Red.

"Make a landing on the far end where it narrows down," he said. "We'll taxi into the cove. Get as near the shore as you can. It's going to be a hard job to get the things ashore that we'll need."

It took them over an hour to move the emergency camping equipment out

of the tails of the two Snorters and ashore in the folding rubber boats.

"We'll have to gamble on our emergency rations," Bill said. "We'll probably be able to shoot some game. But we can't be sure. It isn't much of a trek from here to the place where Blackstone is being held, according to Tyler's map. Be sure your canteens are full. We ought to have native guides. We ought to have a lot of things. But we don't have them. We'll have to gamble. How we'll ever get Blackstone out if he is really a cripple, I don't know. Sandy, you'll stay here and guard the planes."

"Good gosh, Bill!" Sandy said. "I don't—"

"Save it!" Bill said. "I said, you'll stay here. And when I said here, I meant here. You stick in the Stormer and be ready to use your guns if you have to. You may have to take plenty of punishment if they find you."

Bill and Shorty and Red hacked their way through the jungle to a point on the map Tyler had marked. Each step they took their feet sank eight inches into the moist, rotting floor of the jungle. The trees above their heads were so interlaced with vines and parasite growths that the sun, a blazing ball of fire, now, did not penetrate. The vegetation underfoot reeked with the breath of the tropics.

Their clothes were saturated with perspiration as they struggled along. The weight of the equipment they carried doubled a hundredfold under the soft, slimy footing. Insects they could not see settled on their skin and crept under it. The strength oozed out of their bodies as wave after wave of hot, festering air beat upon them.

The sun was high overhead when they came to what was supposed to be a road. Bill's hopes sank as he gazed at it. It was nothing more than an overgrown path that had been cut through the jungle. Parrots, green love birds and toucans flitted through the trees and filled the air with their chatter. Lizards and iguanas scuttled through the damp foliage and over the red, sun-baked soil. Blue-and-yellow macaws cursed at them as they plunged into the green tunnel they must follow. Orchids nodded at them from the sides of rotting trees. A large mottled snake slithered out of their path and disappeared in the underbrush.

"Go easy on your water," Bill said, as they plodded along. "We ought to wait here and go forward at night. But we can't wait. All hell will break loose as soon as Cortez knows we have left Cuyaba."

Late in the afternoon, before they were aware that the day had gone, the sun went to bed and covered the world with a fantastic riot of color. Then the moon rose, yellow and gaudy, making the secrets of the night secrets no

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longer. Fireflies danced along the trail; owls winged from tree to tree; bats darted through the branches of the trees.

They stopped, built a fire, and dropped beef cubes into the water they boiled over the fire. As the moon disappeared Bill and Red curled up while Shorty sat by the fire to stand the first watch of the night. The jungle became a thing of silence and terror—a thing that throbbed and panted beneath the beat of a million insects' wings.

At dawn Bill roused Shorty and Red from a fitful slumber. Their faces were swollen and red from the bite of insects. Their bodies reeked with the smell of the jungle.

That day was a day that was stamped indelibly in their memories. They used nearly all of their water by midday. At two o'clock they were wetting their lips, rinsing their mouths, and spitting out the last of the water in Bill's canteen. It seemed incredible that nowhere in that vast jungle could they find water. Toward nightfall Bill's canteen was empty. Their lips were swollen and cracked as the sun began its dip into the trees to the west.

"Birds," Bill said briefly. "If you see any, watch the direction in which they are flying. They'll be going toward water."

At five o'clock they saw a half dozen parrots circling overhead. They watched them with eyes that burned while they settled not more than a half mile away. That half mile was the longest distance any of them had ever covered. Night was making a dungeon of the jungle when they came to the little stream that was nearly dry.

"Take it easy," Bill said.

They rubbed the water into their faces while they bathed their lips and rinsed their mouths. Finally, when they could stand it no longer, they gulped the putrid stuff down their throats.

"Ponce de Leon never found water like this," Shorty said.

They ate lightly and Shorty stood the first watch of the night.

The next day was like the one before: thirst and heat that crept into the very marrow of their bones. To them, the world had died. No living thing disturbed the terrific silence of the forest. Birds, snakes, even insects had disappeared. There was only that frightful heat of the sun. Not even a breeze stirred the leaves on the trees. They felt that they were three human beings moving through a huge void that was without life.

Then they came on what had been a man and a donkey. Their tongues were black and swollen. They had died from lack of water. Their bones had been picked nearly bare by vultures.

"This," Bill said, "is nice country. We have one more day ahead of us. But it's up to you. We'll go on, or

we'll turn back while we still have a chance to get back."

Red and Shorty grinned with lips that were swollen and cracked.

"You know the answer," Shorty said.

"Just a couple of birds with no sense,"

Bill said grimly.

"Just that," Red agreed.

They settled down for another night of sleepless hell. Red awakened them in the early morning. He had been standing the last watch. Lizards and iguanas scuttled through the dry underbrush as Bill and Shorty sat up. The things of the forest knew what was coming.

The trees swayed in that first soft breeze. Birds screamed as they began their flight before it. The very ground seemed to tremble as the thing settled on them with all its fury. The wind became a siren that shrieked and wailed through the trees. They threw themselves flat on the ground as the heavens opened and great jagged stabs of lightning darted through the skies. Thunder crashed with a force that man has never been able to duplicate with the crash of his largest guns. The wind caught at their bodies, snatched at their clothes, threatened to pick them up and throw them into the living rot that was the jungle.

In that hour they learned to know the horrible force of a tropical storm. Trees crashed in the forest, the sound reverberating as entwined lianas pulled down one tree after another. All of the things that had been silent during the day came to life. The jungle was a thing of sound and fury, while the heavens bellowed forth its rage.

And, as suddenly as it came, it passed. The wind forgot to lash the trees. The gale that had whipped through them became a soft murmur. The rain that had descended with the speed and fury of machine-gun bullets settled down to a thing that was nothing more than a drizzle. The thunder and lightning that had been shaking the earth, as a dog shakes a rat, disappeared.

They stared with white faces into one another's eyes. It was as though they had been lifted out of the mouth of death.

Again, the sun beat down on them as they started their morning trek. A shimmering haze hung over the jungle, and the smell of the vegetation was thick. It had again become a thing of strange silence and heat.

Bill broke the horrible silence of that morning near noontime. His voice trembled as he spoke. It was apparent that they were all reaching the end of their endurance.

"I'd turn around now," he said, "if it weren't for the thought that Dave Blackstone has lived in this hell hole for five long years."

"We've come this far," Shorty said,

"we may as well shoot the works."

"But Dave doesn't mean so much to you two," Bill said. "I wouldn't have brought you in here if I had realized how bad it would be. Dave was my friend, not yours."

"That makes him our friend, fellah," Shorty said.

They stopped beside the sandy banks of a small stream to drink the beef cube dissolved in hot water that had been their only food. As Bill put down his rifle he pointed to a hundred footprints in the sand. They were flat, without an instep.

"Indians," he said. "They were here only a short time ago. Get your guns loaded and take the safety off your automatics. We'll see them soon. Don't shoot unless they attack."

They could feel the eyes of those stark, naked savages throughout the afternoon. They could feel their eyes boring into them as they flitted from tree to tree behind them. They waited for the thud of the first barbed arrow as they plodded along in the intense heat. They knew that the Toba Indians, if Tobas they were, used an arrowhead that was barbed four times. That made it practically impossible to withdraw it from a wound without fatal results.

They heard the voices of the savages, at times, coming out of the jungle. They heard them signaling to one another with calls that were like the calls of the birds. As the afternoon wore on, their courage increased. Hundreds of black bodies flitted along beside them, darting from tree to tree, never pausing long enough to give them a clear shot.

"They'll probably strike at dusk," Bill said.

It was nearly dusk when Bill noticed that Shorty was no longer bringing up the rear of the little procession. He stopped and bent as though he was fixing one of his boots as he called Red's name softly.

"They've grabbed Shorty," Bill said. "Don't act surprised. We'll retrace the way we've come until we find the spot."

Red's hands tightened around the barrel and stock of his rifle. He didn't say anything. He listened to the rustle of the leaves on each side of him. He knew that the rustle was caused by the forms of the brown figures creeping through them.

They went back along the trail for half a mile. When they came to a place where the underbrush had been trampled down they broke through it. Two hundred yards off the trail they came to a clearing. A hundred brown figures were gathered around something that writhed on the ground.

All thought of finesse went out of Bill's mind as he saw the form that was staked out on the ground and knew that it was Shorty. He sent ten shots into

the huddled mass of men as he charged. Men dropped on every side of him as Red's automatic joined the battle. The brown forms dissolved into the forest and became a part of it. Their black hair streamed behind them as they tried to escape from the death that was in the hand of the mad white men who charged them.

Bill ripped up the stakes that held Shorty to the ground. His face was bruised and covered with dried blood. He took up the gourd that was beside Shorty and smelled of the contents.

"Machineel," Shorty mumbled. "They were about to put it in my eyes and turn me loose."

"Turn you loose in this hell hole—blind," Bill gasped. "How did they get you?"

"I fell a little behind you," Shorty said. "Something hit me on the head. I didn't have a chance to call before they swarmed over me."

They could hear the savages all about them in the forest now. They had lost their fear of the white man. They were waiting for night to attack.

"If Tyler's map is right," Bill said, "we've almost reached the place where we'll find Blackstone. There is a small settlement there, and a mine of some kind. It is on the edge of a small lake. The stream we crossed a bit ago must lead into it. It isn't safe for us to stop. We must keep going and stay close together. Shoot to kill if an Indian comes close to you. It seems almost hopeless to go on. But there isn't any more hope in turning back. We'll have to fight our way into the place. And when we'll get there we'll probably never get out."

"Let's figure that when we come to it," Red said. "Can you keep going, Shorty?"

"My legs still move," Shorty answered. "Just."

They carried their automatics in their hands as they pressed back through the jungle to the trail.

"Nurse your water," Bill said. "They'll probably tamper with any water holes ahead. We must go ahead slowly and carefully. But we must keep going. If we stop to sleep they'll be on us. Can you keep going, Shorty?"

"As long as my legs work," Shorty said, "I'm all right. I could stand a cool easy-chair on the roof of a swanky hotel. You know, with three men serving my dinner."

"And an orchestra playing," Red said.

"A symphony orchestra," Shorty answered. "One of the kind that have big French horns and a lot of brass."

They tried to laugh at that with cracked, swollen lips. But the thought of the hundreds of spearheads and poisoned arrows that might come whistling out of the jungle at any minute kept them silent.

Again they could hear those silent,

naked forms flitting through the trees on either side of them as the sun went plummeting into the jungle and the moon's light crept through the treetops.

"They're closing in on each side and are going to converge for an ambush ahead," Shorty said in a low voice. "I can see their bodies glistening. Shall we stop here and be ready for them when they attack?"

"No," Bill said. "Keep going. But be ready for them. Until they attack, we're going to sing. We're going to sing like hell!"

"Sing!" Red Gleason said. "Have you gone nuts?"

"I don't expect you to sing," Bill said, laughing softly. "I know you can't carry a tune. Just make as much noise as you can. Shorty and I will do the singing. What'll it be, Shorty?"

Shorty's laughter broke the stillness of the night. Then he broke into a song that had been sung by a million marching men during war time. Bill's deep voice took up the words. What Red Gleason thought was bass boomed along behind them. Parrots disturbed from their slumber added their horrible, raucous scream of protest. A troop of howler monkeys joined the uproar. The jungle sounded not unlike a Broadway night club at the stroke of twelve on a New Year's Eve, when mad women and drunken men go berserk with voice and horn and rattle.

The brown forms that were flitting ahead of them, nearer and nearer the trail, dissolved into the protecting arms of the jungle night. That the three silent white men they had been stalking had suddenly gone mad they had no doubt. And they knew that mad men were the most dangerous.

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They kept on singing while, with drawn guns, they pulled in firewood and built enormous fires at four places in a large clearing. In the center they made what protection they could for themselves. The savages would have to cross a space of sixty yards from any side to get to them. And that space was lighted up so that they could pick them off as they charged.

"I'll stand the first watch," Bill said. "Start to shoot the minute you get awake if I call you."

"Just a bunch of choir boys!" Red

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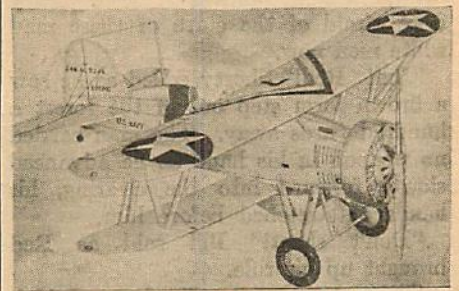
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Gleason said before he dropped his head on his arm and fell asleep.

XI—LOST IS FOUND

SHORTY was standing the last watch when the false dawn crept into the jungle the next morning. They had all been able to get a little sleep. The sores that were forming all over their bodies from the bites of insects had driven them half mad at times. They had been constantly aware of the ring of death beyond the firelight. But no savage had let himself be seen. They were afraid of the curse of these mad white men now.

"Bill! Red!" Shorty called as he saw a brown form step out of the forest a hundred yards away. The man carried no weapon in his hand as he advanced slowly forward into the clearing, his hands outstretched before him.

"Don't shoot!" Bill said as Red brought up his rifle.

The man came steadily forward, high brown forehead and body streaming with perspiration. As he smiled and his lips flashed back over strong, white teeth, Bill remembered the teeth of the man who had been killed on the porch of Ann Blackstone's house.

When the Indian was ten feet away from them he stopped and spoke in a language that none of them understood. His face was friendly as he shot a hand into the belt of the loin cloth he wore. When it came out he held a piece of dirty white paper. Bill measured the man for a moment with his eyes, then laid his rifle on the ground and advanced to take the paper.

"You don't speak any English, of course?" Bill said. The Indian shook his head violently, then nodded it and smiled with the same enthusiasm.

Bill's hands trembled and his eyes narrowed as he recognized the handwriting of Dave Blackstone. The thought came to him with sickening force that he was within striking distance of Blackstone after believing him dead for five years. And he might just as well be dead even now. Bill knew he was powerless to ever get himself out of there, let alone Blackstone.

The scrawled words on the paper spun dizzily under his gaze. He gritted his teeth and shook his head angrily as he forced himself to concentrate.

Dear Bill—if it is you. Word came of your arrival at Cuyaba. It came to me by that strange bush telegraph that there is no explaining. Then word of your escape from prison there and the three planes that landed not far from where I am a prisoner.

Native savages have been sent out to stop you. But they are only armed with poisoned arrows and

spears. Cortez doesn't allow any firearms to get to them. I am sending an Indian I can trust with this note. He will lead you to me.

Cortez—you probably know who he is by now—is still in Cuyaba with his cutthroats. The Indian delivering this can bring you through if you are careful. Do what he says.

I have called off the savages Cortez sent to stop you. I can control them when he is not here. Be sure to follow your guide's instructions. He can make you understand with signs. I'm waiting to try to help you get out of here. You can never get me out and live.

Dave.

Bill passed the note to Shorty while he studied the Indian in front of him. When Shorty and Red had finished reading it he asked them what they thought.

"You're sure it's Blackstone's writing?" Red asked.

"Yes," Bill answered. "But he may have been forced to write it."

"That's something we'll have to find out in our own little way," Shorty said. "I say we follow him. There can't be anything worse ahead of us than there has been behind."

"Blackstone seems to have some control over the Indians," Red offered. "If we get to him we may be able to get out again. We'd never get back to our planes the way we came."

"Shorty," Bill said, "you've kicked around Central America in some of those banana wars. See if you can talk to this man. You ought to be able to dig up a few words that he can understand."

Shorty dug into his knowledge of the patois of Central and South America, trying to find some medium by which they could converse. His pantomime was excellent. But the words he threw at the Indian drew no expression of understanding. The Indian smiled and bowed and was perfectly willing to talk if they could find a way to do it.

"Me," Shorty finally said, "go," pointing into the jungle to the west, "you," tapping the Indian on the chest. The Indian smiled, nodded his head and bowed. That was all.

"Oh, nuts!" Red Gleason broke in. "This isn't getting us anywhere. I thought you were the guy who could speak twelve languages?"

"He speaks the thirteenth," Shorty said.

"All right," Bill said, "let's go." He strapped his automatic around his waist and his knapsack on his back. He pointed a finger at himself, at Shorty and Red, then at the Indian and the note from Blackstone and toward the jungle. The Indian nodded his head

and turned toward the rim of jungle whence he came.

That trek was another day of hell. Insects swarmed around them as they fought their way through the teeming jungle. Macaws and lugubrious toucans called down curses upon their heads. In the early afternoon another tropical storm that tore the heavens apart left them dripping as though they had been soaked in a tub for days, and gasping for breath.

Their legs were numb and their spirit was almost gone when their guide led them out of the rim of that solid wall of forest—a wall that was inexorable as the walls of any medieval dungeon—a wall that had seemed to be ever closing in to crush the life from their bodies, that it might live.

In front of them was a wide expanse of plain that was treeless and covered with grass that was nearly green. Across that plain were the foothills of towering purple mountains that loomed into the sky. They gasped in wonder at the green and blue and purple shadows that the sun cast across those mountains. The very freshness of the scene gave them new life. The Indian pointed a finger at what looked like a great daub of mud in the foothills. The dim outline of buildings took form before their eyes—buildings that nestled at the bottom of that daub of brown earth.

A new vigor was in their stride as they stepped out across that undulating plain. The sun beat down upon them. But its full force was mitigated by the breeze that swayed the grass and fanned their faces.

The Indian led them across the plain and behind a low hill that cut off the buildings that had been visible. He made them understand that now they were to observe caution. They gathered that they must not let themselves be seen from the buildings as they skulked through the thin forest to the left of them.

They stopped and stared as the Indian led them to the edge of another clearing and pointed a finger. To their right was what had once been an ancient pyramid and temple. Around them were the outlines of buildings that were overgrown with jungle growth. Behind the rim of trees was the pile of brown earth they had seen when they came out of the jungle at the first clearing. They knew now that the brown daub was earth that had been taken out of a mine. The buildings were at the mouth of the shafts that had been sunk into the earth. This was the place where Cortez found the minerals he transported to the coast in his armed planes.

To the left the clearing sloped down to the edges of an inland lake whose waters, except for the clearing where they stood, were inclosed by the green terror they had just left—the jungle.

Then they were following their Indian guide toward a door in the ruins of the temple. Two brown-skinned savages half slept on the steps of the temple. They opened their eyes and closed them again, as Bill and his men followed their guide into the semidarkness of the temple.

Bill's hand slipped down to the butt of his automatic as he tried to adjust his eyes to the darkness. Gradually objects took form before his eyes. He saw that the interior of the single room was nothing more than a hovel. The original stones were on the floors. But parts of the sides had crumbled. The roof was gone, had been gone for a thousand years, perhaps. It was covered with a sloping thatch now.

Far back in one corner a naked white man leaned from a stone bench, that had once been a throne, over a brazier in which live coals gleamed.

Something climbed up into Bill's throat and choked him as he realized that the thing mumbling over the fire was the man he had known as David Blackstone. He clenched his teeth and forced himself to walk those few feet. When he was only a yard away, the man looked up from the fire and into his eyes.

Bill saw a face that was haggard and gaunt from five years of pain and isolation. A ragged, unkempt beard straggled down from the sunken cheek bones. The body was thin and undernourished, like the body of an old man who is hungry. The white hair on the man's head straggled down over his shoulders. His eyes were dull, lifeless, like the eyes of a living dead man.

The first thought that flashed through Bill's mind after his first horror was that this man could never have written him the note he had read that morning. Then he saw a miracle performed before his eyes as he spoke.

"Dave!" Bill said. "Dave Blackstone. I got your note." He reached for Blackstone's hand.

It was then that the miracle happened. A metamorphosis took place that seemed beyond belief. Bill heard Shorty and Red gasp as they, too, saw it.

Life came into Blackstone's eyes. His face crackled into a half-incredulous smile that drove away its gaunt, haggard expression and brought one of joy. His hair and beard seemed to change from those of a demented creature of the forest to the neglected hair and beard of a scientist who could not be bothered with such trivial things.

"I knew you'd make it, Bill," Blackstone said. His voice was thick and his eyes were blurred as he reached for Bill's hand. But he didn't move the position of his body or legs. And Bill knew that he didn't move them because he couldn't move them.

"I made it, Dave," Bill said. "You

remember Shorty Hassfurther and Red Gleason?"

That smile flashed across Blackstone's face again as he shook hands with them and exchanged a few words with each of them—words that were as sane and logical as were their own. Then he spoke to the Indian who had brought them. The man bowed low and backed toward the door of the temple. When they were alone, Blackstone threw back his head and laughed.

"You came in at a bad moment, Bill," he said. His words were heavy with a peculiar accent, as though he had only recently learned to speak English. "I was getting myself ready for a trance. I've done it so many times now that I actually become a part of it. It isn't pretense any more. Any of you have an evil spirit you want scared away? If you do, I'm the boy to do it!"

They wondered if their first impression had been right. That he was mad, with flashes of lucid thought. He laughed at their puzzled expressions.

"I'm a witch doctor, a white god to the savages," he explained. "I'll talk fast and tell you what you want to know, so that I can ask you a million questions that are on my lips."

"I got lost flying to Manaos, Bill. Storm, lost my bearings. I crashed in the jungle some place north of here. A savage tribe of Indians let me almost die before they would come near me. I did something to my spine that paralyzed my legs."

"The natives had an old legend that told of a fair-skinned god who left them centuries ago. He went into the skies, but promised to return."

"They decided I was the fair-skinned god. They made me their ruler. Their natural enemies, the savages in this section, heard about it. They, too, had a legend about a fair-skinned god that had gone into the skies. So they got together and hacked my tribe to pieces. Then made me the ruler of their tribe."

"When an expedition of Englishmen came in here to explore, three years ago, I thought I would be able to get in touch with them and get out. But, unfortunately, they found gold. Cortez, the dictator of this part of the world, heard about it and drove them out."

"When he came in to investigate, the savages tried to drive him out. He found me and learned my position with the Indians. So he made me a puppet ruler while he came in to take out the gold." Blackstone waved a hand that encompassed the foul-smelling room. "You see the kind of palace a ruler rates down here."

"When the question of getting his gold out safely came up, he decided to use planes. I couldn't help taking an interest in that. He brought in ships such as I had never believed possible five years ago. At least, I had never

seen anything like them. Cortez is a clever flier. I couldn't help talking to him, in spite of the way he tortured me at first. He talked planes with me until I forgot myself. I thought I might get out of here by telling him about my ideas for a tail armament."

"Cortez got interested in the tail armament idea and began to check up on it. He got an offer of a fortune from some government if he would get the details of the idea. He came back to me and offered me half of it for my plans."

"I stalled, because I knew I'd never get out of here if I told him. He'd take 'em and sell 'em and I'd die here. He forced me to write a letter to Ann, asking for all my papers. I wrote it because I knew what was coming if I didn't write it. Since Cortez has been taking gold out of the mountains the natives have been bringing some of it to me. I used that to finance an Indian I sent north with another note to Ann. You saw those?"

"I saw both of them," Bill answered. "How did you do it?"

"That's too long a story," Blackstone said. "I hoped she would get in touch with you, Bill. I was almost certain she would. Then word came to me that you had been thrown in jail in Cuyaba. I almost gave up hope. Then I heard that you had escaped and I found out where you had gone. It probably seems impossible to you to get messages so quickly in a place where it takes weeks to travel a few miles. I have a system of telegraphing that belongs to the natives. I can rule them without any trouble when Cortez isn't around. When he is, I have to make them do what he tells me."

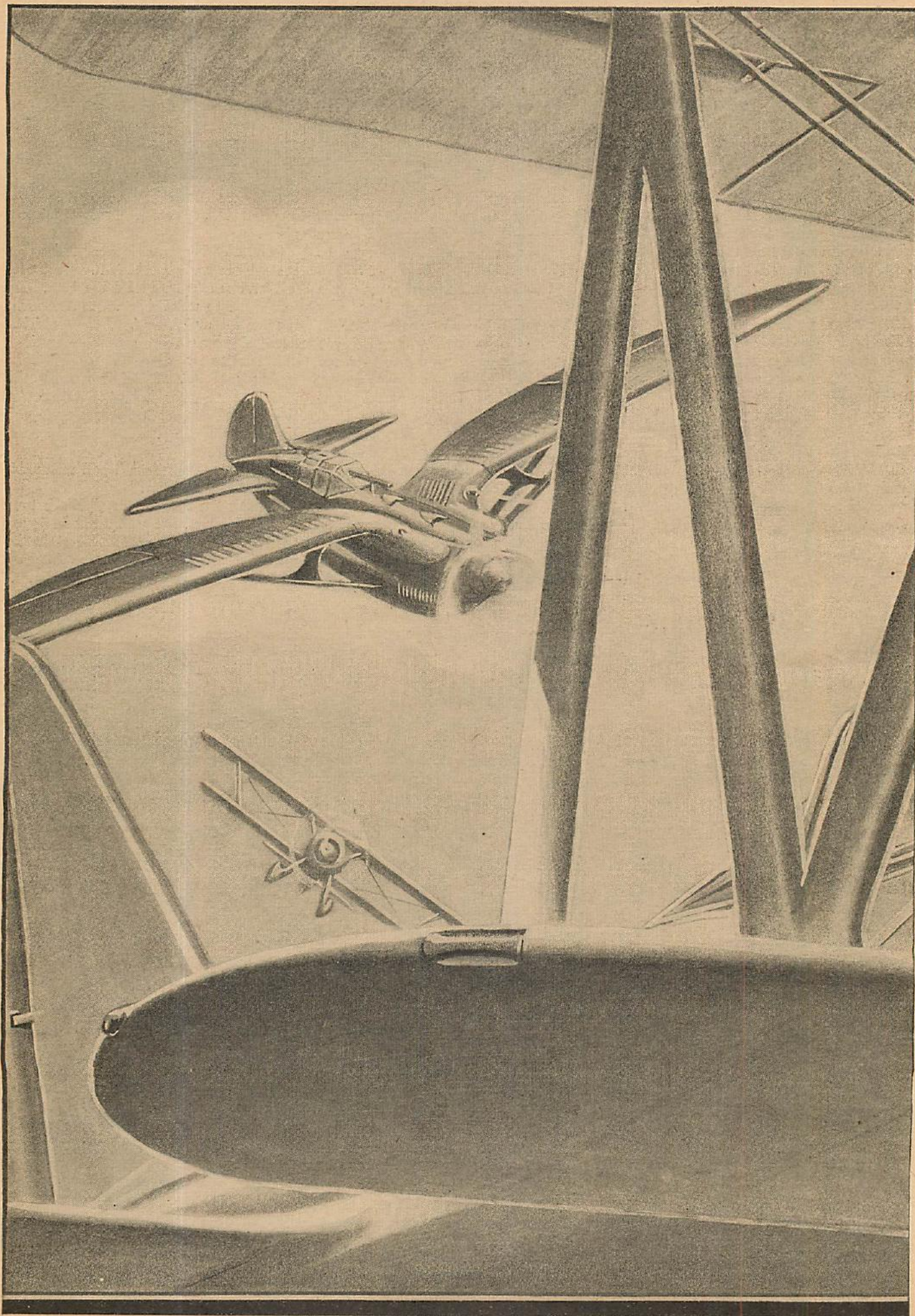
"He's still in Cuyaba trying to locate you."

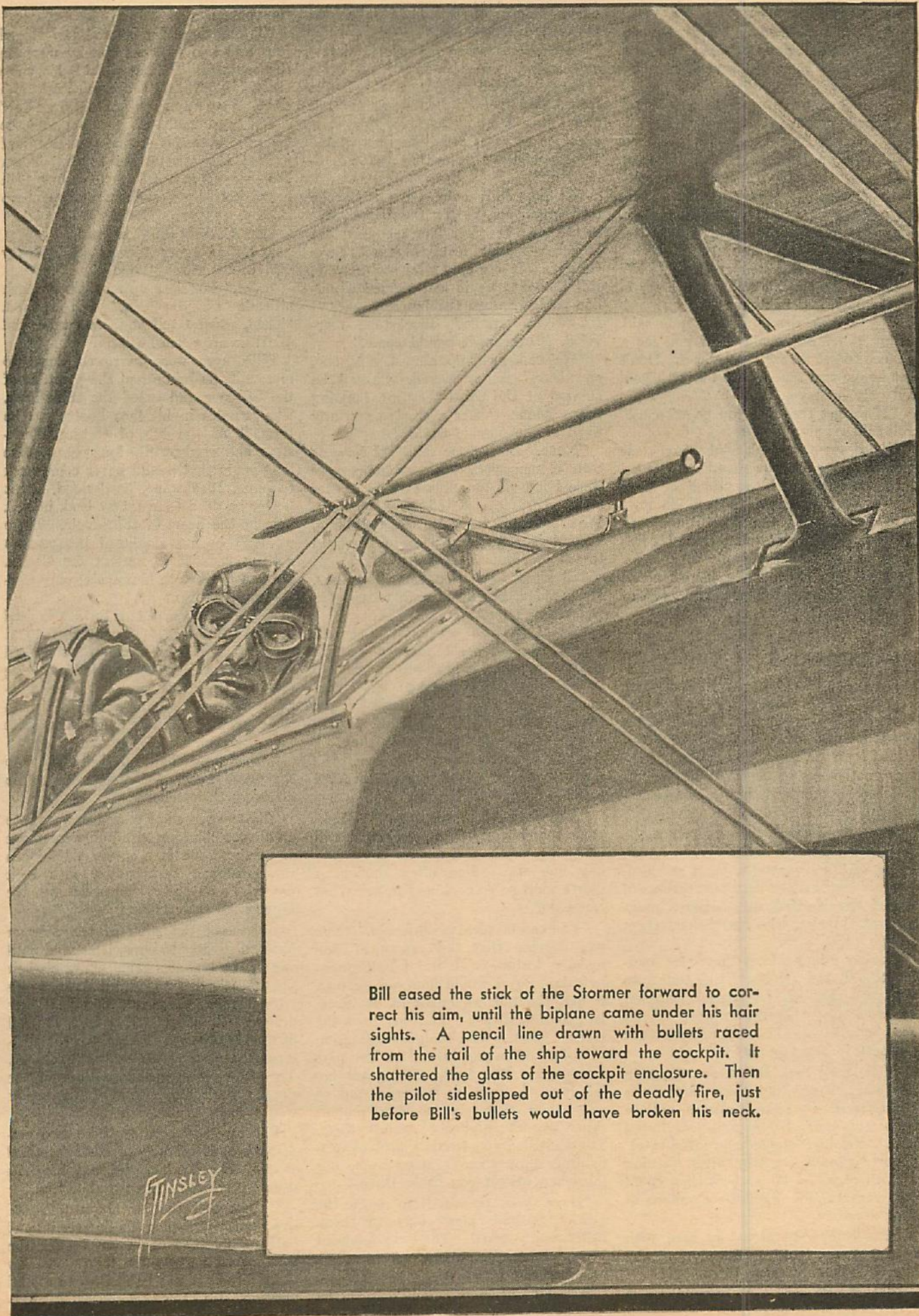
"What about Tyler?" Bill asked quickly. "Do you know anything about him?"

"He's probably dead," Blackstone answered. "Cortez is a direct descendant of the old Conquistadores. He has all of their cruelty and cunning added to a streak of the savage. There is only one thing for us to do—only one way for us to get out. You've got to get your planes in here, land them on this lake. I will send a message, that you write, back to your man who is with your planes. He can come in and take us back to your other two planes. Once we get into the air we'll be safe. Will your man obey a message you write?"

"Sandy?" Bill asked. "He'll obey if he's conscious."

"Write it!" Blackstone said briefly. "Cortez may be here any time. That is what we have to gamble with: time." Suddenly head cocked on one side, and he seemed to be listening. The haggard, gaunt lines came back into his face, and all life died from his eyes.





Bill eased the stick of the Stormer forward to correct his aim, until the biplane came under his hair sights. A pencil line drawn with bullets raced from the tail of the ship toward the cockpit. It shattered the glass of the cockpit enclosure. Then the pilot sideslipped out of the deadly fire, just before Bill's bullets would have broken his neck.

FTINSLEY

"We're too late," he said. "Cortez is coming now."

Then fire gleamed in his eyes again. His emaciated hands doubled into fists. His breath came in quick, sobbing pants.

"We have one chance in a million," he said. "We'll stay here and fight it out. Cortez knows you are here. He will come in cautiously with his men. You may be able to fight your way through and get to his planes. There is only one chance in a million, though. He'll bomb us out of here and scatter us all over the province."

"All right," Bill said quietly. "Let's take it. You mean we'll stay here, in the temple, and fight him off?"

"Until I'm dead," Blackstone said. "This is my last chance. If you see a chance to get through, go ahead. Don't get heroic and try to take me with you. I'll only hold you up."

"If we get through, you go with us!" Bill said grimly.

The drone of two planes beat on their ears as they circled overhead and headed into the wind. As the sound of their motors was swept back to them, Shorty's face suddenly lighted up. His mouth opened and a shout burst from his lips as he ran toward the temple door.

"Hell!" he called over his shoulder. "That's the Scarlet Stormer and one of our Snorters!"

XII—THE RESCUE

BILL and Shorty and Red were standing on the end of the little wharf when Sandy slapped the Scarlet Stormer down on the surface of the lake and taxied toward them. The same question was on the lips of all three of them as the Snorter skimmed the water and taxied up behind Sandy.

The question was answered when the man in the forward cockpit pushed back his helmet and waved a hand at them. They recognized the battered features of Tyler, the North-South Airways manager at Cuyaba, who had helped them escape.

Twenty minutes later they were loading the all but helpless Blackstone into the rear seat of the Scarlet Stormer. He wore only a blanket wrapped around his body. All his belongings were wrapped in a gaudy native headdress.

While they took Blackstone down to the lake, Sandy told them how Tyler had arrived at Lake Gallegos only a couple of hours before and had found him. He had stolen one of Cortez' planes to make the trip, after learning that there was a lake where they could land right beside Blackstone's place of captivity.

"You'll have to crowd in here with us some way, Sandy," Bill said. "The Snorter will only carry three."

Blackstone's eyes were incredulous as

Bill took the Scarlet Stormer almost the whole length of the little lake and kicked it into the air.

"Are all planes as powerful and fast as this one?" he asked.

Sandy grinned at him. "This is the fastest ship in the world," he said. "Bill and I won a round-the-world race in it a couple of years ago. The rest of the ships looked as though they were standing still."

Bill flipped his radio switch and spoke to Shorty when he saw the Snorter was in the air. He gave him a course that he believed would bring them over Lake Gallegos. It was only a few miles away, Bill thought, yet it had seemed a million going through the jungle.

"Two-way radio," Blackstone marveled. "I knew it would come."

"We can pick up almost any one, anywhere," Bill answered. "You'll be amazed at the ships they are building now. Didn't Cortez ever give you any word of the outside world?"

"None," Blackstone said. "I haven't seen a magazine, book or newspaper since I left Barranquilla over five years ago." His face twisted for a moment. When he spoke his voice was trembling. "There is something I've been afraid to ask you, Bill. I—"

Bill knew what that something was. He nodded his head and waited for Blackstone's question.

"Ann," he said softly. "Is she all right? Has—has she married again?" Bill threw back his head and laughed.

"She's all right," he said. "She's fine. She's the one who would never believe that you were dead. She used to talk to me about when you came back. I was beginning to worry about her. She never gave up hope of your return for a moment. She's waiting for you."

"And look what she'll get," Blackstone said bitterly. "A wreck that will never be worth a damn to himself or any one else. I've often thought I didn't want to go back a cripple. What can I do?"

"You can do plenty," Bill said. "You can develop that tail armament and make a fortune with it. I half promised the army I would find you, get you to put the tail armament in the Scarlet Stormer, then let the army have the plans. That is one branch of aviation that has fallen far behind in the past five years. Big, fast bombers are being built that are so powerful and so well-armed that present day pursuit ships haven't a chance against them. The United States needs a fleet of fast, fighting ships. That's going to be our job when we get you back, Dave."

"Have you promised to turn the Scarlet Stormer plans over to them, Bill?" Sandy asked. The kid's forehead was puckered in an anxious frown as he asked the question.

Bill did not answer him because he

was listening to Shorty's voice over the radiophone.

"Two of those dun-colored, low-winged jobs and two biplanes coming up from the south, Bill!" Shorty said, his voice tense. "We've got too much load, both of us, to get any speed. What'll we do?"

Bill considered that question while he glanced over his right shoulder and probed the air to the south. When Blackstone's gaze followed his own, Bill heard his breath suck in with a sharp gasp.

"It's Cortez, Bill!" he said.

"He's swinging toward us!" Shorty said in his ear. "What'll we do?"

"Stick your nose up and get as much altitude as you can," Bill snarled. "Then, when I tell you, we'll take 'em! We'll go after 'em head-on!"

Bill's eyes were narrowed down to mere slits as he opened the throttles of the Stormer and eased the stick back. The muscles in his face knotted as he thought of the life of torture Blackstone had lived for five long years. Five long years that would never come back to him. Blackstone, he decided, might better be dead than thrust back in that hole in the heart of the jungle. There wouldn't be any doubt of Blackstone's getting back if it weren't for Cortez. He had life before him again; only Cortez could prevent it.

Those were the thoughts that burned in Bill's brain as he saw that he and Shorty had an advantage of a thousand feet of altitude over the fast oncoming planes. Only five hundred yards separated them as the air became filled with the chatter of machine guns and a white line of tracers.

"All right, fellah!" Bill barked into the microphone. "Chandelle and come down on their tails!"

The two red ships roared upward into an abrupt climbing turn and were above and behind the four enemy ships when they dropped their noses, with their powerful .50-caliber guns taking the range with their tracers.

Bill eased the stick of the Stormer forward slightly to correct his aim, until one of the biplanes came under his hair sights. His finger clamped down on his trips again. A pencil line that was drawn with bullets raced from the tail of the ship toward the cockpit. It shattered the glass of the cockpit enclosure. Then the pilot side-slipped out of the deadly fire, just before Bill's bullets would have broken his neck.

Bill was aware after those two maneuvers that because of Sandy's added weight, the Stormer did not have its usual speed and maneuverability.

He scanned the air about him and saw Shorty whipping his Snorter up and half rolling it over in an Immelmann turn. And he saw the Snorter wallow sluggishly as it was half rolled to a level position. He knew that Shorty was hav-

ing the same trouble. He spoke into his microphone as he opened his throttles wide again and the Scarlet Stormer became a red bullet racing through the air.

"Shorty," he said. "You'll have to use all your power. Give it all she'll take! If you don't, these babies are going to get us."

"That's what I'm trying now," Shorty said. "This is no place for me to lose my life after all these years! Let's go!"

That fight has probably gone into a folk song that will be handed down to successive generations of savages that roam the wilds of the Matto Grosso.

With the superior speed and maneuverability of Bill's Stormer and the Snorter offset, they had to depend entirely on their skill to weather the odds of two against one. Red Gleason was making a desperate attempt to use the two flexible machine guns mounted on the after deck. But his range was limited because he was cramped for space. The swivel gun in the rear of the Stormer was useless because of Blackstone. That meant that Bill and Shorty must depend on their ability to bring the enemy ships directly under their telescopic sights in front, while keeping them from getting in a position to deal death from the rear.

Dave Blackstone's face was a shade whiter and his eyes were wide with wonder, and not a little fear, as he watched the six ships dart in and out, feinting for an opening. For five long years he had dreamed airplanes and wondered what men were doing with them. The first time away from his confinement he became a part of one of the most vicious fights in air history. It was not fear of death that shone in his eyes, but fear of this horrible death-dealing machine man had created.

Bill came up in a climbing turn, then let the nose of the Stormer fall to take a position alongside Shorty. The four were returning to the attack in a V formation of three planes. The fourth, a dun monoplane, was a little above and behind the point of the V.

"That," Bill said between his clenched teeth, "will be Cortez." He spoke into the microphone. "I'm going to take the bird on top," he said to Shorty. "Break up the other three and single off one of them and finish him before the other two can get to you."

"O. K., Bill," Shorty rasped.

He broke up that alignment of three planes the way a good tackler can sift through interference and get the man with the ball. Two of them swung away to the left and the right as he held the Snorter's nose dead on the nose of the leading biplane with his finger clamped down on his firing trip. His bullets slashed above the head of the center pilot.

As he eased his stick forward to cor-

rect his aim, the enemy pilot sent his ship into a vertical dive. The bullets from Shorty's powerful guns crashed through the tail as it flipped up. Shorty saw it stagger like a man with a fatal wound as it dived at terrific speed. He opened the throttle of the Snorter wide and pulled the stick back. The Snorter flashed up and over on its back and was in a power dive with a gale racing through its struts on the tail of the diving enemy plane.

Shorty's lips were drawn back over his teeth in a snarl as he saw the biplane easing out of its dive. At the same time he eased back on the stick of the Stormer and half closed his throttle.

Time seemed to drag interminably while he closed up the gap between them, with his eyes glued to the rudder and elevators of the biplane.

He saw the pilot of the enemy ship look back up over his shoulder, saw the man's face twist in terror as he swung back to his controls. When the biplane's elevators came up and the rudder swung slightly to the right, Shorty followed the maneuver with his Snorter, keeping the ship in the same position under his guns. The gap between them was closing now. Five hundred yards became four, then three, then two.

Shorty's lips came down over his teeth to make a thin, straight line of his mouth as he got the enemy ship under his telescopic sights. His fingers came down on his gun trip and fastened there. There was a fierce exultation in his heart as he saw his bullets crash into the cockpit of the enemy ship, saw them half tear the head of the pilot from his shoulders before he could skid the ship out of the path of death.

He had waited with a cold, ruthless precision until he had the enemy ship exactly where he wanted it. He had waited like a fencer until he had his adversary in a position to deliver the coup de grâce, with one stroke of mercy that brought death.

As he saw the biplane stagger toward the waiting jungle below he chandelled up in a flashing turn, expecting to feel the thud of bullets ripping into the Snorter. Red Gleason's admiring voice sounded over the intercockpit telephone.

"Neat, young fellow!" Red said. "Couldn't have done it better myself. But for the love of Mrs. Gleason's boy, Red, lay off the inverted flying unless it's necessary. Tyler's using the safety strap. I have to hang on with my teeth. They're loose now."

"They ought to be," Shorty growled. "Where are those other three ships?"

"Playing hide the thimble with Bill, three thousand feet above us," Red answered. "Gimme a chance to use these guns."

Young Sandy had spoken into the microphone of the intercockpit phone as

Bill drove the Stormer toward the leader of the four enemy ships.

"Blackstone says the man in the monoplane above the V formation is Cortez," he said.

Bill nodded his head.

Bill knew the fight would be over if he could get Cortez. The other ships would kick their tails in the air and run for safety. His face was a mask of determination as he held the thundering Stormer's nose on the nose of Cortez's ship. The smoke from Cortez's tracer bullets laced above Bill's head long before Cortez was close enough for accurate shooting.

The ships were only two hundred yards apart when Bill tripped his triggers and poured a hail of lead into the oncoming ship. Knowing his own deadly aim, he did not see how his bullets could miss at so short a range. He could feel the thud of the monoplane's bullets driving into the Stormer and knew by the way it lurched that they were cutting his right wing to bits.

Perspiration poured down his strained face as Cortez held his ship straight on its course, swerving neither to right nor left while Bill poured bullets into it. Bill could hear Sandy screaming in his ear behind him as the two ships rushed on to an inevitable head-on crash—a crash that would mean certain death for all of them.

A thousand thoughts that were melted into one flashed through Bill's mind in the split second in which he had to make a decision. Cortez was not mad enough to kill himself in order to kill them. Of that Bill was certain. Was Cortez trying Bill's nerve, believing that if he forced him to swerve or zoom out of his path he would have won one half the battle? That the finishing blows would be easy after he had shaken Bill's nerve? Bill thought of Sandy and Blackstone behind him. He thought of Shorty. He would be left to the mercy of the other three planes, along with Red and Tyler.

All those things he thought in that split fraction of a second. And in that same time, with characteristic decisiveness, he answered them and made his decision.

Cortez was not piloting that other plane! He had placed another pilot in that position and had given him instructions to wipe out the Stormer with a collision. Cortez knew that Bill would think the man flying the ship on top of the little formation would be the leader—would be Cortez. That would give him a chance to pounce on Bill unexpectedly.

Bill threw a mental salute to the pilot of that dun monoplane as he yanked the Stormer out of its mad path. He could feel the terrific speed of the other ship as they kissed in passing.

Bill pulled the Stormer straight up on

its nose and over on its back. Hanging head down, he dived on the tail of the pilot who had asked for death a moment before. The other dun ship and a biplane were racing in with their guns spewing lead as Bill clamped down on his trigger. He saw his bullets make a snake's path the length of the fuselage and saw the pilot come up on his feet with his arms thrown above his head. He saw him slump back and knew that he must have kicked the controls as the nose of the ship dropped and the tail began to spin toward the waters of Lake Gallegos that had slid beneath them.

He could feel slugs driving into the Stormer as he threw it into an inverted spin, leveled off and opened his throttles wide. He started after the other dun monoplane ahead of him.

Bill's flaming bullets hammered into the engine block of the plane as it started to whip up and around. He saw the white, stricken face of the pilot as he glanced back over his shoulder. He pointed a finger to attract the attention of Blackstone and Sandy to the man.

It was Cortez!

Smoke and flame suddenly spurted out of the engine of the stricken ship as it fell away, half out of control. Bill dived on it with his guns jammering. There was no mercy in his heart as he made a bloody sieve of the body of the man who had tortured Blackstone for five long years. He pulled back on his stick as the flames crept back along the fuselage of the monoplane to make a flaming bier for the body of the murderer of the Matto Grosso.

He flipped the key of his radio and called Shorty's name as he saw the Snorter chasing the last biplane to the south.

"Let him go, fellah," Bill said. "I got Cortez. We'll get out of here alive now."

They set the two ships down on the surface of Lake Gallegos, beside their other Stormer. Red Gleason took the controls with Tyler in the after cockpit. Sandy climbed in with Shorty.

"This is the greatest ship I ever saw, Bill," Blackstone said to Bill as Bill stuck the nose of the Stormer toward Rio de Janeiro.

Suddenly the radio blared in Bill's ear. It was Sandy's voice, and he was singing "Flying Down to Rio" at the top of his voice.

CODE OF THE NAVY

(Continued from page 22)

out of the corner of his mouth. "A natural pilot. Notice how he handled her when she tried to porpoise? That brings out the real seaplane pilot."

That night, after dinner at the Benton mansion, Plunging Platt was a mere legendary character in a filmy novel, indistinctly remembered by one Martin Driggs. Benton never once alluded to his former career, and the name "Platt" was erased from the record.

Only little Solly Blaine, a radio operator, caught the curve of Driggs' jaw, the keen eyes and the strong hands that handled the controls with all the skill of a great organist fingering his stops. Solly Blaine could not get it out of his head that he had seen Martin Driggs somewhere.

THE BRIGANTINE was out on her cradle by daybreak. She was scheduled to leave Seattle at 7 a. m. on the dot. Her test was a non-stop between Seattle and Guam, which meant a continuous flight of at least twenty-four hours. On the trip they were to make a thorough study of fuel consumption, radio control devices, two-way wireless and test a new robot pilot. But of prime importance was the complete secrecy of the flight, and the absolute safe return of the machine. Under no circumstances was it to fall into the hands of those who had no legitimate business with it.

When Martin Driggs realized all this, he smiled to himself. Out of prison a few days for the theft of secret military plane plans, and now asked to make a flight test over a wide ocean with the finest piece of flying equipment the world had ever seen.

Hal Chestney, a boisterous giant of a man, was in charge of the radio equipment. Phil Stroud, a former army air service technician, was motor engineer. Ward Waring, a quiet, unassuming man

with horn-rimmed glasses who had designed most of the structural points of the Brigantine, went aboard as construction engineer to check stresses and assume responsibility for the controls and other mechanical features. Little Solly Blaine, radio operator, pantryman and general clerk, was taken along for the routine jobs.

They went aboard in silence and took their posts. Benton came aboard and turned over the log book and prepared charts to Driggs. He spoke to each man in turn, and then went up into the forward control pit where Marty sat behind one of the great wheels, and gripped his shoulder.

"All right, Driggs," he said in a firm voice. "She's yours. Take her away, but bring her back safely."

"She'll be back. Nothing will stop me."

"All right. I trust you, remember. And don't forget that, above all, you're a navy man. That's all."

"A navy man," nodded Driggs. "Let's go."

They let the big wheeled cradle run down to the water while Benton climbed off. Driggs eased in the compression air starters, and the four big 1,000 h.p. Benton Hurricane motors opened up. They were massive sixteen-cylinder jobs, set in horizontal opposed fashion that provided perfect streamlining into the wings. They were steam- or condensation-cooled, and carried automatic-pitch props fitted with the latest control system.

Chestney, also a licensed pilot, took the co-pilot's seat for the start and marveled at the skill with which Driggs took her off, making the most of every roller and surge of water. The Brigantine had never cleared her hull step like this before. He chanted into his muzzle mike and gave the Benton base op-

erator the news that they were well away and would report every half hour. Behind them in the main radio cabin, Solly Blaine sat over his key set and prepared to hold down the communication with surface vessels while Phil Stroud stood balancing on the balls of his feet before a massive panel of instruments that told the story of their progress with a dancing display of needles.

"Grand work, Driggs!" Chestney belated, as they climbed out and circled once over the Benton plant. "Let's go!"

Then, with a final pean of power, the big Brigantine smoothed off and roared away into the early morning mist that blanketed the Washington coast. It bore Driggs at the controls, Chestney in his co-pilot seat, Stroud in front of his instrument panel, Waring at his folding table—and little Solly Blaine over his radio bench, staring with wide school-boy eyes at a picture in a newspaper clipping he had suddenly remembered he had in his breast pocket. Quietly he shoved over the small panel that opened into the control pit and checked that face again.

"Plunging Platt!" he whispered, torn between his loyalty to Benton, his admiration for a great athlete, and his dread of anything connected with a prison.

He got up and turned around to speak to Phil Stroud, but the motor engineer had gone along the catwalk to the main tanks. He took another look up through the open panel and saw Driggs smiling. Then his fears ceased. Anyone who could smile like that—Besides, there was always the possibility that he might have made a mistake.

TEN HOURS LATER the Benton Brigantine was nearly three thousand miles out over the Pacific. They had

enjoyed a strong tail wind for nearly six hours, but now, Chestney's calculations showed, the encouraging breeze had died down and they were roaring through still air at a speed of 256 at three-quarter throttle. Every half hour Chestney had checked in at Seattle over his speaker set, while young Blaine had been busy keeping up a continuous chatter with surface vessels and assisting materially in noting their position.

"We're hitting the high spots, all right!" beamed Chestney as he came back and slouched down in the co-pilot's seat. "Want to go back and get a snack? I'll take over for a stretch."

"Thanks," smiled Driggs. He stretched, slipped through the divided seat, and made for the companionway that led past the two main compartments. He found Waring sitting at a small table with a steaming plate of soup and an open graph book before him.

"Smells fine!" smiled Driggs. "How're we going, Waring?"

"O. K., so far. Everything tight and orderly. Can't find a creak anywhere."

Solly brought Driggs a plate of steaming soup, some hard biscuits and a spoon. He gave Driggs a queer glance and went back to his bench.

"Great kid, that," Driggs went on, when he had seen Solly sit down and pull on his ear phones.

"One of the best. Funny, though," Waring added. "He's got a nubbin in his noggin that he's seen you somewhere. And to be frank, your face is strangely familiar."

"Forget it. He pulled that on me yesterday when I got to Seattle. I've been abroad for some time, on special duty."

Which in the main was true, but still somewhat misleading.

"Funny, though, how a face can get you like that. I could swear I have seen you somewhere."

"Not a chance. Hello, what's up with the infant?"

Solly was gesticulating frantically through the window of the radio compartment. Driggs darted in and stared down at the message Solly was jotting on a pad as it buzzed through his ear phones. Waring came in and peered over Driggs' shoulder.

They read:

Down in seaplane approx. 155 W.
32 N. Need assistance. Hull damaged. Two compartments flooded.
(signed) Blandon, pilot.

Driggs ripped the sheet up from the pad and scribbled.

Hold on. Pick you up as soon as possible. (signed) Driggs.

"Keep on his wave length!" ordered Driggs when little Solly started to read

the message. "Never mind Seattle. Keep this quiet. We'll advise them when we pick these guys up."

"You're crazy, Driggs!" snapped Waring. "We can't afford to take a chance like that. They will be picked up. Besides, how do you know who they are? What seaplane would be away out here?"

"We're only a couple of hundred miles out of Honolulu. In all probability it's a navy job, down while doing a patrol. We're going to get them out. You can't let men die for a lousy record!"

He stormed out of the compartment and went up into the control pit and shoved the message in front of Chestney.

"Pull that robot out. We're going to look for those birds," Driggs snapped, slipping behind the big wheel. "Give me a position and a course on that point."

Chestney read it twice and scowled.

"This is a hell of a fix. Let's call Benton and get his orders first," Chestney suggested.

"Like hell! No messages through to Seattle until we pick those guys up. The last words Benton said to me were, 'Remember you're a navy man, Driggs!'"

"O. K. You're the doctor, Driggs, but I think you're taking an awful chance. If they're this close to Honolulu, they can be picked up from shore in no time. Besides, there ought to be plenty of surface craft around here. That point is on the main trade route."

"With two compartments filled? You're nuts. Give me a course, and then go in with young Blaine and keep in touch with them on the key. We're navy men, Chestney!"

The co-pilot checked their position quickly and then gave Driggs a new course. It would put them off their chart a few miles, but they might get away with it. Then he darted into the main radio cabin and saw that Solly had spun his wave-length dial over to the Benton operator. His hand was pounding brass like mad. He had just tapped out:

5:15 Pacific time. Pilot Driggs
landing on water—

That was as far as he got. Chestney jerked his arm away and pulled him out of the seat. "What were they working?" he roared.

"It was 62.8 meters," Solly muttered. "Are we going down?"

"That's what Driggs says."

"Look! Ever see this guy before?" asked Solly, pulling out the newspaper clipping and shoving it in front of Chestney.

"Judas Priest! Plunging Platt—the jailbird!" gasped the radio engineer. "I thought something was funny. Let me out of here."

He started up the companionway, fire

in his eyes, but Marty Driggs had heard the words "—the jailbird!" He slipped out of his seat and met Chestney with a lightning punch on the button and sprawled him all down the catwalk.

THE WORLD lost track of the Benton Brigantine from that minute on. Five-fifteen heard their last report, a sketchy thing about Pilot Driggs going down to land. No reason, no explanation, no further word.

Clintock Benton paced the great hangar for hours, his last ounce of trust in humanity torn from his heart. He snarled muffled curses for his belief that a jailbird could be retrieved from his past. He pondered on the Kosnov syndicate of international spies who had threatened to steal his design, his wonderful flagship bomber—and he wondered about the man he had known as Plunging Platt.

"It was probably worth two years at Moordaunt for what he got out of the Sandusky Shark plot," he reflected bitterly. "Two years in safety while his gang planned another coup, perfected it and set the wheels in motion. I can't believe it, though. He was a navy man!"

THE MEN ABOARD the Brigantine were stunned. What had happened up front? Hal Chestney lay, a limp heap, in the companionway. Little Solly was trying to bring him around, but the blow had been wicked, and the harsh metal framework of the structure had not helped any. A cruel gash in his scalp spurted blood that trickled down over his ear.

Phil Stroud clambered through to the front compartment and leaned over Driggs who was guiding the Brigantine down to a white spot that was bobbing on the ocean four thousand feet below.

"What's the idea?" demanded Stroud.

"Going to pick up those poor devils down there. Chestney had objections."

"Who is it, down there? No insignia—no markings. You're falling for something."

"They sent out a distress call. I'm a navy man, and no navy man leaves a man to die on the water. Get ready for a landing. We won't lose half an hour." "We might lose the whole damn boat."

"Shut up and take posts for a landing. Clear a compartment to take care of those poor devils."

"That boat rides too high to be in distress. You're falling for a sucker play."

"You take your post, Stroud," snapped Driggs. "I'm chief pilot here."

"Yes, sir," replied Stroud, backing down the companionway.

Driggs checked his drift and swung her around gently. Then he let her glide and simmer down to a foam-spreading path on the water.

The big, gleaming Brigantine swayed up under marvelous control. Stroud opened a hatchway and climbed up on to the narrow catwalk that ran from the front gun turret, which was now used as a stowage cabin for anchors, sheets and nautical equipment. He had a megaphone and barked into it while Driggs eased the big flying boat up closer.

"Ahoy!" bawled Stroud. "Anyone aboard? Ahoy! Stand by for rescue by dinghy." Somewhere aft Waring and Blaine were breaking out a collapsible boat to get across to the disabled craft.

"No one aboard, evidently!" he bellowed through Driggs' open window. "Must have been rescued by a surface vessel and left their craft."

"We're going aboard and find out why. There's something fishy here," Driggs snapped, letting the motors idle.

Bong!

A shell screamed over their heads and splashed in the water ten chains' length away. Stroud turned, deathly white. As suddenly men appeared in the cockpits and turrets of the flying boat. They manned guns that crackled and spewed bullets over their heads. Stroud never saw the men in the seaplane. He was staring at a giant submarine that had come up out of nowhere. It nosed toward the Brigantine and the gun crew forward kept their Q-F gun trained on them.

Stroud turned and glared at Driggs. "So this is your game, eh? Handed it right over to someone out in the middle of the Pacific Ocean. A swell gag. Won't Benton love this story?"

"Shut up, Stroud! I'm as dumb about this as you," protested Driggs.

"Well, take a chance and get off. What are you waiting for?"

"Yeh? With a 40 mm. Madsen quick-firer on that deck? I'm not dying like that. Let's see what it's all about."

They soon found out. A small boat came over from the submarine and landed four men on the deck of the Brigantine. Marty Driggs sat back, astounded, as he watched them crawl up the steps that had been lowered by Stroud.

"Burslavsky—Hans Nolbein—Udenich—and Pentrulo! My God!"

They strode along the whale-back catwalk of the big Brigantine and leaned over the open port of the control pit.

"Wonderfully well done, Platt!" the big Russian Udenich beamed.

"After all these years, eh, Platt? We meet again!" grinned Pentrulo, the little deformed Italian wireless expert.

"What's your game, Udenich?" asked Driggs.

"Simple. We want this ship—and just as it is, too. We can get a million in American dollars for it in—"

The Italian hissed, and he never finished the sentence.

Stroud barked from the front turret.

"Well, you're with your own kind now, Driggs! I hope the dough you get out of this burns right through to your guts!"

Driggs ignored the crushing accusation. He said to the Russian, "Well, what's your proposition? We don't carry blue prints this time."

"You must be getting soft, Platt," the Italian answered. "We're taking the whole ship. Come on, you guys, disembark here and take to the sardine can over there. Make it snappy."

For a minute Driggs could not believe his ears, but finally he got out, "Who's flying her? Not me!"

"No one's flying her. We're putting her aboard a trawler in a few minutes. She'll be over the horizon soon. They have a derrick, and the rest will be easy."

"What about us?" demanded Driggs.

"Well, I'll tell you," the little Italian taunted. "If you're real nice and walk off quietly, we'll put you aboard the sub and take you for a nice long ride!"

"I get it. We'll go quietly."

Driggs shifted out of the seat and called down the catwalk to Waring and Blaine. He told them to bring Chestney with them.

"What a lousy trick," muttered Stroud through the window. "You're not getting away with this one, Driggs."

"Shut up and get over side," ordered Driggs. "That's right, Solly. Help Chestney up the ladder."

They were bundled over the side and into the rocking boat. Their four visitors stayed aboard the Brigantine and tossed out a sea anchor to steady her. Driggs sat in the stern of the dory and evaded the gaze of Solly, who was still supporting Chestney. Solly was recalling an end run plunging Platt, the convict star, had made two weeks before at Moordant. He felt sorry for the man now known as Marty Driggs. He hoped he could do something for him sometime.

With a strange twist of imagination peculiar to youth, Solly was under the impression that he had caused all this trouble by displaying that clipping to Hal Chestney. But Driggs was now trying to catch his eye, and Solly sensed that he was expected to do some lip-reading, a qualification in which he was well versed through his radio-operator training. Driggs was saying, "Batteries! Batteries! Batteries!"

QUEER figures that looked like "12" had been painted over on the side of the conning tower. Driggs noticed that the instant he clambered out of the dory and made his way over the sleek back of the submarine. Someone had come along and helped them get Chestney up the curved deck, where he rested himself against the conning-tower rail. Men in greasy uniforms and overalls, carrying

the submarine-man's badge of waste in their hands, were lined up, grinning at their victims, from the low wire rail.

"All right, Solly!" whispered Driggs. "Slip down and get at those batteries—gas 'em—you know."

Solly grinned and nodded. He watched Waring clamber up, and then slipped around the other side of the conning tower. The officers and men on the deck were anxious about the captured Brigantine. No one saw Driggs slip down into the water on the other side.

The gun crew at the 40 mm. Madsen had left their posts to watch a C.P.O., who was broaching another case of shells and clearing two empties from under the elevation wheel platform. He did not see the swimming figure edging along the curved back of the sub.

Driggs acted like lightning once he was clear of the water again. He came up hand over hand, gripping a greasy wire cable that formed part of the trap-net cutting equipment, and before the startled C.P.O. could utter a sound, Driggs had timed his first punch to connect just as the outlaw submarine man tried to turn and bellow toward the conning tower. He went over in a fluttering arc and hit the water with a blinding splash. The other two members of the gun team turned and started to move, but Driggs released the traversing lever and swung the long, slim barrel of the high-speed weapon around and swept them off the narrow catwalk before they could get their footing. They rolled down the greasy back of the sub and went spluttering below.

Bong!

The Madsen barked once. The shell spat out and screamed across the water.

Bong! A flash of flame leaped up beyond the Brigantine and the treacherous white-hulled flying boat disintegrated and let her broad wings flutter down to the rollers. Fire leaped out from what was left of the hull. For a space of five lengthy seconds every eye was focussed on the shattered flying boat. Five seconds is not a long time, but the transition between defeat and victory took but that moment. Smiles changed to masks of terror, and frowns of doubt and distrust became glowing countenances of happy amazement.

"Hold that dory, Stroud!" screamed Driggs. "We're going back to that ship."

Stroud grabbed at the painter of the dory and muttered something about the code of the navy, but he found himself laughing this time.

"Call Solly on deck. He's down inside!" bellowed Driggs, closing the breech again on a second shell.

Chestney, who had been reclining back against the rail of the conning tower, stiffened suddenly. His eye had caught the glint of a black Mauser. He

swung, the gun barked, but the man who held it had pitched forward on his face as the result of a sledge-hammer blow on the curve of the jaw. Hal shoved two amazed men in jumpers to one side and leaped up the greasy metal steps.

"Everybody overboard!" Driggs commanded. "Every member of the crew over the side. Now! Not to-morrow. The navy is in charge here. Get overboard, you rats, or I'll blow you right through the conning tower! Take charge of that dory, Stroud!"

The Madsen swung around and pointed her blue-black snout at the knot of men under the conning tower.

"Go on, get over. You can hang to the net cable if you can't swim. Come up here, Chestney. Man this damn gun. I'm going down and show these birds a thing or two. Here's the firing trigger."

Chestney was laughing through the mask of blood that partially dried on his face.

"Where you going?" he demanded.

"Below to open up the forward tanks and flood the battery compartment. I told Solly to take out the caps. We'll give 'em plenty to worry about."

He darted along the catwalk, grabbed a Mauser out of the belt of a young officer and shoved him overboard. Solly was waving out of the top of the tower and throwing round black caps into the sea.

"Great! Get in that dory, Solly, and stand by."

Driggs went down the steps of the conning tower and shoved a gun into a greasy mechanic's belly. "Get up there and get a swim. You need one, you stinking tin-fish merchant!"

He ran across to the maze of instruments a few feet beyond the periscope table and stared at the row of wheels, polished and gleaming. He fumbled for a minute and then twirled two. He waited and listened, glad he had been abroad on that observation course and had learned about foreign submarines, guns, and particularly Madsens.

He found himself in the battery compartment. He hurried through and looked for the valves of the forward tanks. They were marked there on the curved wall, and he spun them hard and sensed that the floor was dipping slowly toward the bow.

A length of hose hung in a quick-release rack and he ripped it out, dragged the nozzle across the floor and aimed it at the long bench of batteries. Then he twirled another valve handle and water spurted across the battery array, releasing a powerful stench of chlorine. He cupped his hands over his nose and ran back to the periscope table chamber and ripped a new Bren machine gun out of a rack. It was a Czechoslovakian weapon with a curved magazine holding thirty cartridges. He

gripped it by the carrying handle and started up the steps again, which by now had taken on an alarming angle.

He saw Chestney still behind the gun. Water was lapping at his feet.

"Up here!" he shouted at Stroud, who was still standing by with the dory. "Pull up under the gun, quick!"

Stroud, Waring and Solly shoved away through the bobbing heads of the submarine men and came up near the gun mounting.

"Hold this," ordered Marty. "I'm going to fix this boiler so that she never takes another dive—and comes up again."

He swung the gun around, sat in the metal saddle and pressed the firing lever.

Bong!

He reloaded quickly and aimed again into the smoke at the base of the tower.

Bong!

The second shot banged through, and behind the drifting smoke they saw two gaping holes.

"Come on, she's sinking!" roared Chestney.

"No she won't, Hal. Only her forward tanks open. She'll stay afloat long enough to keep them on the surface for some destroyer to pick up. Gimme that gun—let's go."

They slipped down into the bobbing dory and Driggs knelt in the bow with the Bren cradled in his arms. Solly and Waring pulled away. Chestney sat in the stern and covered the men in the water.

"There's no gun aboard the Brigantine," reminded Stroud.

"And we finished off the guys in that other flying boat, who did have 'em," replied Driggs grimly. "Hurry up. I want to nail those four guys before they muster up enough courage to try to take her off."

AS THEY drew closer, two shots rang out from the forward cabin of the Brigantine and spat past Marty's head. He ducked and brought the Bren up to his shoulder. It weighed twenty-one pounds and could be fired from the shoulder, if necessary.

"Hold it, Driggs!" cried Stroud.

"I will—as long as I possibly can. I want those guys alive."

He told them why later.

Another shot rang out and splintered the gunwale of the dory. That was too close. Driggs ripped the Bren back to his shoulder and yelled.

"One more shot, and I'll blow you all to hell!"

Crack!

Driggs ripped out the breech block and tossed it overboard. The Bren spat back and Driggs staggered under the kick of the cruel weapon. His shots pounded into the window in the radio cabin.

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BRETHREN OF DEATH

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"There goes all my comfort," moaned Solly.

There was a low scream from the cabin, and a man, a small dark man, ran out of the commander's cockpit bridge and waved his arms, standing fully exposed on the open catwalk between the control cabin and the front hatch.

"O. K., but no funny work, Pentrulo!" roared Driggs. "Keep your hands up until we board you."

The dory eased up to the folding steps and Driggs clambered up. The rest followed, Solly still holding on to the painter.

"All right, Pentrulo," ordered Driggs. "Get your lousy mob into that boat. Get back to that sub—and wait until some one comes and picks you up."

Burslavsky and Nolbein came up, white and shaking, dragging Udennich with them. He had stopped a burst in the right shoulder. They went down

the steps and clambered back into the dory, defeated and dejected.

"And when they pick you up, Pentrulo," added Driggs, "be sure to tell them the right story about who stole the plans of the Sandusky Shark. It might help you to get out of a charge of piracy on the high seas, you know. Shove off, you rats!"

Driggs stood on the bridge and covered them while they moved away.

"Don't expect your mob to have a shot at us with that Madsen, either," he twitted once they were clear. "I threw the breech block away."

The opening roar of the Benton engines cut off further conversation.

"Let's go," grinned Driggs, crawling into his cockpit. "We've lost half an hour fooling with those guys."

"Never mind. We're more than an hour ahead of schedule now," roared Chestney, slapping Driggs across the shoulder.

TWENTY MINUTES LATER Clinck Benton received a new and reassuring message. It ran:

Went down to give assistance disabled seaplane. All hands taken care of according to the navy's code of the sea. U. S. S. Destroyer *Templeton* completing rescue and collecting evidence of interest to Sandusky Corporation.

(Signed) Driggs, Chief Pilot.

Benton read it once, twice, three times and then grinned.

"I had an idea he would run into that syndicate," he thought aloud. No one in the control tower at Benton Field had the slightest idea as to what he was talking about; they put it down to the excitement and strain, when he went on, "But if you want a job done right, get a navy man—even if you have to get one out of jail to do it."

"ALWAYS READY"

(Continued from page 26)

But there are some who fear and hold a healthy respect for the coast guard; the men who operate on the shady side of law and order.

When a plane on patrol sights a foreign smuggling vessel, its position, course, and speed are radioed to the nearest coast guard surface craft which then picks up the trail and pickets the "black," as these smugglers are called, to prevent them from contacting their shore operators, and holds the trail until the vessel's food and fuel supplies are exhausted, forcing it to return to its own country, the contraband still on board.

Lightships send out distinguishing radio signals at stated intervals for the benefit of surface craft. Coast guard planes, with their modern radio direction-finding equipment, take advantage of these signals, obtain radio bearings of three or more lightships, plot the bearing lines on a chart—and the point at which all lines cross is the exact location of the plane, at that time. The latitude and longitude are then read off the chart and radioed to coast guard surface craft.

Recently an American speed boat, after contacting a "black," was observed speeding toward shore. The coast guard plane dove across its bow, warning it to stop. This warning unheeded, the aircraft swiftly landed, taxied alongside the speed boat, fired tracer bullets across its bow and caused the vessel to immediately heave to. A prize crew was put on board and the captured boat was escorted into shore by a surface craft that had been summoned to the scene by the plane's radio man.

The coast guard maintains an aerial patrol along the Canadian and Mexican borders for the purpose of preventing the smuggling of narcotics, aliens, and other contraband. For these duties, Vought Corsair observation land planes are employed, although newer equipment is being contemplated.

Still another one of the duties of the coast guard is cooperation with the Internal Revenue Department (Alcohol Tax Unit) in locating illicit distilleries hidden away in the interior swamps, woods, and mountains, where they can

defy attempts at observation from the ground. One observation plane, piloted by Lieutenant William Schissler of the Cape May air station, last fall located seventy-five of these stills hidden away in the hills and mountains of the South. After the plane located the plants from the air, they were seized and destroyed by the A. T. U. ground crews.

One job that caused coast guard pilots a bit of puzzled head-scratching was a request by the United States Biological Survey, for the aviators to fly up and down the coast and count the wild ducks that were strung along this area. It seemed that these feathered airmen were rapidly becoming extinct, and that something should be done about it. A census was the first step. It was not revealed by what manner the ducks were counted, but the coast guard did its usual good job.

Day by day the air division expands, keeping pace with the country's needs.

The sea gives no respite, ever, and the coast guard must be on guard everywhere, *semper paratus*—always ready!

WINGS OF TO-MORROW

(Continued from page 30)

under side of the wing, near the root. It is completely clean, without a strut or wire of any sort to offer air resistance. The engine is a supercharged 9-cylinder Bristol Pegasus of the latest type, capable of producing over 900 h.p.

The Wellesley's specialty is long range. Although performance figures have been withheld, it is known that it can carry a large load of bombs for thousands of miles. It was estimated that if the test monoplane had been loaded with fuel

alone instead of passengers and other weight, it could have flown for at least 8,000 miles in calm air, non-stop.

Its value for military use is heightened by the fact that its geodetic structure of many metal strips placed on edge renders it almost completely immune from bullet damage. A machine gun would have about as much effect firing into this construction, with no important spars or beams, as it would in firing into a flattened roll of chicken wire, which

the uncovered wing, by a stretch of the imagination, somewhat resembles.

Though still experimental, the Wellesley has already been ordered in a quantity of 75 for the Royal Air Force. The Wallis geodetic structure undoubtedly marks the beginning of a new chapter in airplane construction and may bring into existence a new type of aircraft, one step closer to the dream of all aviation designers—the perfect "flying wing" that will challenge the flight of birds!

THE FASTEST LAND PLANE

(Continued from page 42)

at which the wings are mounted add materially to the stability of the ship.

The under surface of each wing contains a large well into which the landing gear retracts. This gear is of the individual type, operates hydraulically, and is equipped with oleo shock absorbers enclosed in a box-type strut of riveted sheet dural. The landing wheels have a 10-foot tread and are furnished with tires of the low-pressure variety. The tail skid, which retracts into the fuselage in flight, is steerable and is cushioned against landing shocks by an oleo unit. The tail surfaces are of full cantilever construction and are all metal, with the exception of the elevators and rudder, which are fabric covered.

Such is the racing plane in which Howard Hughes flashed around the official 3-kilometer course at 352.46 m.p.h. With it he brought back to America a

new world's speed record for land planes. We held the record from 1932 to 1934, thanks to Jimmy Doolittle and Jimmy Wedell, until Raymond Delmotte of France captured it on Christmas Day, 1934, with a speed of 314.319 miles an hour. Hughes' new mark is more than 38 miles an hour faster.

Not content with this feat, the young Texas speed pilot promptly purchased one of the new 925 h.p. Wright Cyclone engines and installed it in his Northrop mail plane. After ten test hops to fa-



miliarize himself with the new power plant, Hughes took off from Burbank, California, with full fuel tanks.

Flying through the stratosphere at tremendous speed, he landed his ship at Newark, New Jersey, just 9 hours, 27 minutes and 10 seconds later. This startling flight clipped more than half an hour from the record held by Roscoe Turner.

Howard Hughes is not at all impressed by the hop. He says it's only a starter. For months now, he has been working on the problems of high-speed flight at high altitudes with the stepping up of fast passenger transport in mind. The Texas amateur hopes to get his Wasp, Jr., racer up to 30,000 feet or more one of these days.

When he does, I'd like to lay a little bet that this old world is going to see some "real speed." Any takers?

THE MODEL WORKSHOP

(Continued from page 36)

Contest preparation is especially important for model builders who will be entering contests for the first time. Contest procedure is a little flabbergasting to the beginner and some explanation and advice may make things easier.

The National Aeronautic Association governs both real airplane and model contests. The N. A. A. draws up a set of rules governing model plane competition. Any contest recognized by the N. A. A. must follow these rules, which are changed from year to year. However, during the last five years, the rules have been built upon one fundamental idea—the weight of the model should be proportional to its size.

The ratio of one ounce for every 50 square inches of wing area has applied to contest models ever since 1930. This ruling keeps the weight of the competing ships more or less uniform and prevents super-lightweight models from being caught by air currents and carried high in the sky to win over heavier and more scientifically constructed planes. Wing area is taken as the part of the wing that actually contributes to the lift of the model. That part of the wing over the fuselage is never counted.

The area of the large over-size tail surfaces used on most contest models also is not included, so it does not require additional weight. With this setup, the elevator can be made to lift part of the model's weight without adding a weight penalty. This is why the elevator area ranges as high as 40 per cent of the wing area.

When flying in a weight-rule contest,

you'll be required to weigh your model prior to flying. Always weigh your models at home before the contest. If your model requires additional weight, add it in the form of increased strength or additional strands of rubber motor. This will eliminate delay at the contest.

The size requirements of the fuselage in the cabin fuselage contests is one rule that usually causes confusion in the minds of contestants. Its purpose is to make contestants design their ships in approximately the same proportions as a man-carrying plane. This rule reads, "The maximum fuselage cross section area shall not be less than the (over-all length \div 10)²."

Let's see what is meant by this rule in a concrete example. Suppose you have a cabin fuselage model that measures 28 inches from the propeller thrust bearing to the rear tip of the tail. This is the over-all length, which does not include the propeller. Dividing by 10 is the same as shifting the decimal point one number to the left, resulting in this case in 2.8 inches. Now, the small figure 2, raised, to the right of the parenthesis above, indicates that our result is to be squared. "Squared" merely means multiplying a number by itself. Therefore 2.8 x 2.8 equals 7.84 square inches, which is the area of the required fuselage maximum cross section area. To find if your model qualifies, multiply the greatest width of the fuselage by its maximum height, and the result should be 7.84 square inches or greater.

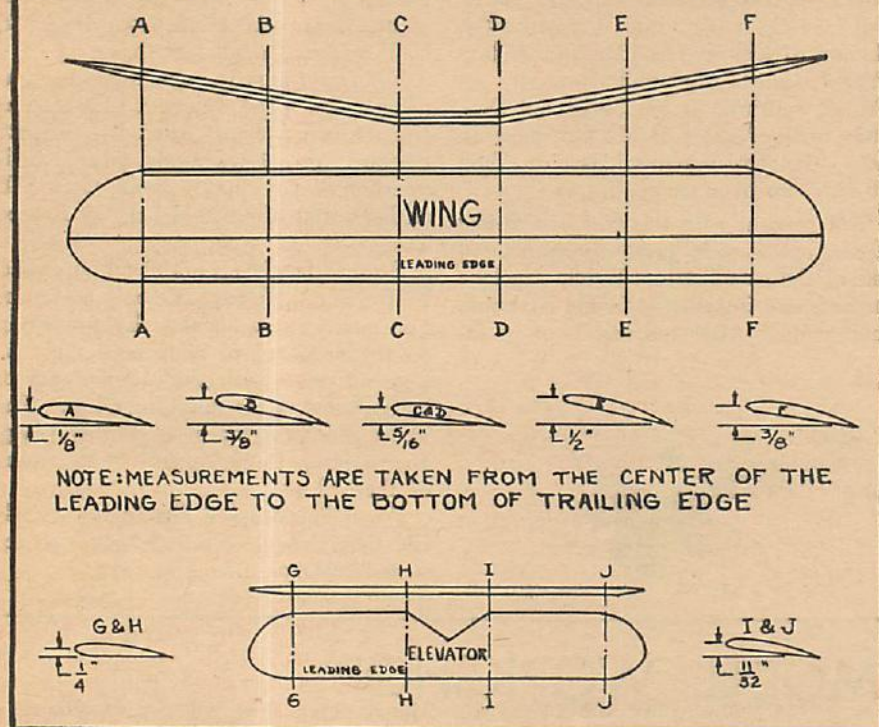
There are additional minor rules governing the size of wheels, conditions of

flight, eligibility for contest participation, etc. Each contest will probably have rule variations. However, by building your model to conform to the weight and fuselage cross section requirements, you will make it eligible for every contest conducted under N. A. A. rules.

Actual contest procedure is the test of a modeler's resourcefulness and ingenuity. It's up to the builder to decide which wing setting or tail adjustment would be best for the particular occasion. But there are certain rules that apply to all contest procedure. We've listed ten points of contest technique that should be followed:

1. Take a complete repair kit to every contest. Have cement, tissue, wood, etc., and be prepared to make repairs. Don't waste time borrowing tools and supplies.
2. Don't test-fly your models too often. Decide on wing and tail settings and take an official flight. Many fine models have crashed or have been lost during trial flights. Remember, it's only the official flights that make records.
3. Don't wait until the last few minutes of the contest to fly your models. Get your flights in early, when the timers are not busy. You won't suffer by taking early flights, since conditions are usually best about noontime.
4. Keep your models out of the sunlight. Your rubber motor will become lifeless if exposed too long.
5. Coöperate with the timers—get ready when they call you for flights. However, make sure no one else is pre-

DRAWING #5 WASHIN & WASHOUT IN THE WING & ELEVATOR OF THE 1935 WAKEFIELD MODEL PLANS PRINTED IN AIR TRAILS APRIL 1936



NOTE: MEASUREMENTS ARE TAKEN FROM THE CENTER OF THE LEADING EDGE TO THE BOTTOM OF TRAILING EDGE

paring for a flight when you start to wind your motor.

6. Wind rubber motors tightly. It's those last few "power turns" that take your ship into the clouds.

7. Various models have distinctly different flying characteristics. Acquaint yourself with them before the day of the contest.

8. Pack your contest models carefully in boxes. Keep them in these boxes between flights. Careless spectators have eliminated more than one entrant from the contest by tramping on his ships.

9. Print your name and address on your models. At each contest many lost ships are brought back to their builders because of their thoughtfulness in marking them.

10. Be prepared to endure heat! The contest field, baked by the summer sun, is the hottest place on earth. And unless you're prepared for it, all your energy will be consumed in drinking soda in an attempt to keep cool. You'll have no strength left for winding rubber motors.

But there are no cut and dried rules to success in model airplane contests. It's really up to you yourself, so use your modeling sense to pull you through the tight places.

In many cases a contest sanctioned by the N. A. A. is open only to N. A. A. members. If you would like to join the N. A. A., send 50 cents to N. A. A. headquarters, du Pont Circle, Washington, D. C. This is a special junior annual membership offered to aviation enthusiasts under 21 years. For those older

than 21, the regular N. A. A. membership fee of \$5 is charged.

THE NATIONAL CONTEST

Participation in a national contest is every model builder's dream—and it's open to anybody who wants to enter. To prevent overcrowding by model builders who live in the place where the contest is held, entrants from the contest city are selected in elimination events held ahead of time. Anybody elsewhere needs only to show up with his model, an N. A. A. membership, and a deposit of \$3 to \$5 to assure his actually taking part. The deposit is returned after the contest. Thus, not only is there no charge, but you actually get a free dinner at the monster banquet that ends the meeting.

The 1936 contest will probably be held in Akron, Ohio, during the latter days of June. Six regular events will be run off during this two-day contest—three outdoor and two indoor flying events, and one non-flying scale model event. One special event will also be held—the Lord Wakefield International Trophy contest.

Trophies that are valuable from a sentimental as well as metallic viewpoint will be awarded to winners. These trophies are fought for year after year. The winners hold the cups for one year and then they're put back into competition.

The Stout Outdoor Trophy, donated by William E. Stout, aeronautic and automotive engineer, is for cabin fuselage

models; the Mulvihill Trophy is for outdoor stick or fuselage. It was put into competition by B. H. Mulvihill, who was a director of the N. A. A. The Moffett International Trophy, given in memory of Rear Admiral William A. Moffett, who was lost on the dirigible *Akron*, is for outdoor cabin fuselage; this contest is open to builders of all nations. There are two indoor contests—the Bloomingdale Trophy for indoor cabin fuselage and the Stout Indoor Trophy for stick models.

A scale-model event is held at every national contest. Builders send their models from all parts of the United States. They are judged on appearance and accuracy of reproduction. An attractive trophy is awarded to the winner. You need not attend the contest to enter this event. Merely ship your model from your home, inclosing return postage or express charges. Your plane will be unpacked, exhibited, judged, and then shipped back to you. If you're a good scale builder, you'll probably receive a trophy or medal along with it.

The national contest will assume greater significance this year, since the Lord Wakefield International Trophy contest will be held in this country for the first time since 1931. Already British, French, Australian, and Canadian entrants are priming their planes for an invasion of the United States in an attempt to take away from us the Wakefield cup that was won in England last year by your model editor's Wakefield Winner.

This contest should be the high spot of the year, and no model builder should miss it. And few really have to miss it. Arranging a trip to the contest is not always difficult.

Number One prospect is found at home—dad, mother, and the family auto, if any. First of all begin to talk models to mother and dad. Tell them about the model hobby, about its popularity and its usefulness. And above all, never fail to fly your ships for them. The actual flights are what will sell modeling. Your next step is to tell them about the national contest. Tell them that mothers and dads are welcome at the contests. And don't fail to add that reduced hotel rates are offered to those attending the meet.

If mother and father are unable to arrange a trip, maybe you can join some friend who is driving to Akron with his folks. Or perhaps the local model club is sending a delegation to the contest. If this is the case, there will be elimination contests conducted and the winners will go to the contest with all expenses paid. So get your models prepared and ready well in advance of June.

If you run into trouble in your contest preparations, either with your models or in arranging your trip to Akron, write to me and I'll try to help clear up

your trouble. Sometimes a few words of advice will explain the most perplexing angles of contest participation. I am anxious to give you all possible help if you'll let me know what's troubling you.

And when you get to the contest, be sure to look up your model editor. Gossiping about models is an important contest activity, so we should get together and talk shop. During the contest at St. Louis last year I slept about 12 hours during the three nights. Sleeping is a secondary consideration when there are old friends to meet, models to be inspected, new ideas to talk over, and work to be finished. So I'll be looking for you, and when we start discussing models we'll out-gossip the most talkative old ladies!

QUESTIONS

Question: What are wash-in and wash-out, why are they important, and how are they added to a model? R. C. L., New Haven, Connecticut.

Answer: To illustrate this point, I have made drawing #5, which shows the exact amount of wash-in and wash-out on the wing of my 1935 Wakefield Winner model, the plans of which appeared in April issue of Bill Barnes-Air TRAILS. Looking from the front, you'll

notice that the leading edge of the right half of the wing is warped up. This is wash-in; its purpose is to balance the effect of the revolving propeller, which tends to depress the wing. Wash-out is the exact opposite—the trailing edge is warped higher than the leading edge. The effect of wash-out is a force which pushes down the wing. Wash-out is not used to any great extent, since wash-in alone will balance the model.

An effective way of warping wings is to decrease the incidence at the tips. This eliminates wing-tip drag and improves the efficiency of the wing.

The elevator on the Wakefield Winner was given 3/32" wash-in on the right side. This helped turn the model, with the result that it circled uniformly with neutral rudder setting.

Warping the wing is easiest after it has been covered. Moisten the covering with a light spray of water and twist to shape while you dry it over a hot stove. Or the wing can be pinned in position after spraying or doping. Usually it takes several treatments before you are satisfied with the shape.

If your model has not been treated with waterproof dope, don't fly it when the air is damp, since the tissue will collect moisture and the wash-in you carefully added to the wing will dis-

appear. Even a doped wing will sometimes lose its shape when exposed to the damp air of early morning or late evening.

Question: What is the best way to trim bamboo down to the right size? E. K., British Columbia.

Answer: Let's suppose you have a section of bamboo pole which must be split into 1/16 x 1/8" landing gear struts. Start your knife through the center of one end and split toward the other end. Keep the split running through the center by bending the larger section away from the smaller when the split veers off, and at the same time, exerting pressure on the knife blade to guide the split back to the center.

After the pole is split, take one of the half sections and split it into two halves. Continue splitting into halves until you've reached the desired size. As it's impossible to split a thin strip of bamboo from a thick section, always split bamboo into halves. This insures uniform size and straight-grained pieces.

The shiny outside portion of the bamboo is the only useful part, so pull away as much of the inside pulp as the required dimensions will permit. Bamboo can be rounded by scraping with a knife and by sanding.

Build These Performers for New Flying Thrills!

Even if you can't go to the national contest in June, there's a whole summer of fine flying weather ahead. Take advantage of it—get Gordon Light's flight-tested plans of ships that win! They meet N. A. A. requirements, they're keen lookers, and they're dangerous planes in any contest anywhere. Stock up now for a successful season, whether you fly for trophies or just for fun. Clear and simple plans and building instructions are available in back issues of Bill Barnes-Air TRAILS Magazine for the following models:

WANDERER—stick twin pusher; eligible for Mulvihill Trophy—September, 1934

CLOUD DUSTER—closed fuselage; for Stout Trophy—November, 1934

HUMDINGER—cockpit fuselage; for Stout Trophy—April, 1935

PERFORMER—cabin fuselage; for Stout or Moffett Trophies—September, 1935

DUCKY WUCKY (as landplane)—cockpit fuselage; for Stout Trophy—October, 1935

SOCKDOLAGER—closed fuselage; for Stout Trophy—November, 1935

RANGER—closed fuselage; for Stout or Moffett Trophies—January, 1936

THERMAL FINDER—closed fuselage; for Stout or Moffett Trophies—March, 1936

WAKEFIELD WINNER—cabin fuselage; for Stout or Moffett Trophies—April, 1936

Complete issues containing the model plans listed will be sent on receipt of 15 cents each, in stamps or coin, by the Circulation Department, Bill Barnes-Air TRAILS, 79 Seventh Avenue, New York, N. Y.

**Next
Month**

Gordon Light presents his brand-new flying model of the famous SKY FLEA. The June issue will go on sale at your newsstand May 13th

**Watch
For It**

It's a Fact That—

Our scheduled air lines flew more than a million miles per accident during the latter half of 1935. This was in spite of several notable crashes that made the rate for the second six months of the year out of proportion with the rate for the first half. Total miles flown were 34,811,105.

There were only three fatal accidents among the 33 reported during the above period, lifting the mile rate to 11,603,702 for each accident in which a death occurred. Of the 274 persons, including passengers, pilots and crew who were involved in the total number of accidents, 226 suffered no injuries whatsoever.

Customs officials were not eager to inspect one item of air freight that arrived in London by plane recently. It was a nest of bees shipped in a section of tree trunk from Rhodesia, Africa. The bees, however, were stingless—a rare African variety destined for the London zoo.

August was the biggest month for air travel in the United States last year, with 89,581 passengers riding the scheduled air lines. They formed 12 per cent of the total of 746,946 passengers for the year. January was the smallest month, with 28,922, or less than 4 per cent.

Not all fields of American aviation activity have expanded steadily with our progress in the air. The total production of aircraft engines, for instance, has wavered from year to year, with a general downward trend as the supply became adjusted to the demand. In 1934, the production was 2,736 engines. During the days of feverish World War arming, the government ordered 22,500 Liberty motors of the 400 h.p. type from American manufacturers in August, 1917, to put our fliers into the air, and 13,396 of them were actually delivered by the time the armistice was signed in November, 1918—only fourteen months later.

Full-sized wind tunnels for testing real planes, instead of models, have been completed in Germany, whose tunnel measures 17 by 35 feet in throat size, and in France, where the tunnel is 26 by 52 feet. The tunnel maintained by the United States, however, located at Langley Field and the first one built, is still the largest, measuring 30 by 60 feet.

Transport planes flying on American-operated air lines at the end of last year, including those in service to Canada and on the Pan American Airways system to Latin America, numbered 459. In a year's flying they consumed 33,260,609 gallons of gasoline—almost 100,000 tons. They also used 879,775 gallons of oil.

Defying fog, cold and gales, the country's airliners went through to their destinations 85,063 times out of 90,124 flights started in 1935, for a performance of 94.38 per cent.

Steam engines for planes are getting new attention in the present quest for high-speed flight in the stratosphere. Due to the limits of superchargers in helping gasoline engines to operate up where the air is rarefied, it is believed by some European scientists that steam power may solve the problem. The fact that water boils at lower temperatures as the air pressure decreases would reduce the steam engine's fuel consumption and increase its efficiency. There still remains, however, the task of designing proper wings, propellers, and cabin sealing for real stratosphere flight.

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Please send me a Vacu-matic for a Model A. The mileage on my 1933 Chevrolet jumped from 18 to 22 miles per gallon with Vacu-matic. — Paul P. Haas, Mass.

MODEL A FORD

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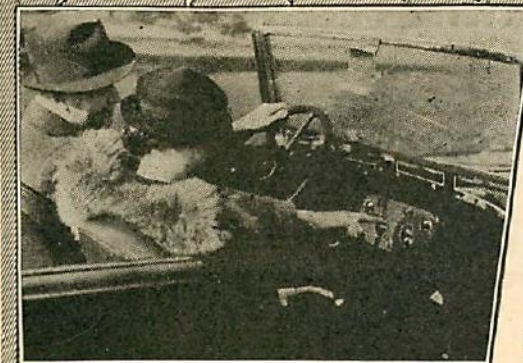
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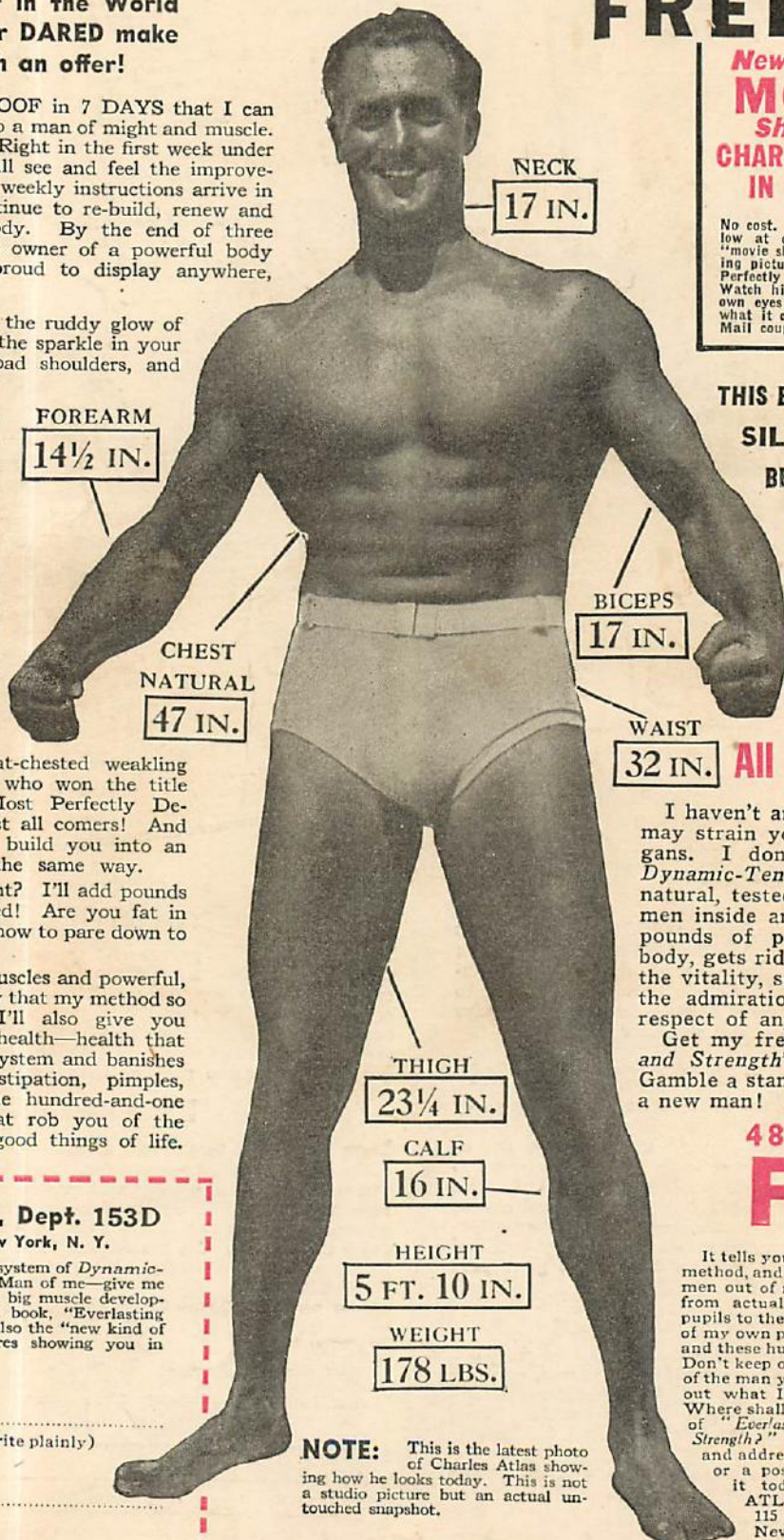
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