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AIR TRAILS ★

FEBRUARY
1936

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*told in
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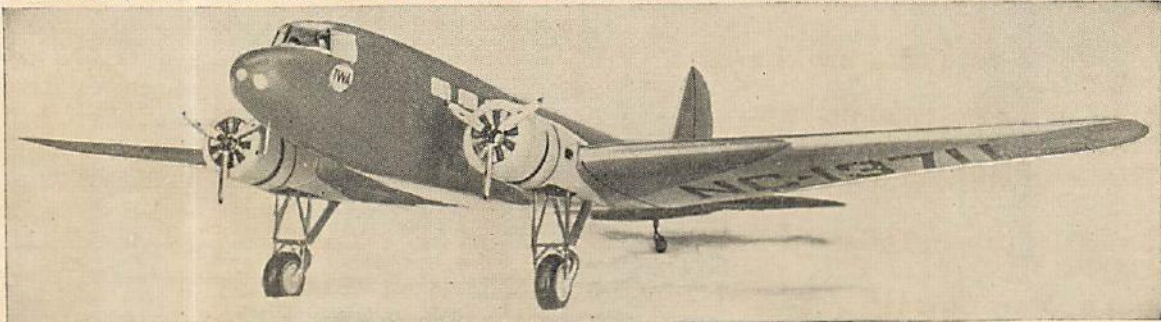
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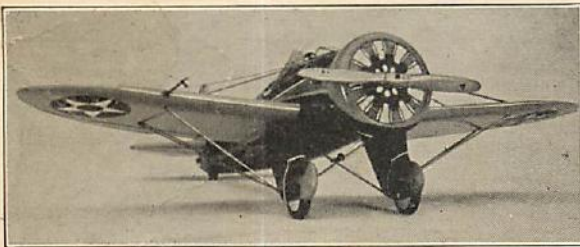
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When he was graduated from West Point in 1906, at the age of 22, Second Lieutenant Frank M. Andrews from Nashville, Tenn., was assigned to the cavalry. Flying was still in its cradle; the Wright brothers had made their first hop only two and a half years before. It was not until 1917 that Frank Andrews entered aviation, with a major's rank, but his career has been bound up with army flying activities practically ever since. The only interruption was a two-year period of duty as executive officer of the American forces in Germany. He has commanded army air fields and training schools, has served in staff positions, and a year ago was designated commanding general of the newly-formed General Headquarters Air Force, which gathers all the combatant units of the air corps under one separate command responsible only to the army's chief of staff. On the first anniversary of the G. H. Q. force, General Andrews is head man of our fighting fliers.



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The March Bill Barnes Air Novel

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VOL. V

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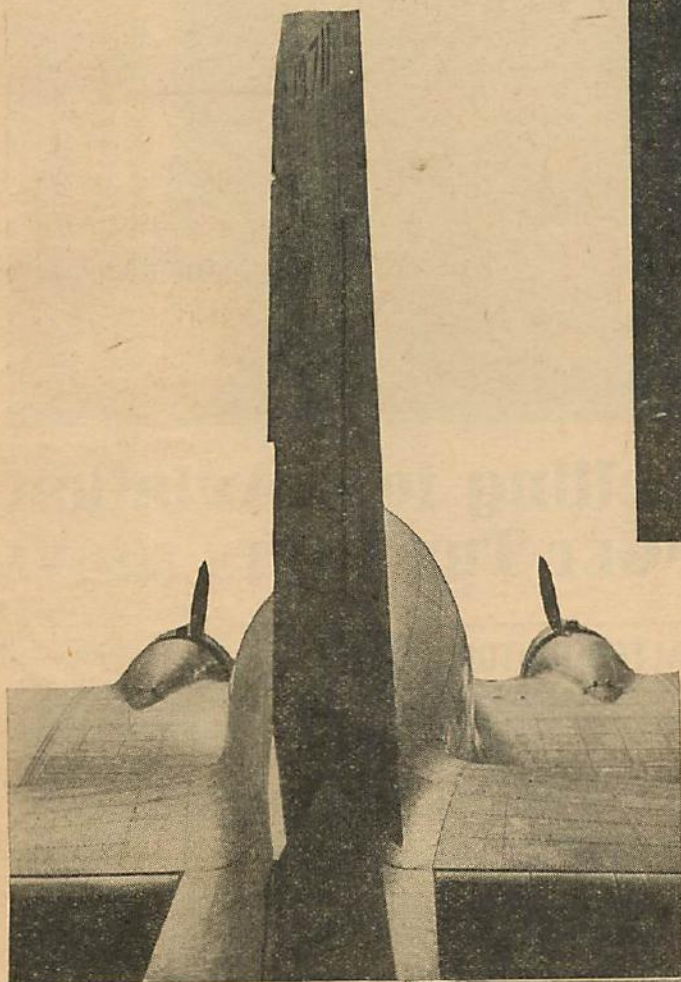
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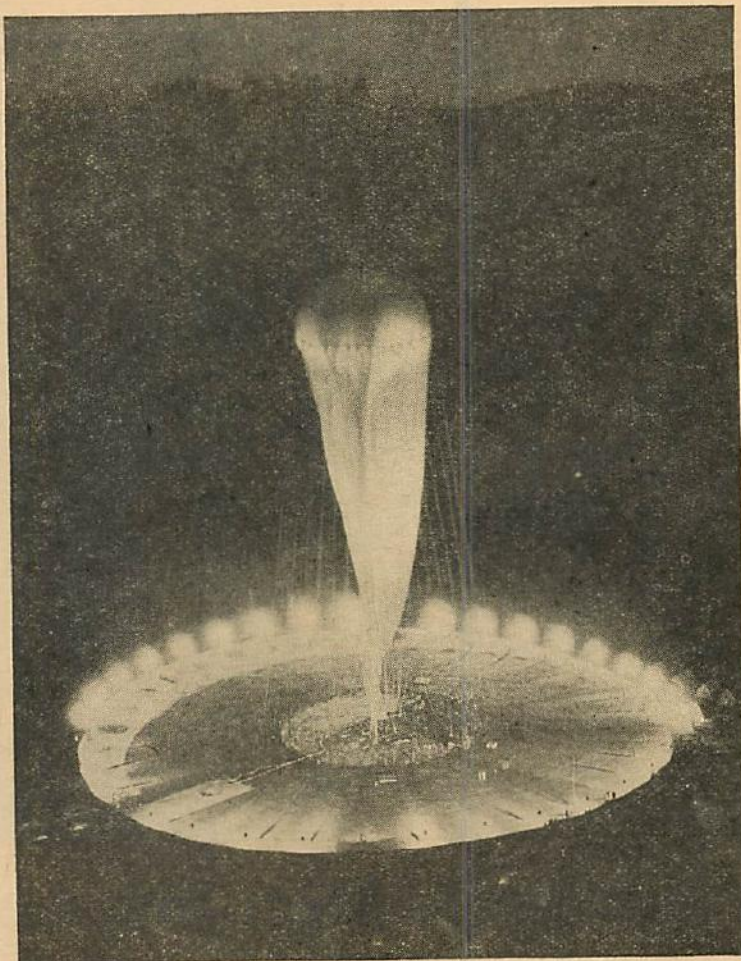


This Winged World

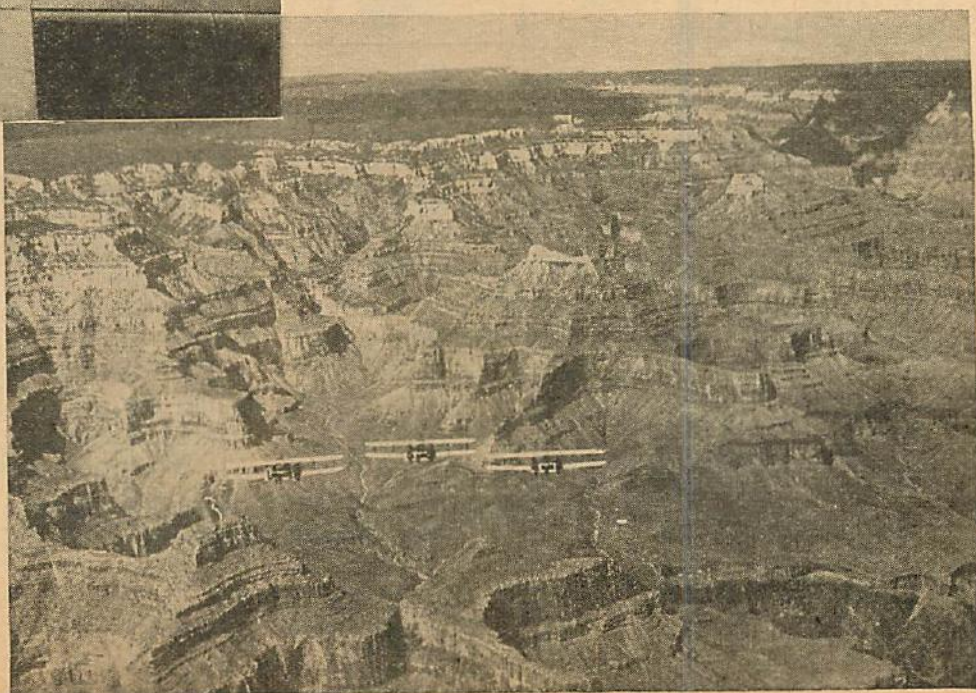


TAIL first, this TWA liner presents a striking appearance. It doesn't look much like the sleek Douglas DC-2 we all know, does it?

DANGER lies above the Grand Canyon for three 11th Bombardment Squadron planes from Rockwell Field, Calif. Pilots know the air currents there to be tricky.



TUGGING at its leashes, the Explorer II waits while dawn climbs the hill. Soon it soared aloft, bearing Capt. Stevens and Anderson into the stratosphere to a height of 73,000 feet—nearly 14 miles—a new world record.





TELESCOPE or gun? Neither; it's the world's longest camera, designed to snap the stratosphere balloon. It photographs 4-inch letters a mile away.

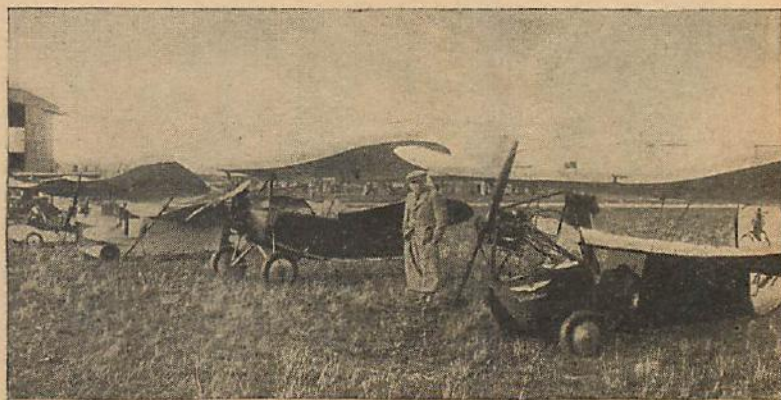


PROPS are as necessary as pilots, as Sergt. Norton and Pvt. Bohlender, preparing a Boeing P-12 for San Joaquin valley maneuvers, could tell you.



Official Photograph, U. S. Air Corps

SAILING a peaceful sea of clouds, these Martin B-12 bombers hold perfect formation.



FLEAS infested the Orly airport, near Paris, in all their different shapes and hues for a combination demonstration flight of Monsieur Mignet's lively little craft.

THIRTEEN racing balloons was an unlucky number for Uncle Sam's Bennett Cup entry, which finished ninth. Poland's 994-mile flight from Warsaw won.

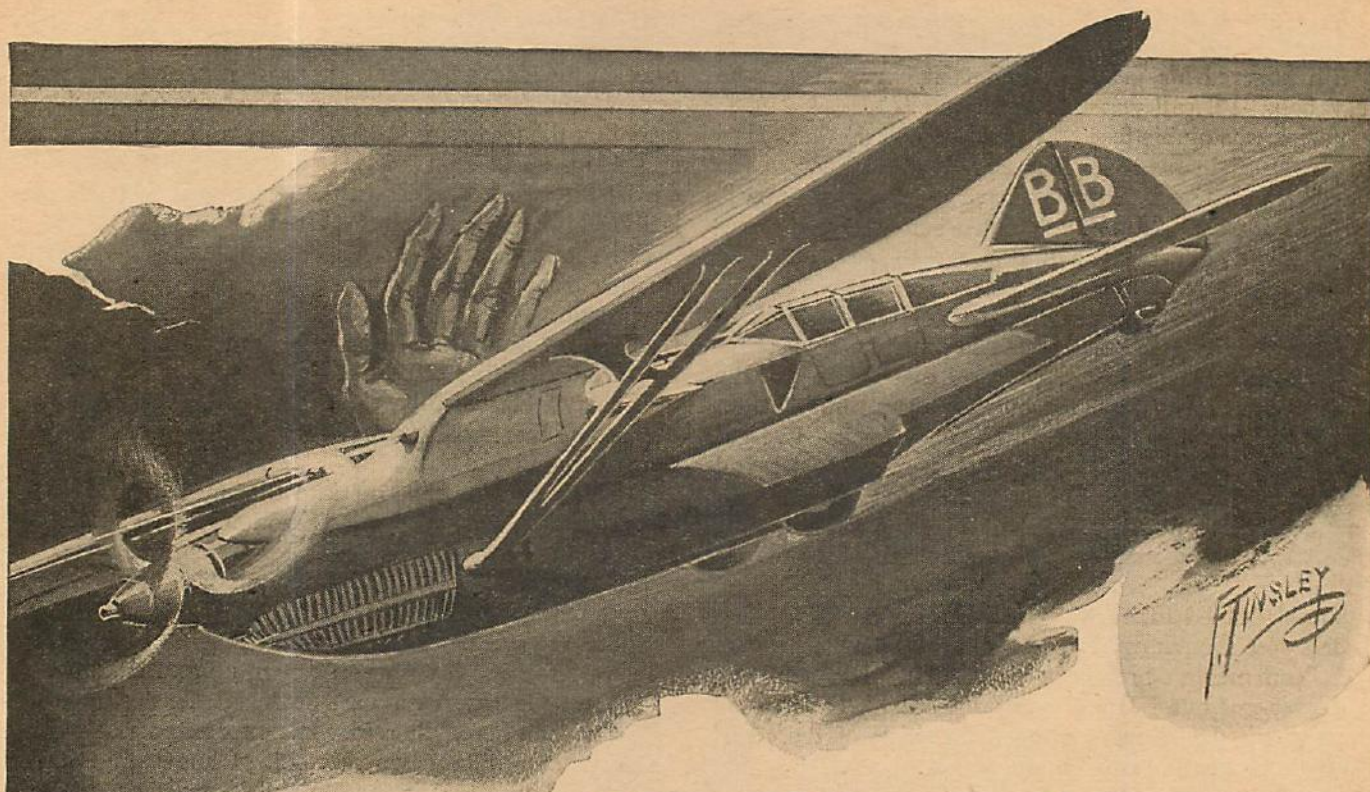




by
George L. Eaton

The BLACK GHOST

A Great Bill Barnes Air Novel



What hideous evil lurked behind the sinister shroud that set guns hammering and motors shrieking in a sky tangle for stupendous stakes?

HE CAME only by night, a slinking shadow, a creature of darkness. He came thirsting for power, for revenge. He came from the region of the tomb and he was armed with unholy might.

He was the "Black Ghost."

His cadaverous body was shrouded in black. A voluminous cloak fell from bony shoulders to stir the dust. Black gloves incased his hands. A hood covered his entire head. Of the man, nothing showed but his eyes—eyes that glowed through slits in the mask.

He was the Black Ghost.

This is the story of him—the Black Ghost. And it is the story of Bill Barnes, the world-famous pilot, whom Fate chose as the evil one's antagonist. It is a tale far from pleasant. It deals with pestilence and horror; with maniacs and murderers; with thundering planes and bloody skies; with yammering machine guns and the thudding of bullets. It deals with the Black Ghost and—Death.

So far as Bill Barnes was concerned, it really began when he agreed to fly Max Stonge to Vienna, Austria.

Max Stonge was acknowledged to be the most successful criminal lawyer in the country. The prohibition era had brought him a reputation and tremendous wealth. He had been King Zaro's attorney back in the days when that suave Sicilian hoodlum had been overlord of American gangdom. And rumor had it that the glib-tongued Max Stonge had salted away a million dollars from the

successful defending of the various and sundry Zaro mobsters in their frequent tangles with the law.

When King Zaro had vanished to an unknown fate in 1928, with the department of justice agents hot on his trail for income tax evasion, Max Stonge had found little difficulty in getting new clients who were willing to pay staggering fees for jury-swaying eloquence.

Bill knew Max Stonge for what he was. Twice before he had piloted him on long flights—once to Buenos Aires; another time to Nome, Alaska. All the attorney had demanded on those trips had been speed, with discomforts and risks blandly accepted. And he had paid liberally.

It was, therefore, no great surprise to Bill when, early one morning, he was informed that Varick, the lawyer's confidential aide, was at the main entrance of the Long Island airport and wished to see him. Bill issued instructions for him to be shown to the office.

The little man was breathing hard when he came in. He wasted no time in stating his business. His employer, Max Stonge, wanted Bill to fly him to Vienna immediately. He would pay fifty thousand dollars.

Bill's bronzed face was inscrutable. "That's a lot of money. What do you mean—immediately?"

"As soon as humanly possible. As soon as you can get a ship ready. He'll pay you in cash. Fifty thousand—in cash! How soon can you leave?"

"Why the rush?"

"You know the boss. When he's got to go somewhere, he wants to go in a hurry. You'll take him O. K.?"

Bill fingered his jaw. "I'll think it over. That's no easy hop. I'll call you this afternoon."

Varick was on his feet. "No! You can't do that. He's got to go right away!" He leaned halfway across the desk, his body tense. "I have to have your answer—now!"

"Take it easy," said Bill. "You'd better tell me something about this. No one's going to pay out fifty thousand just for an airplane ride."

The aide stared at him wildly, then dropped back in his chair. His voice was restrained when he spoke.

"I guess it does sound phony—all that dough and the rush to get away. But, it's on the up and up. All he wants you to do is fly him to Vienna. Look. I've got his passport." He pulled out a dark-green folder and opened it. "He's booked to go on the *Normandie*. But, now even that's not fast enough. Flying's the only possible way. It's a matter of life and death—his life; his death."

Varick leaned forward. His voice sank. "I'm going to tell you something, Barnes. The reason he's got to go. You mustn't breathe a word of it. It'd ruin him if it ever got out. I had hoped I wouldn't have to tell even you." His fingers gripped the arms of the chair. "Stonge has to see a Viennese specialist. It's his only chance. Any delay may prove fatal. He's got a tumor of the brain."

Bill started. "The brain—"

"Yes. This Austrian doctor—he's the only one who can operate with any chance of success. We thought the boss could go by boat—but he's gotten worse. There's no time to lose. If you could only see him, Barnes. You'd scarcely recognize him. He's desperately sick—dying. It's his only chance, I tell you. He's willing to pay you a fortune. Oh, you've got to take him! You've got to!"

Bill sat motionless. He stared across the room, his eyes half closed. He waited a long minute before he said, abruptly: "O. K."

A choked sob came from Varick. "You'll do it—you'll do it—I can't thank—"

"Tell Stonge to be here by nine to-morrow morning," Bill said, brusquely. "Can't leave before then. The Stormer's got to be conditioned."

Varick grabbed Bill's hand, shook it. "I knew you'd take him when you realized— It'll—it may save his life." He reached for his hat, jammed it on his head. "I must go. Must tell him. He'll be here in the morning—by nine. Please don't say anything—to anybody about his condition."

"I won't."

With the closing of the door, Bill had the telephone receiver jammed to his ear.

"Get me Martin!"

Martin was the head mechanic at the Barnes Field.

There was a wait, then: "Martin? . . . Start working on the Stormer pronto. I'm taking her to Vienna, Austria. Leaving at nine in the morning. Get going!"

II—STORM WARNING

MARTIN and his squad of experts had labored through the afternoon and night. The Stormer had been given a thorough overhauling from its taut tail surfaces to its pointed nose. By eight thirty the next

morning, the superamphibian was fueled to capacity and ready to take to the air. Sleep-starved mechanics had wheeled the sinewy, red bird from its hangar to the concrete apron. The morning sun blazed down and shimmered on the gleaming scarlet lacquer of the wide-spread gull wing. The twin Diesels were throbbing, throttled down; the two propellers in the sharp nose swung over lazily. Max Stonge hadn't arrived.

Bill sat at his desk in his office scanning a detailed weather report. He was dressed in a heavy overall flying suit. His broad forehead was furrowed as he re-read the report. The proposed route across the Atlantic lay befouled with storms.

"Shorty" Hassfurther, the veteran flier, paced across the room, his hands buried in his pockets, his broad shoulders hunched.

"You're crazy to take off into that mess, Bill. Anything can happen. Why don't you wait? There's no sense taking fool chances—even for fifty grand."

Bill didn't look up. He said quietly: "The money doesn't matter in this case."

Shorty scowled. "There's something screwy somewhere. I feel it. I wish you'd open up and talk."

Bill put the weather report down on the desk.

"Now, look here," he said. His expression was bleak. "You're acting like a two-year-old. I know my client's problem. I was told it frankly and in strict confidence. If I suspected that there was anything wrong, that it wasn't as represented, I'd naturally have nothing to do with it. When the passenger arrives, I'll tell him exactly what we're up against. If he still wants to leave—we take off immediately. Now, for the love of Allah, pipe down."

Shorty kicked at a crease in the rug. "All right," he growled. "Only I still think you're—"

The telephone jangled. Bill picked up the instrument.

"Bill Barnes speaking." He hunched forward, his eyes brightening. "Stephen Drake! How are—?" He stopped short and listened. Then: "Sorry. I got a job. It'll take some time—days. . . . Can't put it off. I'm leaving in half an hour. Tell you what, Shorty Hassfurther will take you—in a Snorter. . . . Yes. . . . O. K.? . . . At eleven, here."

He hung up and turned to Shorty.

"Stephen Drake, the government man. Wanted me to fly him to Miami. He's in a big hurry. That's your job, fella. He'll be here in two hours. Beat it out and get your ship ready. Start worrying about that instead of me."

Shorty nodded. "O. K. I won't say another word. It isn't often that I try to interfere in your business, Bill. But, it isn't often that I get such a strong hunch. When fifty-grand fees start floating around, there's sure to be trouble."

"Drake will be here in two hours," said Bill, evenly.

Shorty walked across the room to the door and opened it. He shot a look back.

"I'll see you before you go," he said gloomily, and went out.

He hadn't been gone two minutes when knuckles sounded on the door.

"Come in," said Bill.

"Sandy" Sanders, the kid ace of Bill's flying organization, came inside. His freckled face had been well-scrubbed and glistened.

"Could I see you a sec, Bill?" he said. "It's something pretty important."

Bill put down the report. "Let's have it."

Sandy lowered himself to the arm of a red leather chair. "Vienna's in Austria, huh?"

"Yes."

"And you're going to Vienna?"

"Sure. Get to the point."

The boy's hazel eyes were bright. "I want you to do something for me when you're in Vienna. Will you?"

"That depends," said Bill, warily. "What?"

"Get me a *schilling*."

"A what?"

"A *schilling*. It's an Austrian silver coin."

Bill frowned. "What under the sun do you want with a *schilling*?"

Sandy looked at him in amazement. "Why, didn't you know? I'm collecting coins. I've been saving them for years. Not seriously—until now. I got an English farthing, a Peruvian *dinero*, a Swedish *krona*, a Canadian copper—and quite a few more. If you get me that *schilling*, it'll help a lot. I'm going to make this my life work. And when I die, I'll will my collection to some museum."

Bill grinned. "You and your hobbies! All right. I'll try to get it. But by the time I get back, you'll be collecting manhole covers instead."

"You got me wrong," said Sandy, his small face flushed. "I'm going into this thing seriously."

"Then, you're a numismatist," said Bill.

The boy looked at him from under lowered eyebrows. "I don't know what that means, Bill, but I don't like the sound of it."

"It means a person interested in the science of coins. If you're a real coin collector—you're a numismatist."

Sandy batted his eyes. "Well," he said slowly, "I guess that's what I am then. How's that again?"

"Numismatist."

"Numismatist," muttered the boy. He settled down into the chair. "Gosh, I'd better memorize that. Numismatist—numismatist—numismatist—"

Bill shrugged, picked up the telephone and called the main entrance to the airport. He instructed the guards there to pass Max Stonge through when he arrived.

III—TAKE-OFF

MAX STONGE came in a taxicab at eight forty-five. He was alone, aside from the driver.

Bill went outside to meet him as the cab came to a stop in front of the office. The rear door opened and a man slowly emerged. He was wearing a heavy overcoat with the collar upturned. A woolen scarf was around his neck and covered the lower part of his face. A black fedora was pulled far down on his head, casting his eyes in heavy shadow. He wore thick gloves. The skin of the exposed part of his face was a dead-white.

Bill saw it all in one sweeping glance. The man was Max Stonge. Yet, he scarcely recognized him. The robust, healthy attorney he had known before was gone, and in his place was a bent, hunch-shouldered man, sick and weak.

The airman stifled his surprise and hurried forward, hand outstretched.

"Glad to see you, sir."

Max Stonge had waved the cab driver away. He

turned to face Bill.

"Barnes! Take me to the plane. Quick!" His voice was husky and thin. "There's no time to lose."

"All right. But come inside first." Bill took his arm.

The man moved irritably away. "You mean the money. I have it with me. I'll pay you. We must hurry."

"It's not the money," said Bill. "We'll hit bad weather. I want you to see the report."

They went inside. Sandy came to his feet quickly. Bill introduced him to Stonge. The lawyer ignored the boy.

Bill handed him the weather report. "There's

what we're facing. If we leave now, we're taking a big chance of coming through in one piece. But, it's up to you. If you want to go—O. K. I just want to warn you. The trip's going to be tough. If we wait until later, things may clear up."

Stonge scarcely looked at the report.

"I must go *now*. I don't care about the weather."

Bill nodded. "Very well. We'll leave immediately. I think it would be advisable for you to change into warm flying clothes."

"No—no! That would take too much time. I'm prepared to go the way I am." Stonge fumbled beneath his coat and brought out a bulging, oversized wallet. He worked the zipper opening and upturned the wallet over the desk.

A massive bundle of bank notes, tightly bound together by elastic bands, fell to the desk top. And with it came a sprinkling of two or three coins. They struck the desk with sharp, metallic sound, then dropped to the floor and rolled.

Bill bent down to look.

"Never mind. It was only change." Stonge's feeble voice was excited. "Count this money. We're wasting time."

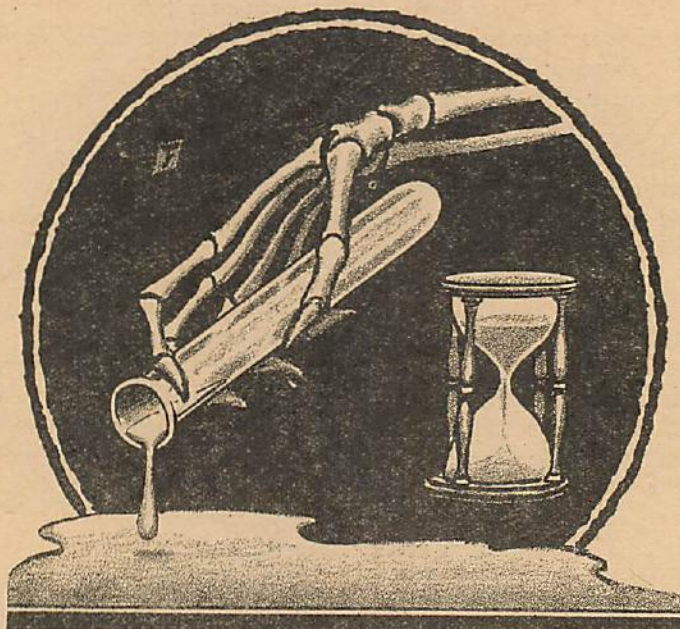
Bill saw that Sandy was on his hands and knees, his small face almost pressed to the floor, his eyes searching.

"Sandy," he said brusquely. "Take Mr. Stonge to the plane. Fix him up with a 'chute."

"O. K.," said the boy. He got to his feet, went to the door and held it open.

"Go with him, Mr. Stonge," said Bill. "I'll be along directly."

"It's all there, Barnes," the lawyer said. "Fifty thou-



sand dollars. Don't delay!" His hands were shaking visibly. He followed Sandy outside.

Bill hurriedly leafed through the heavy bundle of bank notes. They were all of one-thousand-dollar denomination. He counted fifty, picked up the stack, went rapidly to his secret study and, opening the steel vault, put the money inside.

By the time he reached the Stormer, Max Stonge was seated in the rear of the amphibian's tiny cabin, parachute harness strapped to his body, a flying helmet on his head. He gestured to Bill to hurry.

The members of Bill's gang of aces crowded around. Shorty's face was gloomy. "So you're leaving?"

"Yes," said Bill. "You look after Drake. Keep in communication with the field. I'll do the same."

He shook hands all around, then swung up into the pilot's office. He settled himself, pulled on a fur-lined helmet, plugged the ends of the dangling wires into the radio panel and spoke briefly to Max Stonge over the intercockpit telephone.

"Ready, sir?"

The lawyer's reply was frantic. "Yes—yes—— Get started! Quick!"

Bill throttled down, released the brakes and, shooting a quick look to right and left, guided the ship off the apron. The throttle was rammed wide open. The Diesels thundered. The heavily laden Stormer picked up speed, fled down the runway, faster and faster. The field on either side blurred past. The wing flaps came down; the control stick came back—and the shimmering scarlet bullet rocketed for the heavens.

In the first half hour, Bill tried to talk to Max Stonge and received only monosyllabic replies. The lawyer was hunched up in his seat, his gloved hands clasped

tightly together. His eyes were closed. Bill watched him closely in the rear-view mirror and felt a twinge of horror. The man looked very ill. Would Stonge ever live to reach Vienna? Would the race to save his life from the horrible brain growth be lost? Instinctively, Bill's hand went out to push the throttle to its last notch. It was a race against death.

The Stormer had climbed steadily to twenty-three thousand feet and there leveled off. The plane was hurtling ahead. The air-speed indicator quivered at three hundred and twenty. Bill talked back to the field repeatedly over the radio. Tony relayed the latest weather bulletins.

The pilot's face was grim. He was heading straight into the storm center. Yet, there was no other course. To try to avoid the raging elements, a detour would be a gamble, would cost thousands of extra miles and put too great a toll on the fuel supply. There was nothing for it but try to battle through.

The Atlantic Ocean below was obliterated by a churning blanket of clouds. Ahead, Bill saw blackness and stabs of crimson lightning.

And then, at nine forty-five, the Stormer hit the tempest. Daylight vanished. Rain, whipped by gale winds, slashed against the speeding plane. Bill hunched forward in his seat, his face demoniacal in the reflected light from the instrument board. His hand gripped the control stick like a vise. His feet were jammed tightly into the rudder stirrups.

The Stormer was thrown violently up on one wing, to fall in the next second into a wild side slip. Bill fought the machine into level flight, tugged back the stick. The altimeter needle swung higher. Still there was no relief from the storm. The glass of the cabin streamed with water. Hail rattled against the hatchways like a barrage of machine-gun bullets.

Bill snatched quick glimpses of Max Stonge. The man was clinging desperately to his safety belt.

And then, in the midst of the furious battle, Bill saw the red square on the radio panel blink into life. He threw the switch over. A blast of static roared against his eardrums. Through it he heard a voice.

"Calling B. B. . . . Calling B. B. . . ." Static again boomed.

Bill gripped the microphone.

"B. B. answering. . . . Go ahead. . . . B. B. answering. . . ."

The voice grew in volume. "Bill. . . . Tony speaking. . . . Something's wrong. . . . The police are here. . . . There's a man in the radio room . . . wants to speak to you. Urgent. . . ."

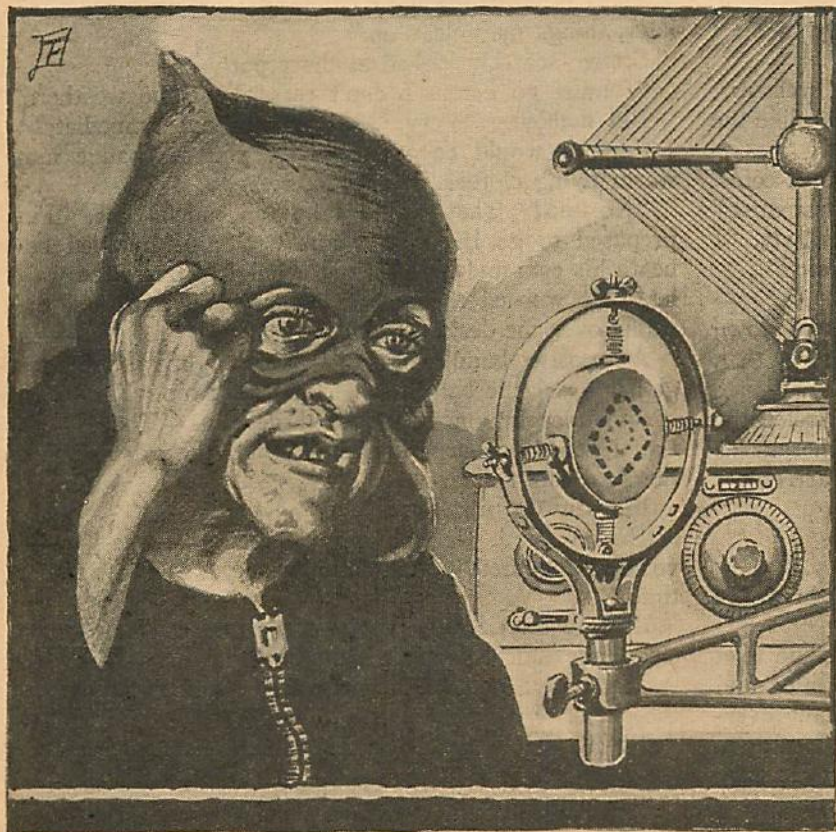
Bill's eyes were alarmed. "Put him on."

The ear phones rattled. Bill heard some one talking, could distinguish no words.

"Repeat. . . . Static bad. . . . Repeat. . . ."

He twisted his head, straining his ears. A far-away voice was saying:

"Dr. Carter speaking. . . . Health officer. . . . Return here immediately. . . . Extreme danger to you. . . ."



The husky voice was almost a whisper—

Your passenger, Max Stonge, is in the advanced stages of leprosy!"

IV—RETURN

LEPROSY!

Max Stonge—in the advanced stages of leprosy!

The word seared into Bill's brain. And with it came horror. Leprosy—the disease of decaying flesh, of body mutilation, of ghastly disfigurement. Leprosy—the plague of living death, of shame and exile. Leprosy—the very symbol of revulsion and uncleanness.

It was here in the Stormer's tiny cabin, within a few feet of him!

The monoplane reeled drunkenly through the storm, buffeted by cyclonic winds and Bill flew it by instinct alone. His whole being was surfeited with loathing. Max Stonge—a leper!

With an effort he pulled the microphone to his lips.

"You're sure of this?"

He could hear the voice at the other end clearer now. The bombardment of static was less frequent. Dr. Carter was talking. He caught snatches of what he was saying.

"No mistake. . . . Stonge's physician paid not to reveal facts. . . . Frightened and talked. . . . You must bring Stonge back. . . . Going to Dr. Lumsky in Vienna. . . . Leprosy specialist. . . . Useless anyway. . . . Just received word. . . . Dr. Lumsky dead, murdered. . . . Bring Stonge back. . . . Passport revoked. . . . Extremely infectious. . . . Keep away from physical contact. . . . Precautions against violence."

As the words vibrated against his eardrums, Bill shot a quick look into the rear-view mirror. He could see Max Stonge only vaguely in the dim light. The leper was straining forward against the safety belt, bracing himself against the pitching motions of the plane. But his eyes were staring at Bill.

Bill worked his automatic loose from his pocket, laid it in his lap, within easy reach. Stonge's extreme anxiety for a quick take-off was explained. Not only did he want to get to Dr. Lumsky as fast as possible, but he had been afraid of being caught by the health authorities and held. And now the attorney had seen him talking over the radio and was suspicious.

"I'll head back," Bill said. He spoke well into the microphone, even though he knew Stonge couldn't possibly hear his words above the raging elements and the roar of the engines. "In bad storm. Try to make it to field."

"Be careful." Dr. Carter's voice faded entirely under a blast of static.

Bill flicked the switch over connecting the intercockpit phone as the indicator showed that Stonge wanted to speak. His hoarse voice came through the ear phones and Bill involuntarily shuddered.

"To whom were you talking?"

"The field," Bill said into the microphone. "Weather report."

"Nothing else?"



—Bill sat motionless, held spellbound.

The Stormer hit an airpocket, dropped with the speed of a runaway elevator. It smashed against the layer of air below with a bone-breaking crash. Bill was thrown heavily against his safety belt. He held grimly to the controls. He didn't answer Stonge's last question. He was fighting his reeling ship with every ounce of his strength.

But the storm was helping him. He was instantly alert to his opportunity. Stonge would have lost all sense of direction. He wouldn't have the vaguest idea if they were flying east or west unless he came forward to look at the compass.

Bill didn't wait. Gradually he brought the roaring amphibian around in a half circle until finally the Stormer was speeding due west and back to America—instead of due east and toward Europe.

He watched his instruments like a hawk. Stonge remained quiet, scarcely moving. The hand on the clock on the instrument board moved slowly. Bill calculated his position again and again.

He made radio contact with his field and reported his progress. At ten thirty, Tony told him that Stephen Drake, the government agent, had arrived.

"He's waiting here for you. Anxious to see you. Been talking to Dr. Carter. Wants you to fly to Miami yourself."

It was right after that that Max Stonge's voice came again to his ears.

"Barnes, is there anything wrong? To whom do you keep talking?"

Bill's face was grim. The thought of the leprous creature within a few feet of him set his flesh crawling.

"Weather report. Trying to find a way out of this."

"Don't turn back," said Stonge. "We must go on." Fear was in his voice.

Bill's face was relentless. The man had to be taken

back. There was no breaking of any contract. The whole scheme had been misrepresented. Stonge had sent Varick out to the field to deliberately hoodwink him—to tell a false story. The agreement to fly to Vienna had been automatically broken when the news had come that Stonge had leprosy.

The Stormer was hurtling nearer and nearer to land, outracing the storm. Bill held the ship at a high altitude on a course dead on for the home field. Underneath, in never-ending succession, rolled a solid carpet of clouds, blotting out what lay below. The pilot regarded it eagerly. If the condition should continue, he would be able to reach the vicinity of the field without Stonge realizing that they had turned back. But, once the leper did catch sight of land, he'd know immediately that something was wrong.

The radio signal blazed crimson. Bill threw the switch over. A voice sounded over the ear phones.

"Calling Bill Barnes. . . . Calling Bill Barnes. . . . Calling Bill Barnes. . . ."

He replied quickly: "B. B. answering. . . . Go ahead. . . ."

He frowned in perplexity. The voice of the caller was a husky masculine rasp, almost a whisper—certainly not Tony's, the radio operator. Nor was it Dr. Carter's, the health officer.

It came again.

"Continue your flight to Europe, Bill Barnes. To return to America is to perish. This is the Black Ghost speaking."

Bill's fingers tightened over the microphone.

"What—who's that?"

"I am the Black Ghost. I have learned your secret wave length. I have listened to all your radio communications. If you bring Max Stonge back, you will forfeit your life. This is no idle threat. Mr. Stephen Drake, your friend, the efficient government man, will tell you that. Ask him about me." There was a shrill laugh. "Fly on to Europe and save your life. I sign off."

A sharp crackle jabbed Bill's eardrums, followed by a monotonous humming, and he knew that his mysterious caller had gone off the air. He sat motionless, clutching the microphone, sheer amazement holding him spellbound.

Suddenly Tony Lamport's voice cut in: "Bill. . . . Bill. . . ."

"O. K., Tony."

"I heard everything. I told Stephen Drake. It's serious. Can't explain now." The radio operator rapped out the words in shrill excitement. "Drake says to get back here—fast. And watch yourself. Prepare for any emergency. Get that?"

Bill's eyes were hard. "Got it."

They signed off.

The pilot hunched forward in the seat, searching the

skies ahead. A scowl darkened his face. The Black Ghost? Who was he? How had he ever obtained the secret wave length? Why was he so interested in Max Stonge? How did Stephen Drake, the government agent, figure in it?

A welter of questions swirled through his mind—questions that he couldn't attempt to answer. Stephen Drake held the secret to it all. The government agent had planned to leave for Miami with Shorty. Then, suddenly, he had changed his mind and was waiting at the field for the return of the Stormer. Why? The reason must have been Max Stonge.

Bill shot a quick look at Stonge in the mirror. The leper was staring suspiciously at him. Despite the eerie warning of the unknown Black Ghost there was only one course to follow—and that lay back to the field. Death was threatened either way.

The minute hand of the clock on the instrument board steadily advanced as Bill held rigidly to his course. The Stormer arrowed on and on, the Diesels hammering out smooth thunder. And the layer of masking clouds underneath remained unbroken.

Bill never relaxed his vigilance. Menace crowded in on him. He felt the hair at the base of his neck crawling and his hands grew damp.

It was precisely eleven fifteen, when he estimated that they were over Long Island. And he saw with satisfaction that the tumbling, white vapors still blanketed what lay below. Suddenly Bill went rigid, his eyes staring. Ahead, on the smooth cloud surface was the small shadow of an airplane.

He leaned back, shot a searching glance up through the hatchway. And then he saw it.

Thousands of feet above, and almost in line with the sun, was a biplane. It was painted white. It was flying in the same direction as the Stormer.

He had only a fleeting glimpse of the plane for, without a trace of warning, the speeding Stormer once again dropped into an air pocket. It landed heavily on a firm layer of

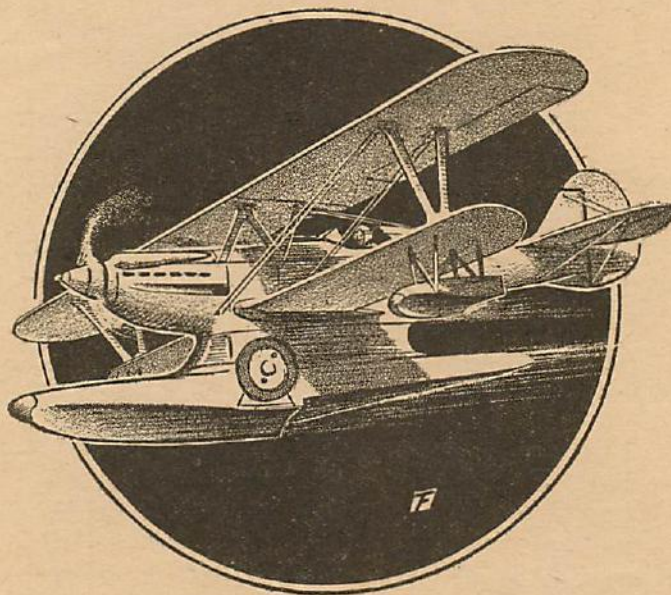
air, was thrown roughly up on a wing tip and side-slipped dizzily.

Bill fought the controls. His eyes were glued to the instrument board and he didn't realize, for the moment, that they had plunged straight through the cloud formation and that land showed below. It was only after he had wrenched the plane into level flight that he glanced down and gasped.

A voice was coming over the ear phones to him and something hard was pressing into the small of his back.

"Barnes! We're over land!" It was Stonge. A steely quality had crept into his voice. "I got a gun in your back, you double-crosser!"

Bill's hand snaked instantly into his lap where he had



placed his automatic and discovered, with dismay, that it wasn't there. In the last wild plunge of the Stormer the weapon must have slipped to the cabin floor. He reached down, his fingers groping across the flooring, and couldn't find it.

Stonge was talking wildly. "You've brought me back! You've tricked me! Take me to Vienna—or I'll kill you!"

The Stormer was streaking across Long Island, heading in the direction of the field—racing closer and closer.

Bill's brain was whirling. He forced calm into his voice. "Blown off course. Had to come back," he said, fighting for time. "We'll have to land and wait until the weather clears."

The gun pressed harder. "You lie! They told you about me—over the radio. They told you to bring me back." Rage strengthened the diseased man's voice. "You'll never land me here. I've got your gun. It slid back here. You haven't a chance. Head east! Don't try any tricks. I'm watching the instrument board over your shoulder."

Bill felt cold sweat break over his body. It wasn't the threat of the gun—it was the feeling of the leper's hot breath on the back of his neck.

And again he played desperately for time. "I know you've got leprosy, Stonge," he said. "Got a radio report. There's no sense in your going to Vienna now, anyway. Dr. Lumsky's been murdered."

He heard the leper gasp. His voice became a whisper of terror. "Murdered! Another one! The Black Ghost has killed them all. No one can cure me now. Lumsky was the only one left." The whisper suddenly twisted into a snarl. "You lie! Lumsky isn't dead. Damn you—turn east!"

Bill didn't attempt to alter his western course. "There's a doctor waiting at the field. He'll help you. He'll—"

"Fool!" the leper screamed. "No one can cure me now. No one in this country. The Black Ghost killed all of them who might have saved me. He promised I'd die. Lumsky is the only one. Take me to Vienna!"

"We'll land first," said Bill, his eyes searching the land ahead for sight of his field. "We'll refuel and start out again. Take it easy."

Bill felt the pressure of the gun leave his back. He shot a quick glance into the mirror. Stonge had opened the hatch over his head, had unfastened his safety belt and was crouching down, his gun leveled.

"I'm going to kill you, Barnes." The leper's words dripped with venom. "You'll never hand me over to the authorities. I'm going to shoot you and jump."

Bill, in that instant, caught a glimpse of the field. The Stormer was sprinting closer.

Stonge tugged off his helmet. The scarf had fallen from the lower part of his face and Bill saw that his chin and lips were massed with running sores.

The leper's gun was aimed at him. The man had dropped the microphone. There was madness in his eyes. He was saying something—something that Bill couldn't hear above the roar of the engines.

He was going to shoot!

Bill didn't wait. He kicked the rudder bar sharply, threw the stick over and ducked. The Stormer whirled over in a lightning-fast barrel roll. The gun blasted out a wild shot as the leper was thrown heavily against the top of the cabin. He went halfway through the open

hatchway. Bill twisted in his seat, tried to reach back to grab the man's legs—and missed.

The Stormer whirled right-side up just as Stonge was thrown clear of the plane.

V—DEATH DROP

STONGE FELL as if shot from a cannon.

Bill had a fleeting glimpse of him whirling head over heels—and then he was whisked from sight. The pilot crowded close to the side window, looked down and again caught sight of the man far below, already a small, shapeless mass.

Bill was aghast. He hadn't intended throwing the leper out; had merely meant to disarm him. Stonge was equipped with a parachute, but would he use it? Or would he seek instant death rather than live to die a lingering one?

The Stormer's speed had carried it almost over the airport. Bill brought his ship around on a wing tip, headed back as the signal light on the radio panel blazed. He snapped the switch over, heard Tony's voice shouting:

"Bill. . . . Bill. . . . What happened?"

The pilot's eyes were riveted on the now barely discernible figure of the falling man. Then—something white puffed up and became a white circle, dime size. Stonge had pulled the rip cord. The parachute had opened—and not a moment too soon. It was close to the ground.

Bill rammed the control column forward and bellowed into the microphone:

"It's Stonge. . . . Get some one down there where he's going to land! Hurry up!"

The amphibian was plummeting down in a wild power dive. The altimeter needle blurred. At two thousand feet, Bill eased the stick back and continued down in a wide spiral. He shot a searching look back at the airport and saw toy-sized cars sprint out from the main entrance and head north down the highway.

The Stormer was within two hundred feet of the ground when it came level with the parachute and its human cargo. Bill flattened out and circled. He could see Stonge clearly. The man was hanging limply in the harness and in his right hand he still grasped the revolver.

The wind was strong and was blowing the parachute rapidly across flat, open country toward a line of wire-conveying telephone poles that bordered a narrow, dirt road. And Bill realized, with a start, that at the rate the parachute was dropping it was likely to run foul of the wires.

Tony's voice again jabbed through the ear phones. "Two police cars and a police ambulance heading out, Bill. Stephen Drake's with them."

"O. K."

The parachute was moving nearer and nearer to the barrier and dropping steadily. Bill banked his machine around, roaring back overhead. He saw, in that instant, that the billowing umbrella was too low to possibly avoid hitting the wires. He waited, holding his breath. And then it happened.

The taut, air-filled dome of the parachute smashed straight into the obstruction and collapsed like a toy balloon pricked by a pin. The great silken mass sprawled over the wires in a twisted tangle. The shroud lines became snarled. Stonge, in the harness below, was jerked violently by the sudden stop and then swung

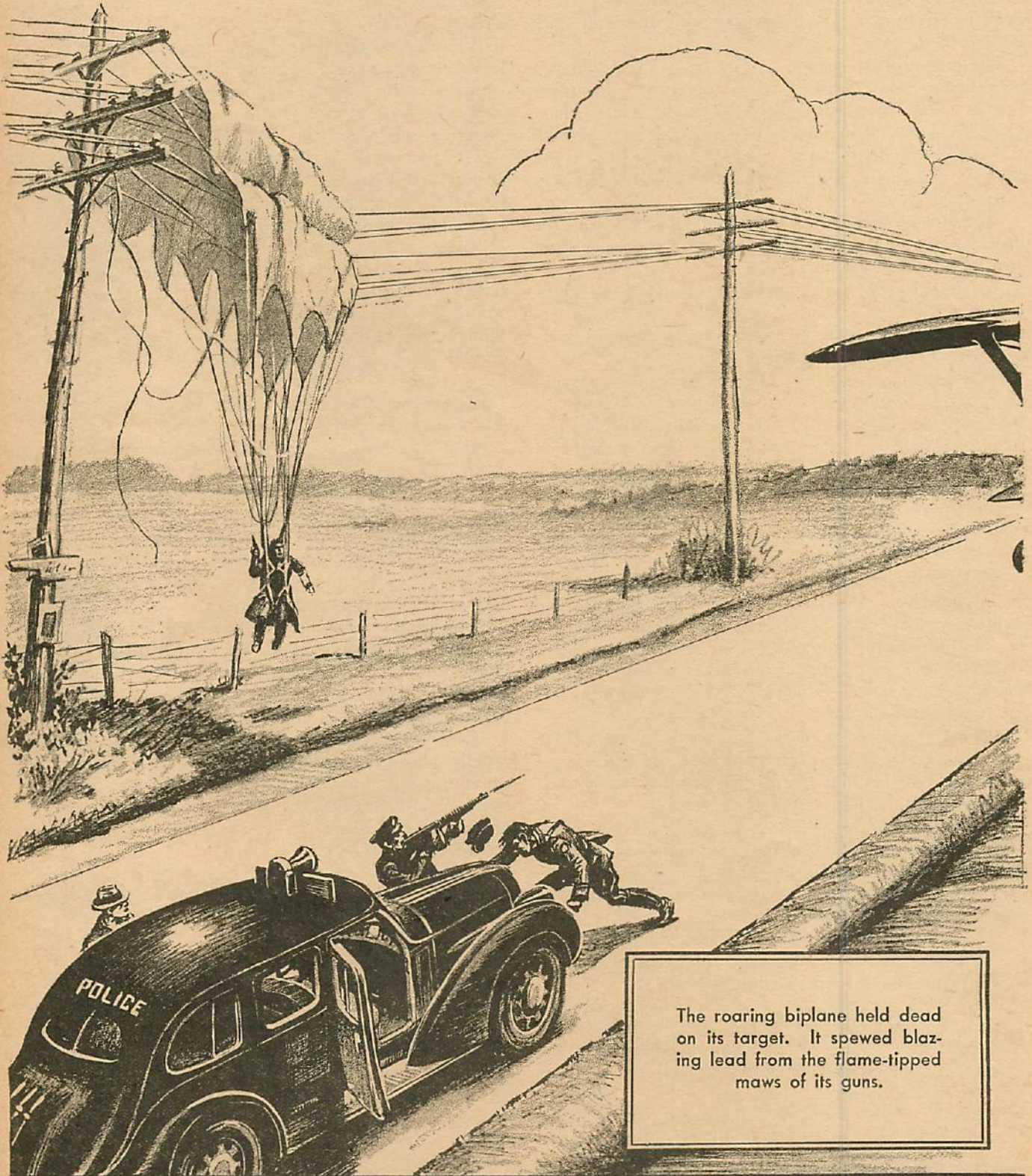
helplessly, suspended halfway between the wires and the road beneath.

Bill received a fleeting impression of the police cars turning sharply off the highway and racing down the dirt road, columns of dust churning up in their wake. He closed the throttle, dived the Stormer over the road and went down for a fast landing in the field beyond. He rammed on the brakes, snatched off his helmet, and vaulted to the ground. As he started across the field, the police cars and ambulances came to a hurried stop

a hundred yards from where the leper dangled in mid-air. Stonge was pulling madly at the shroud lines, struggling to free the wire-entangled parachute.

Two men leaped from the first squad car. One was a uniformed policeman. The other was in civilian clothes and Bill recognized him from the distance as Stephen Drake, the department of justice agent. They started toward Stonge.

Bill was running madly across the stubbly field. Suddenly he saw Stonge's right arm jab out. He heard the



The roaring biplane held dead on its target. It spewed blazing lead from the flame-tipped maws of its guns.

sharp explosion of a fired gun; saw smoke coming from the revolver in the leper's hand.

The policeman staggered, fell.

The lawyer was screaming: "Go away! I'll kill you all!"

Drake had grabbed the fallen policeman by the collar, jerked him behind the squad car. Crimson flared again from the leper's gun.

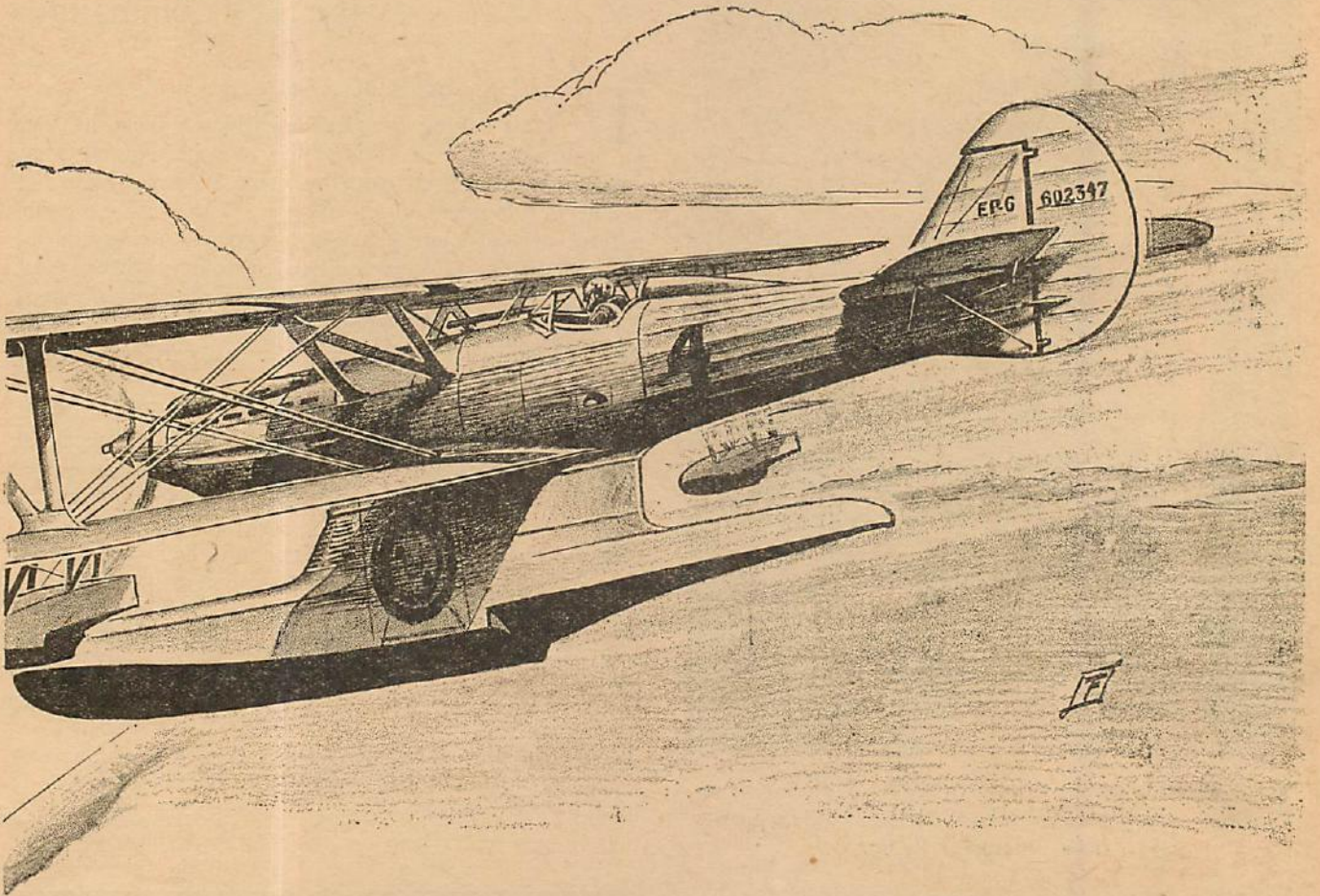
Bill put extra speed into his pumping legs. He heard Drake shouting orders.

"Don't shoot him! Get him down alive! Aim for the shroud lines!"

VI—FLAMES

THERE WAS no time to think, only to act. Bill bellowed a frantic warning and threw himself wildly into the ditch. He landed heavily, half rolled over. He received a flashing impression of policemen diving to the road beside the cars; of one of them swinging up his submachine gun; of Stephen Drake yelling unheard orders; of the leper twisting frantically around in the parachute harness; of the biplane coming like a meteor.

Everything was in split seconds. White ribbons of tracers and blazing lead were spewing from the flame-



The second squad car had disgorged two men. One carried a submachine gun. He crouched down, shielded by the car, and opened fire. A burst of bullets slashed through the air above the suspended leper's head and pumped into the jumbled silken mass of the parachute. Three of the shroud lines snapped. But the grotesque figure did not fall.

Stonge was shouting and cursing. He fired again and again—wildly. Slugs from his revolver smashed into the first police car, drilled through the windshield.

Bill, the breath tearing at his lungs, reached the roadside. Above the crashing of the guns he suddenly heard a steady drumming. It became a deep-throated drone. It welled into a roar.

An airplane engine!

He looked up, looked past Stonge's dangling figure—and ice shot through his veins.

A biplane, painted white, was streaking low across the fields, pelting headlong for the little group on the road—and its guns were streaming fire!

tipped maws of the plane's guns; were drilling through the air straight at the helpless Stonge. The enemy pilot's aim was deadly. In the twinkling of an eye he was within range.

Bill saw the leper's mouth gape open in a scream of terror; saw the streams of bullets pump into him; saw his body leap in one convulsive movement; saw the man's features obliterated in that frightful moment as the head was smashed in; saw the entire figure bathed in a sudden torrent of crimson blood.

The roaring biplane held dead on its course, its yammering guns pounding the lawyer's body to an unrecognizable pulp. And then, at the last possible second, when it seemed that the plane would hurl itself at its slaughtered victim, the enemy pilot jerked the stick back. The white ship zoomed straight up, its undercarriage barely clearing the wires.

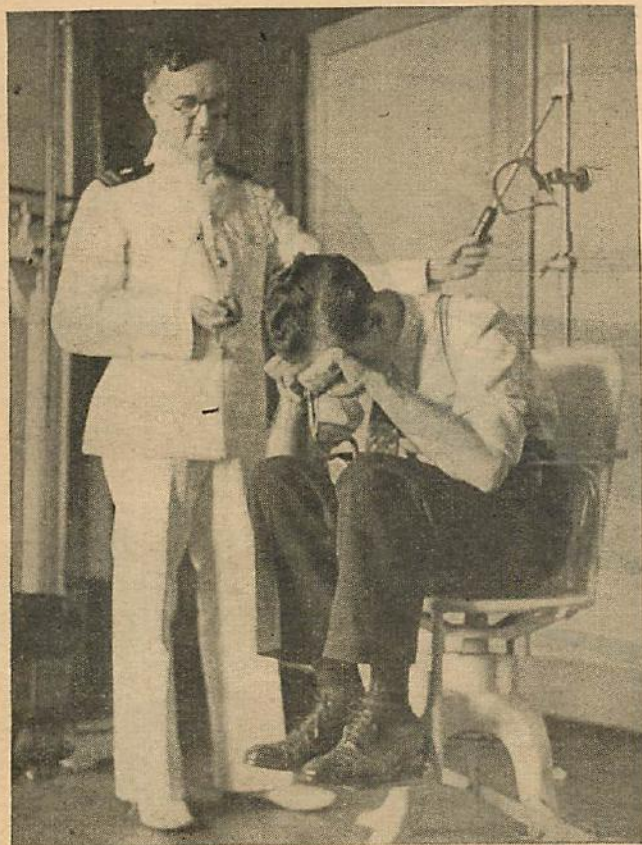
And then it was gone, in a blur of white, its engine screaming, tearing madly up for the protection of the cloud blanket from which it had come. (Turn to page 44)

How the NAVY PICKS

*Exclusive photos
by KEYSTONE*

*Do you want to
flier? Here's*

by Lt. Commander



1 Ten seconds in this revolving chair tell the medical examiner a great deal about the candidate's probable fitness for flying.

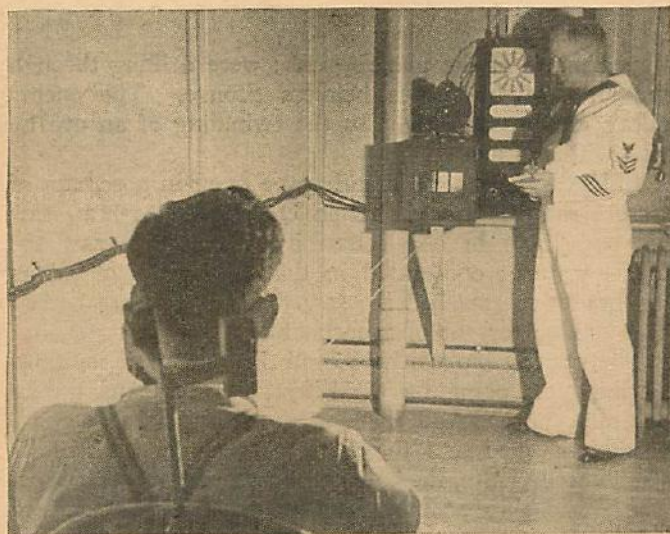
THE United States navy wants fliers.

It is taking qualified candidates from its own ranks and from civilian life, and it is giving them aviation training that can't be surpassed anywhere.

The development of the navy's flying staff is an important part of a great five-year expansion program for the entire navy. Many millions of dollars are involved. The air fleet will be built up to the full treaty quota of 2,184 planes, and the flying personnel will be increased some 27 per cent. Three new aircraft carriers are being made ready, the *Yorktown*, *Enterprise*, and *Essex*, reported to have a capacity of over a hundred planes each. The Philadelphia naval aircraft factory will be developed, and the Pensacola air station and school will be expanded to accommodate the new pilots who will be trained.

How would you like to become a navy flier? You can, if you are one of the exceptionally lucky young men who can pass the strict standards and tests that the navy sets up. You will have to meet stiff competition, for there are thousands of applicants, while the classes of cadets sent to Pensacola number only about 500, and of those only some 70 per cent are able to reach graduation.

The first step is to check your qualifications against the requirements. If the result is discouraging, don't be downhearted. There may be a place for you in aviation elsewhere. If you are too young, perhaps your age



2 A watchful sergeant notes the errors made in judging distance, tested by an indicator that the recruit operates with strings.



3 He knows that his future as a navy flier depends on whether he can move the two little sticks to the correct position.

Its PILOTS

*become a navy
how, as told*

George O. Noville

is an advantage. You may yet have time to fit yourself for the desired job.

Civilians, enlisted men of the navy, and members of the naval reserve are eligible. You've got to be a citizen, unmarried (and remain so during active duty), and not less than 18 nor more than 28 years of age at the time you receive your appointment as aviation cadet. You must not be a member of any other military organization, with the single possible exception of the naval militia. You must be physically qualified, of which more later.

Educational standards are high. If you haven't a college diploma, you're handicapped right at the start. Any college diploma by itself, moreover, isn't the whole story. You should have satisfactorily completed a course in aeronautical engineering, if you want to get first preference. Lacking aeronautics, the next best specialty is mathematics. If you are not a college graduate with either of the above subjects to your credit, you should be prepared to prove, by documentary evidence and by examination if necessary, that you possess equivalent knowledge.

Education, however, is less than half the battle. You can have the world's best schooling, but it won't be of much use if you can't measure up physically.

The medical examination is very rigid. First it checks your general physical condition. Then it goes on to a more detailed inquiry into your various physical



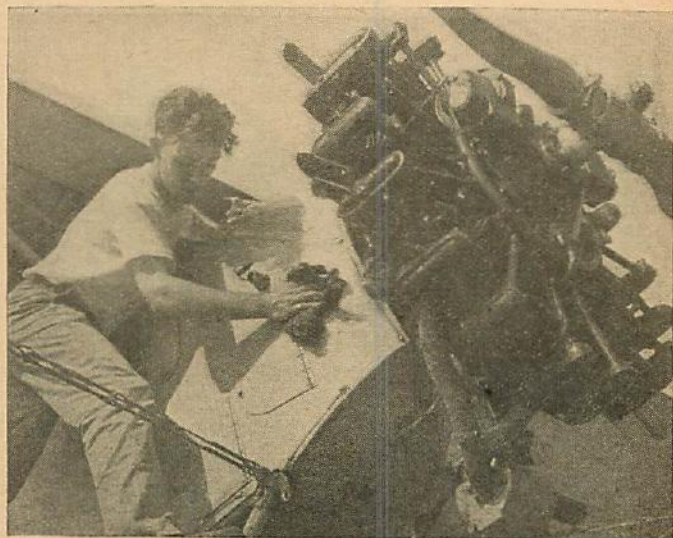
5 The flying instructor introduces his pupils to a light navy plane at Floyd Bennett Field, New York naval reserve base.



6 The recruits' barracks have a huge map—perhaps to accustom them mentally to large distances. Note Pensacola route marked.



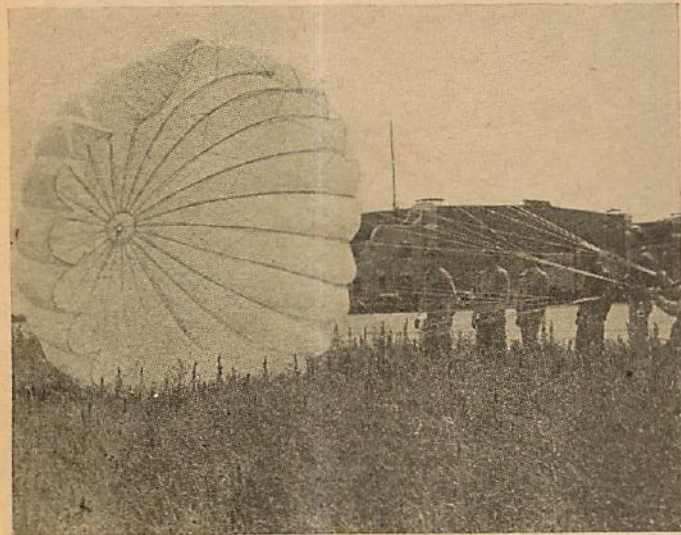
4 The severe eye test that is designed to reveal defects in vision utilizes the ophthalmologist's most elaborate apparatus.



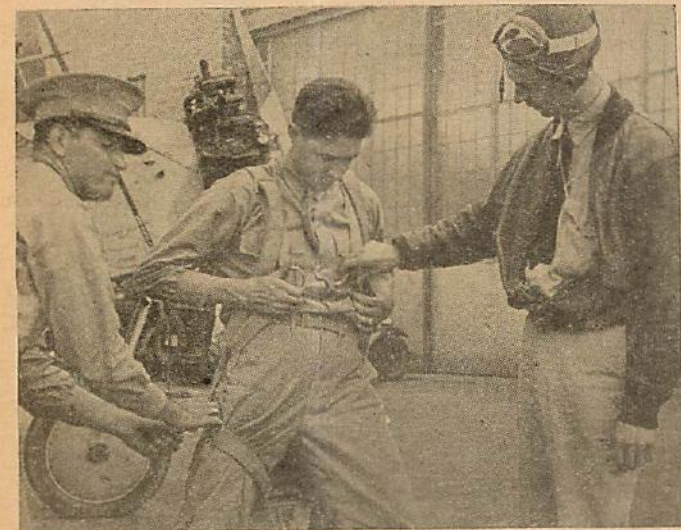
7 In somewhat closer contact with the ship, but still not flying. "Dirty work" is a good way to learn about airplanes.



- 8** Ground-school subjects like the Morse alphabet are not neglected, even during the one-month elimination flying course.



- 9** The parachute and its construction is demonstrated for the pupils with the aid of the wind from a plane's propeller.



- 10** Veterans assist the beginner to master the parachute harness, so that he will know how to equip himself for emergencies.



- 11** It's not so easy as it seemed to start a powerful airplane motor with a crank, so the instructor lends a helping hand.

qualities. Good eyesight, of course, is fundamental. Part of that, and of your hearing, is the necessary ability to judge distance and the ability to maintain a sense of balance.

Muscular and mental reactions are important, not only as indicators of general health, but in determining your fitness to meet the situations that a pilot must face.

The old three-dimensional "merry-go-round"—the dummy cockpit in which the candidate was whirled, pitched, turned upside down in separate movements and all at once—has been moved out of the office of the medical director into the amusement parks, where it more properly belongs. Modern knowledge has substituted a comfortable chair in which the candidate sits bent over while the examiner turns him around for a few slow revolutions. His success in straightening up when the turning stops tells whether he is fitted for the "unnatural" movements his plane will force him to make.

If you have survived the educational and physical requirements, you are enlisted as a seaman, second class, in the naval reserve for elimination flight training lasting about a month, at one of the various naval reserve aviation bases.

Elimination flight training, as its name implies, eliminates those accepted cadets who prove to lack aptitude for flying or who develop characteristics which indicate that they may not be good pilot material. The training is a regular beginners' course of dual instruction.

The course tests, in practice, your flying ability. It is probably the biggest hurdle in your path to a navy pilot's job. All the intelligence, education, and technical knowledge possible, plus perfect physical capabilities, are



12 That flying helmet with the head phones presses on the ears of the novice. It's a minor inconvenience that he will not even notice after a few weeks in the air.

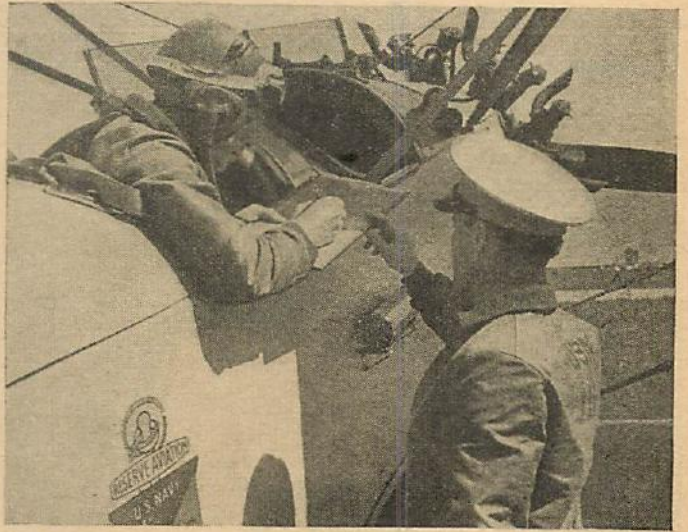
insufficient to get you by if you can't actually learn to fly.

During the elimination training, therefore, not much time is wasted on theory. Rudiments of related naval subjects are given, of course, such as the handling of parachutes and engines, radio, general drill, and even the complicated technique of tying knots in a rope. But emphasis is placed on getting into the air, usually for a total of ten or fifteen hours.

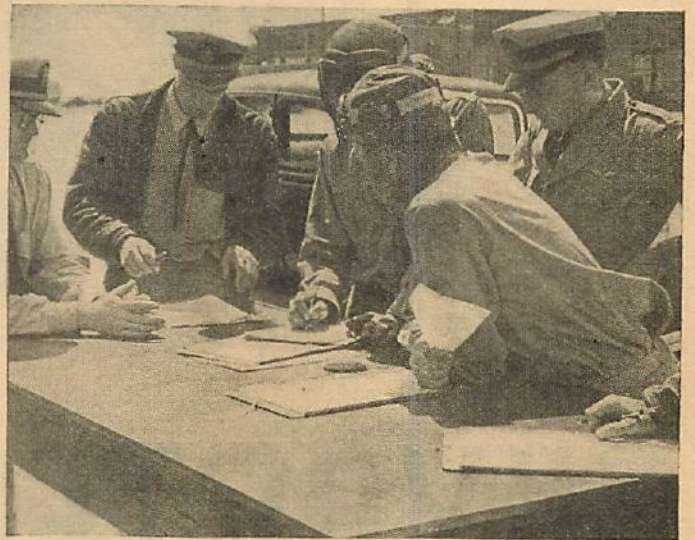
The end of the month's training decides whether the candidate is eliminated or whether he proceeds as an aviation cadet to Pensacola air station, the navy training center, for the 10-month course in primary and advanced flying. You have a good chance of reaching your goal as a pilot once you are on your way to Pensacola, for two out of three cadets succeed in winning through to final graduation and subsequent assignment to active flying duty with the navy. The active-duty period may be as long as three years. At the end of active duty, the navy aviator is eligible for commission in the naval reserve, where he agrees to maintain flying efficiency in civil life by a regular amount of flying each year.

There, very briefly, is the road that must be followed by civilian applicants for a navy flier's job. If you want to try it, send to the commandant of the naval district in which you live for application blanks. Local inquiry or a letter to the navy department will inform you of the commandant's address.

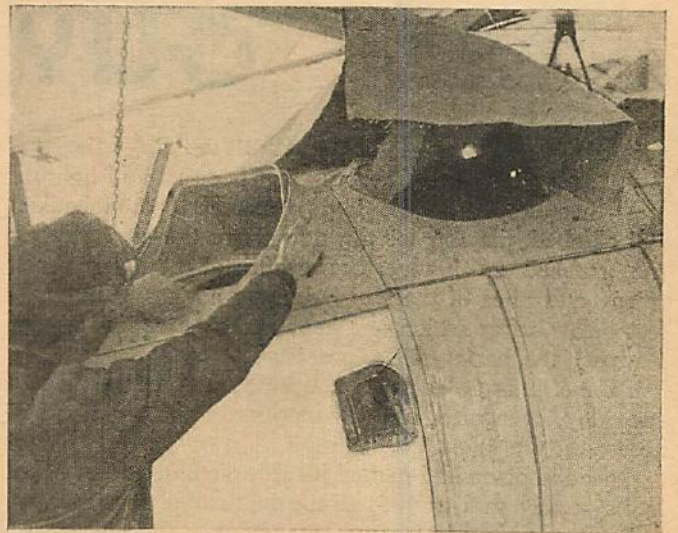
Naval training, finally, means more than glamorous flying with the fleet. It means preparation for a place in commercial aviation later. It means development of mind and body, and a whole new disciplined outlook—advantages that are lifelong.



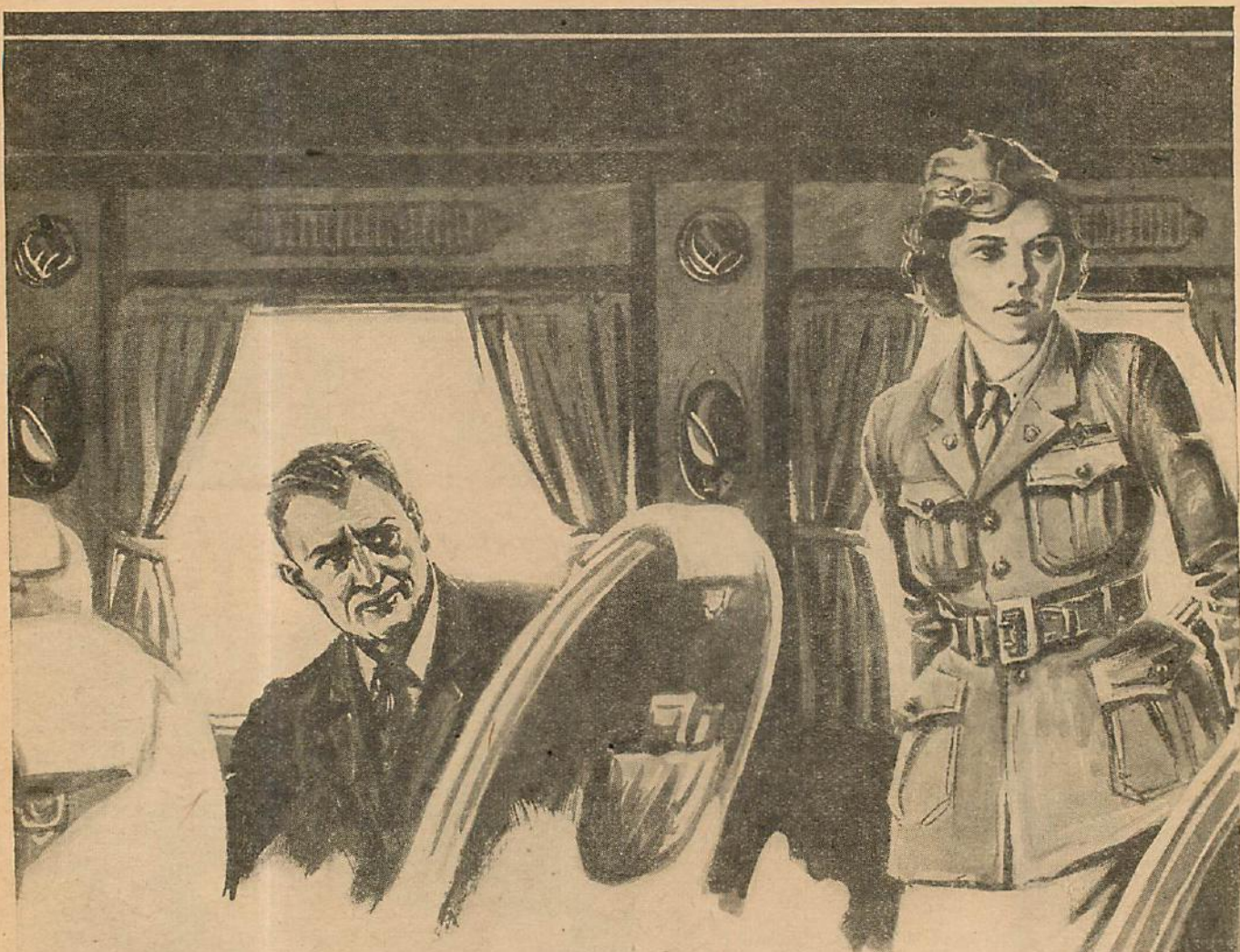
13 Ready to go, at last, as soon as the release slip is signed. Dual instruction soon brings out flying ability.



14 The "bookkeeping department" registers the time each plane and pupil spends in the air and the instructor adds his comments.



15 Night flying by day to test aptitude for blind flight ends the elimination training course. Then—on to Pensacola!



SKYROTECHNICS

by

GUY R. STREAM

AS USUAL, Connie retreated to the rear of the passenger cabin and sat gripping her seat and fighting her nerves as the big tri-motored plane banked and climbed, playing for altitude above the city. Twice she grabbed an inadvertent eyeful of swaying roofs, spires, and piles of the city buildings not many hundred feet below, after which she kept her gaze rigidly ahead, studying the backs of the passengers' heads.

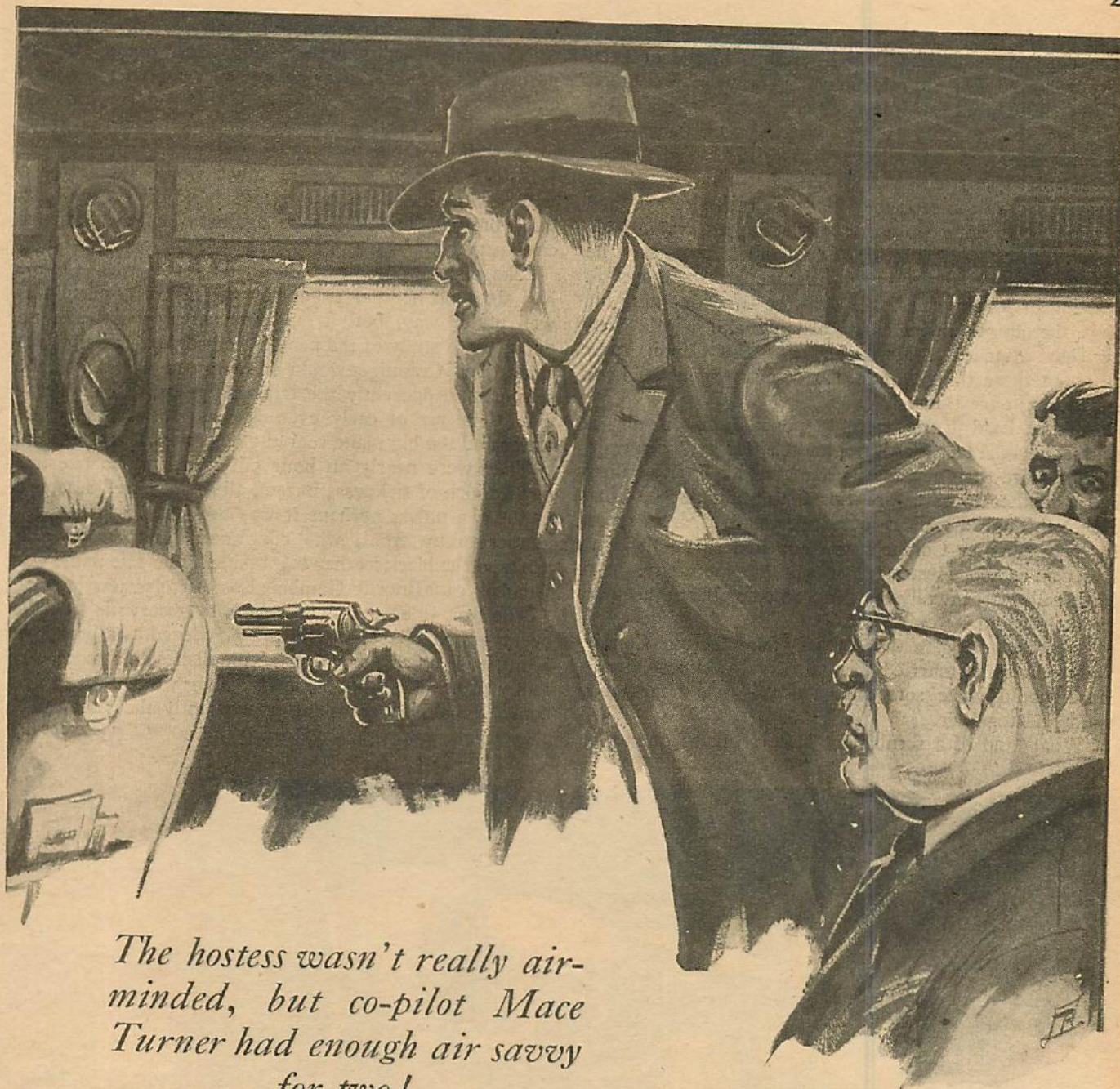
Take-offs and landings continued to get her down each day, even after six full months in the air as stewardess on the West Coast liners.

Once the plane had gained its altitude and settled down to its steady mile-and-a-half-a-minute clip, it was easy. One never thought of mountains, or even fog and storm, with Pilot Joe Riopelle at the controls. Everything steadied down then except for an occasional "bump"; there was plenty to do to keep the mind occupied.

New, odd symptoms cropped up in each day's "menagerie," as Joe called the passenger cabin. Fidgets, mild cases of hysterics, nerves and nausea, heart attacks and fits of feverish talking, and now and then some silly attempt at jumping overboard. A surcharged and colorful life, but Connie Morgan was never cut out for it, though up to now it was her secret alone.

Paradoxically enough there was nothing air-minded about the stewardess of the Los Angeles-San Francisco run, and never had been. Even now it turned her giddy to look down from a tenth-story window. But no one even suspected that, not even Joe Riopelle, or Mace Turner himself.

Mace had gotten her on with the West Coast Air Lines after all other work had failed. Of course, Mace, who had played with homemade planes and gliders instead of carts and velocipedes in boyhood, didn't dream



The hostess wasn't really air-minded, but co-pilot Mace Turner had enough air savvy for two!

"You're off duty for the night, sister," the man said.

of the rebellion of that "lame-duck" stomach of hers, and she had bravely refrained from talking about it. It was to be only for a short time anyway, until Mace got out of the ranks of co-pilots and was given a regular run.

The plane had gained its altitude now and leveled off for its straight run north. Connie, with no further need to look at gulfs and buildings below, had slipped into her work-time mask and become the essence of cool efficiency.

The scenes from the plane windows at this height were like particularly vivid canvasses; on her left a limitless blue seascape; on her right the tawny San Fernando hills rolling up to a back-drop of pastel mountains in the east.

Cool and blond, Connie passed down the aisle between the passenger seats, attending to a dozen small duties, apparently wholly intent upon her work, but her thoughts

were far away—back in Los Angeles with Mace and the problem they had carried all summer.

Being a substitute pilot among twenty or thirty other substitutes, Mace Turner had found, was about on a par with being a bat boy on a ball team, or the dummy in a bridge game. He was a good man in the air, super-trained, amply prepared for a full-fledged pilot rating—but so were all the other co-pilots.

At first he had been full of optimism, but eight months had gone by and he was still no nearer promotion than when he had started. No new runs were being scheduled, and illness or crack-ups seemed unknown on the West Coast Lines. Only once or twice a week was he called out for relief work.

A few weeks ago, however, a new cigarette had come out, and now Mace was sky-writing about it in spare time. Every day, twelve thousand feet up in a cockle-

shell fighting plane, he gave Los Angeles—and residents of a dozen surrounding towns—cramps in the neck as they followed his skyrotechnics. The pay was good while it lasted, but few knew the exquisite dangers of his job; how his writing had to stretch over twenty-five miles of sky, with capital letters more than a mile long; the suicidal speed with which he had to fly to finish his message before the sea winds obliterated it; how he had to stand on a wing tip again and again, to swoop back and dot an "i" or cross a "t" two miles back; how he had to avoid flying through his smoke streamers in crossing or looping his letters, all the time watching his dials, the gauges on his chemical tanks and a little writing chart attached to his dashboard. But Connie knew all about these things, and each day she spent an hour shuddering over them.

General hard times were responsible for it all, of course, plus the fact that Mace and Connie had been waiting for more than a year to get married. Each of them had a mother to care for—ties that could not be lifted except through a radical increase in both their incomes. In early summer Connie's new job had saved the day. Her pay envelope was still an absolute necessity. But Mace railed continually over the need for her to keep up the daily grind.

"We've got to give that job of yours the air, Connie. You're almost a married woman now." Almost always Mace would voice something on the rare hours they could find together.

"What kind of a scrub pilot have I turned out to be,

with my girl holding down the paying job of the pair?"

"Position, dear," Connie would banter bravely. "My position's practically ritzy, if any one should ask you—and so is the pay. Three thousand other girls are on the waiting list. Besides, we just couldn't make the grade for a while without both of us working."

"Don't I know it." And Mace would figure for a while with the desperate seriousness of twenty-four, until brought up as always against the hard wall of circumstance.

Like the accomplished stewardess she was, Connie had sized up her passengers by the time the plane was well under way, both from the passenger list and an unobtrusive study of the people themselves. No notables aboard, or Crannige would have tipped her off at the terminal. Apparently the trip was going to be an easy one. The air of early evening was smooth as lagoon water and the big plane roared along as steady as a train.

They were nearly an hour out now, but no one had had a touch of sickness; in fact, all seemed well seasoned to the air, unless perhaps it was the stout, white-haired gentleman up front, who continually gripped his seat arm and the black leather bag beside him. His name was Gombel, of Mintz & Gombel, Los Angeles jewelers.

The first rule for an air hostess to observe is to make every passenger feel as safe and privileged as a broker in his private office. Nothing accomplishes this more certainly than the sight of a comely young woman dressed in conventional black, strolling nonchalantly about the cabin, dispensing newspapers and magazines. (Turn to page 72)

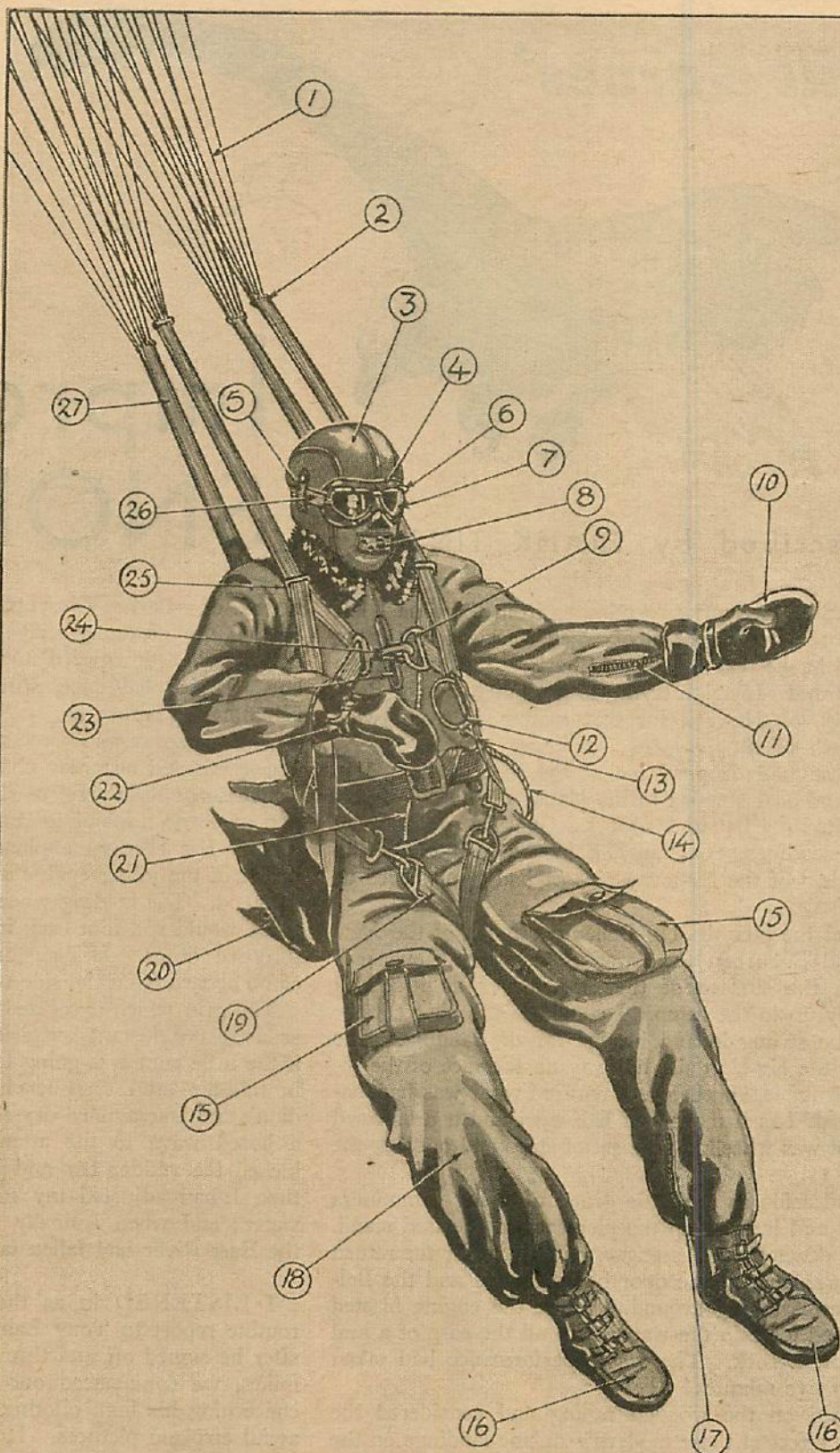


Mace, on top, seized every advantage.

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

PARACHUTE JUMPER

- 1 SHROUD LINES
- 2 ADAPTER
- 3 HELMET
- 4 RUBBER MASK
- 5 GOGGLE STRAP HOLDER
- 6 VENT ON GOGGLE FRAME
- 7 LENS
- 8 MOUTH OPENING IN ALTITUDE MASK
- 9 "D" RING OF HARNESS
- 10 FUR-LINED MITTEN
- 11 SLEEVE ZIPPER
- 12 PULL RING FOR PARACHUTE
- 13 RIP CORD
- 14 RIP CORD TUBE
- 15 KNEE POCKET
- 16 FUR-LINED BOOT
- 17 ANKLE ZIPPER
- 18 FLYING SUIT
- 19 PARACHUTE HARNESS
- 20 PARACHUTE PACK (OPEN)
- 21 SUIT ZIPPER
- 22 MITTEN WRIST STRAP
- 23 CHEST POCKET ON SUIT
- 24 HARNESS SNAP
- 25 HARNESS ADAPTER
- 26 GOGGLE STRAP
- 27 HARNESS LIFT WEBS



The Flier's Dictionary
BY
C. B. Colby

Bill Barnes'



Described by FRANK TINSLEY

Improved SNORTER

IT WAS just twenty-two minutes from the time I left my studio to the moment when I was comfortably seated in the rear cockpit of Shorty's Snorter. That's making time! Imagine trying to get out to Floyd Bennett Field, or Newark for that matter, in even twice that length of time.

The taxi had dropped me at the foot of East 31st Street; and as I stepped to the planks of the pier I solemnly lifted my hat to Mayor La Guardia and his new seaplane landings. Certainly, it looked to me as if the old problem of the far-away airport had been solved at last.

Beyond the pier the big Bellanca air bus of the New York and Suburban Line was cutting lacy ribbons of foam on the surface of the East River as it taxied gracefully up to the ramp. I could see the pilot cut the gun as he swung in and headed for the landing. The floats of the big ship slid halfway up the face of the inclined turntable, and before I realized what was happening, the air bus had made a half turn and a uniformed attendant was wheeling up a set of steps and opening the door.

I stood aside as the little group of flying commuters emerged and hustled up the pier toward the taxi stand. Another dozen or so passengers climbed in for the return trip. In an instant the door had slammed and the Bellanca was swinging around. When the engine blasted she slipped off into the water with all the ease of a seal sliding off a rock. The whole performance had taken less than five minutes!

I leaned on the wooden railing and considered the probable effect of these modern seaplane landings on the development of our air transport. In conjunction with high-speed amphibians like the new Sikorsky and Fairchild models, they might easily mean the substitution of speedy water craft for the Boeings and Douglas transports on many of the important routes of the major air lines.

As a pilot put it to me recently: "A passenger could be fifty or sixty miles on his way to Chicago in the time it took him to get out to the airport. And if he landed on the lake front at a similar base, he would have saved upward of an hour's time at present speeds."

My reflections ceased abruptly as the powerful *whoom-*

whoom of a Barnes Diesel motor smote my ears. I soon spotted the gleaming shape of Shorty's Snorter as it came diving downward toward the Manhattan shore line. He circled once, still going pretty fast. Then, fishtailing to reduce his speed, he struck the water with a cloud of spray and came roaring up to the float with that verve and accuracy characteristic of service pilots.

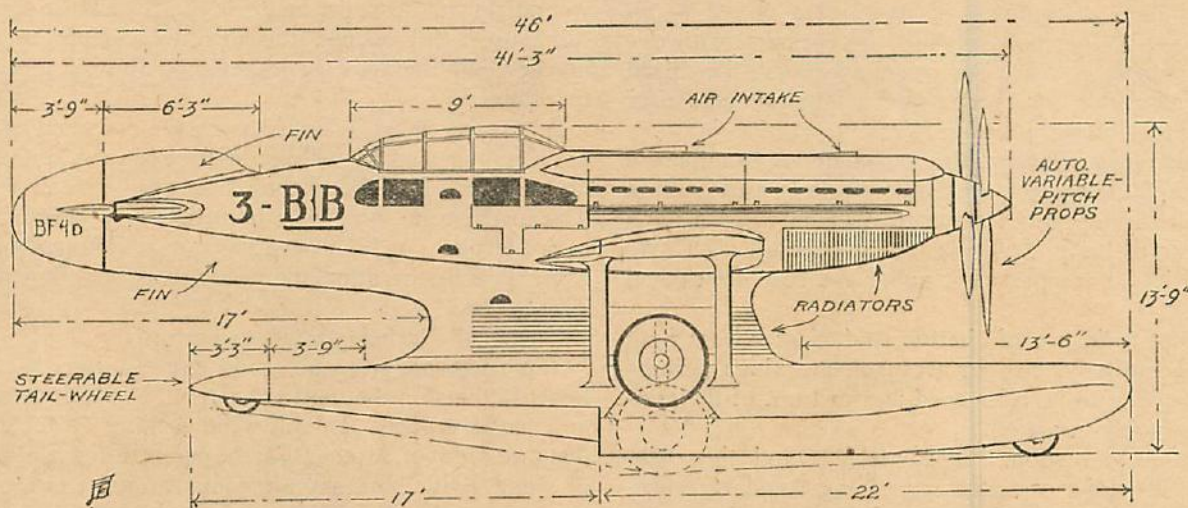
The squat little chief of staff of the Barnes organization made no attempt to run his sturdy ship up on the ramp. His shouted explanation reached me over the racket of the idling engine and I nodded to show I understood. The landing wheels projecting from the pontoons would roll him back into the water as soon as he throttled down. His gesture meant I would have to climb aboard from the side of the float.

The grin which decorated his face as I lifted my foot aroused my instant suspicions. I wondered uneasily if the little runt was going to wait until I was straddled in mid-air—and then let his ship drift! Luckily he didn't and I scrambled dry-shod into the rear pit. With a bored wave to the attendants on the pier, Shorty kicked the rudder bar and blasted the Diesel. By the time I had adjusted my safety belt, we were off the water; and when I finally plugged in the ear phones, the East River had fallen far astern.

I LISTENED in as the sawed-off pilot made his routine report to Tony Lamport back at the field; and after he signed off and threw the switch connecting our mikes, we commenced our usual kidding conversation concerning his bum piloting and my, according to him, awful airplane pictures. He has three originals on the wall of his room and keeps begging for more! We finally got to the subject I really wanted to talk about: the improved Snorter that Bill had been building as an attempt to find a ship that would step up his pilots' performances to something approaching his own speed in the proud Stormer.

"There's nothing new about it," Shorty grinned. "Outside of a new motor, a redesigned wing and some changes in the fuselage, it's the same old Snorter. Maybe she flies faster than she used to—and maybe all the outside wire bracing has been eliminated. So what?"

If I knew *anything* about planes, he went on—and



Plans show the redesigned Snorter scaled one-eighth inch to a foot.

hastily assured me that I didn't—I must realize that these extra things were mere details. In fact Shorty wondered that I had bothered to come out for a look at the crate at all; unless, of course, it was just to get a chance to ride behind a really first-class pilot—meaning himself.

I gravely assured him that at last he had hit on my secret ambition. By the time we had finished these little pleasantries that we always go through, the private airport of Bill Barnes hove into view and Tony Lamport was repeating the landing orders in his professional drone.

As we keeled over in a steep bank I could not repress a thrill at the sight of the gleaming ship parked on the concrete right below me. When the Snorter rolled to a stop in front of the hangars, I was out of the cockpit and headed up the apron before Shorty had his safety belt unbuckled.

Bill Barnes and Sandy emerged from the administration building as I passed, and together we approached the new Snorter. Martin, the chief mechanic, was ensconced in the forward cockpit, tinkering with the controls; several of his grease monkeys were busily engaged at various open inspection panels.

While Bill made a quick check-up on how the work was going, Sandy and I circled the ship, taking in her points. The kid pilot made it clear that the principal changes in the crate were the substitution of a double motor for the old Barnes Diesel, and a new type of amphibian landing gear.

This double Diesel, with its tandem arrangement of the engines and twin opposed propellers, had originally been installed in the Stormer, Bill's personal fighting ship. After considerable tinkering the bugs had been worked out of it, and what was originally a high-speed racing type had been husked up sufficiently to stand service use.

When the new Barnes transport was created, it was designed around two of these engines whose power output had been stepped up to around 3000 horses apiece. The big ship proved in speed tests to be almost as fast in a straightaway run as the old Snorters. This left the veteran two-seaters in the unenviable position of being the slowest fighting ships in the Barnes fleet.

Of course, they were still quite a few miles per hour faster than anything in either the U. S. air forces or the R. A. F.! However, Bill Barnes realized that his fleet was only as fast as the slowest unit in it and he determined to rebuild the Snorters around the new motor.

A glance at the reborn two-seater made me realize how far the science and technique of the aviation engineer had progressed in the last few years.

THE redesigned Barnes Snorter, now designated as the B. F. 4-D, is a low-wing, all-metal, two-place fighter. It is powered with the Barnes twin-Diesel motor, developing 3000 horse power at 20,000 feet. This power plant, similar in arrangement to that used in the "Macchi" Schneider Cup racer, drives two triple-bladed, automatic-pitch propellers which revolve in opposite directions, thus neutralizing torque. The engine is chemically cooled by means of radiators placed in the pontoon fairing.

The Snorter is equipped with a new and experimental type of amphibious landing gear consisting of a single float faired into the fuselage, and wing tip floats which retract into the thickness of the wing. A pair of air wheels are provided for ground landings, together with a steerable tail wheel faired into the water rudder, and a small wheel mounted in the forward end of the float to prevent the ship from nosing over when landing on rough terrain.

The main wheels are mounted on oleo shock absorbers and retract into wells sunk in the center section of the pontoon fairing. This landing gear arrangement is more flexible than the old one and has the added advantage of eliminating considerable head resistance.

The pilot's cockpit is set just back of the rear wing spar; and the wing stubs containing fuel tanks are cut in and tapered to increase visibility. The pilot is armed with two .50-caliber machine guns, set one on either side of his seat, within easy reach in case of jams. These guns fire through troughs alongside the engines. They are equipped with automatic ammunition counters and engine-driven synchronizing gear. The sight is a telescopic one of the standard U. S. air corps type.

The pilot is provided with a complete set of blind-flying instruments, including the Kruesi short-wave di-

rection finder. The radio installation is placed in an easily accessible position between the cockpits, with duplicate controls on each instrument board. The head sets are adaptable for use as intercockpit phones, after the standard Barnes practice.

The gunner, equipped with a complete set of duplicate controls and navigating instruments, is armed with a flexible Browning gun of .50 caliber, mounted on a track in the rear of his pit. The entire gun installation may be folded into a compartment under the rear deck when not in use.

A sliding inclosure of shatterproof glass covers both cockpits completely with an arrangement which permits the rear section to be telescoped forward out of the gunner's way when in action.

The fuselage section, immediately behind the cockpits, is utilized for the stowage of the standard emergency equipment with which all Barnes planes are provided.

The tail design is unusual in that the greater portion of the fin surface is carried under the fuselage, thus increasing to a large degree the field of fire from the rear cockpit. Both rudders and elevators are provided with tabs for adjusting the trim of the ship.

While I snooped around, admiring the features of this ingenious fighting ship, the mechanics finished their last-minute adjustments; and Martin, approaching Bill Barnes with a smart salute, pronounced the Snorter ready for a hop.

Bill motioned for me to slide my 200-odd pounds into the harness of a 'chute, explaining with a nasty grin that he wanted to try out the ship with a "full load." I didn't have any comeback to that, so I just looked dignified and ignored him—or pretended to, anyway.

Bill slid into the pilot's office and while the big, double-motor was warming up, we plugged in our head sets and I listened to a lecture on the various knobs and dials with which I was surrounded. Then the throttle moved and I watched the tachometer climb as the powerful Diesel roared and the plane struggled and quivered in an effort to jump the chocks.

AFTER satisfying himself that the big mill was grinding properly, Bill Barnes throttled down, waved the chocks away, blasted the tail around and we rolled down the diagonal runway into the wind.

I saw the duplicate wheel turning as the blond pilot

wound down the flaps, and felt the lift of the tail as it came up. Bill opened the throttle another couple of notches and the Snorter leaped into the air and began to climb.

As we ascended I looked over the side and watched the spinning landing wheels describe an arc as the bracing members folded and they swung up into their wells. The increase in speed was immediately perceptible and, as we leveled out high over the tiny relief map that was Long Island, the altimeter needle was hovering around 20,000 feet.

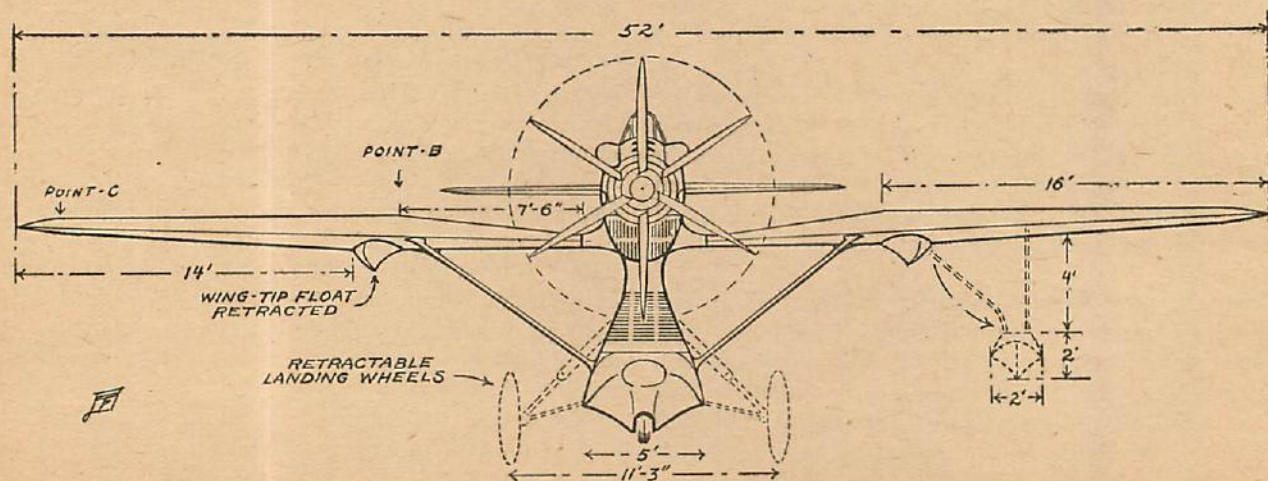
Then Bill Barnes started to perform!

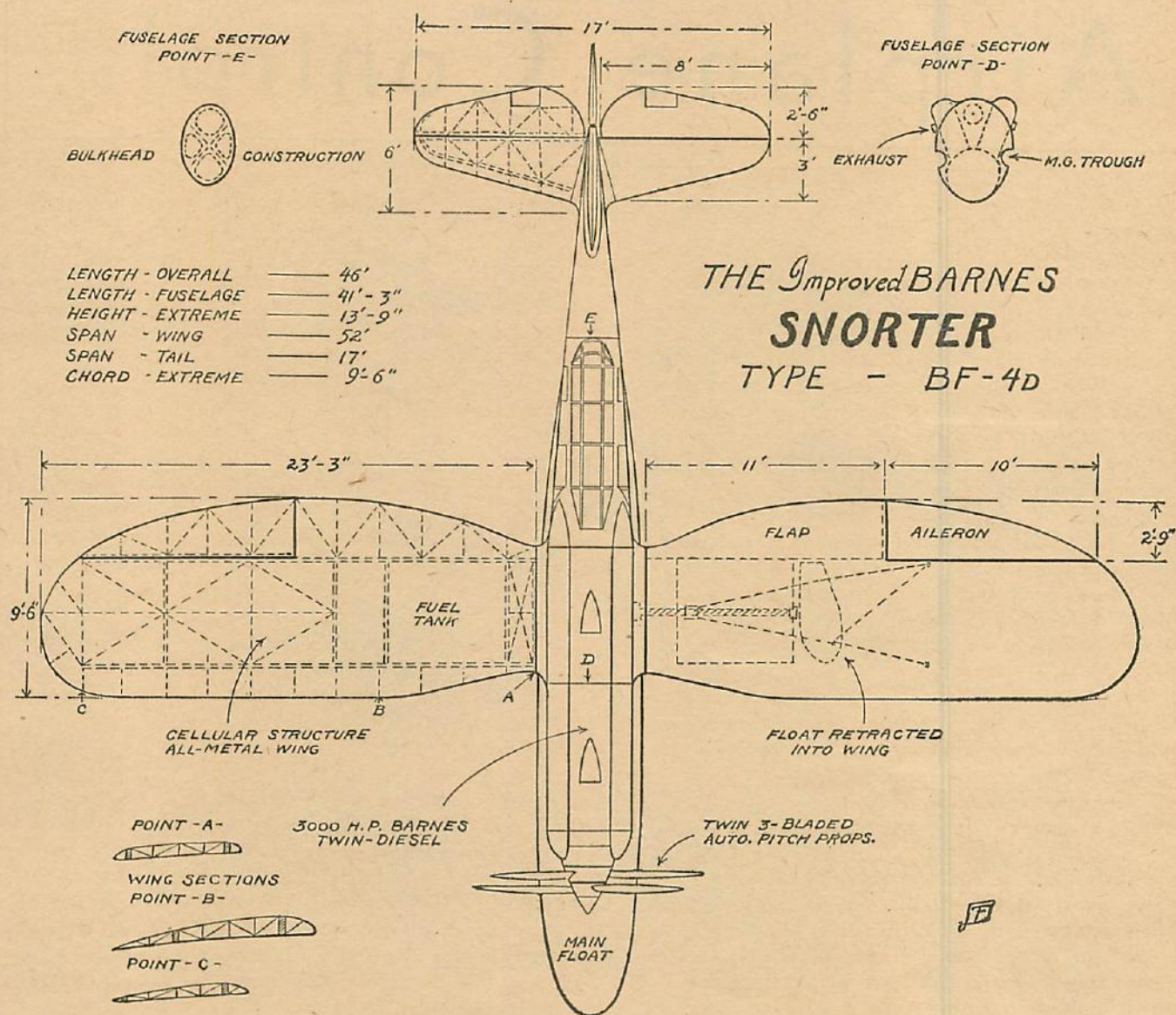
Don't ask me what he made that Snorter do. All I know is that for the next twenty minutes we weren't on an even keel once. I don't mind looking *up* for a long-distance view of Mother Earth, or even *down* at a bank of clouds with blue sky showing through; but when a guy who calls himself a pal forces me to look at the Atlantic Ocean stuck up vertically like a wall, with ships crawling over it like flies on a blue screen—I claim it's more than you can expect any ordinary stomach to stand! I told that to Bill later and all he did was to squint thoughtfully at my ample middle section and murmur dryly: "Did you say *ordinary* stomach, Frank?"

Be that as it may, I freely admit that I was glad to crawl out when the Snorter's wheels connected at last with the sandy soil of Long Island. But when Bill, looking a little thoughtful, asked me for my check notes on speed and performance in the air, all he got from me was a greenish and slightly silly grin. Notes were the last things I had been thinking about in the air.

There's no denying that the Snorter is a ship that can do things in a big way. At least, that's the way it seems to me. I didn't handle the controls, and Bill is never satisfied with anything short of perfection. But if you want to know all the details of just what she will do, I say to you very firmly: "Here are the plans! Go build one and find out for yourself. You'll find a ride in the remodeled Snorter pretty hard to describe."

Painted in yellow, black and red, her appearance is striking. Yellow is the dominant color, being applied to the cockpit framework, the sides of the fuselage, the lower three-quarters of the float fairing, and the top half of the float itself. Black is used as a frame for the oval yellow sides of the fuselage, curving back from around the nose along the top and the bottom, where it descends about a quarter way down the fairing, and spread-





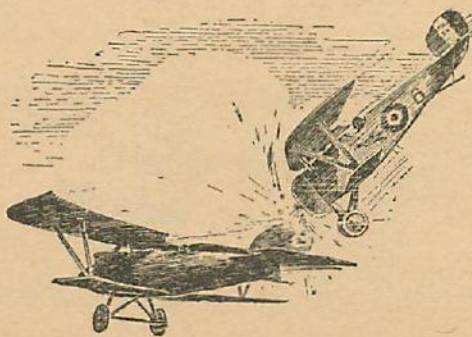
ing out a little on the upper and lower fin following the shape of the fuselage tail to a point. The wing struts are also black. Red covers the rest of the fin and rudder, and the wing-stub fuel tanks and air scoops, the spinner caps, the wheel disks, and the bottom of the float.

The only way I can graphically explain her performance is to tell you that she's the kind of ship that makes

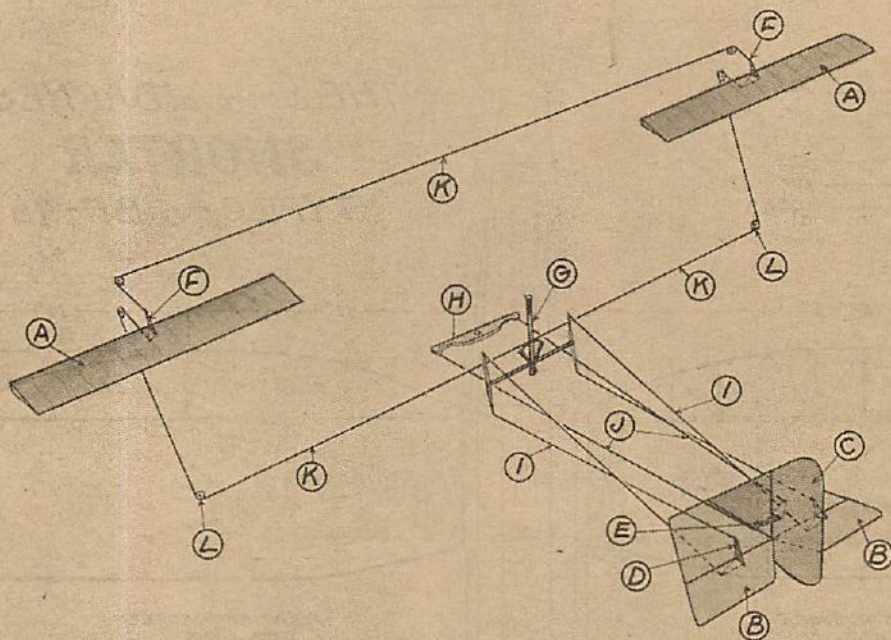
you say, "Oooooof! Whooomf! Eeerrrrrr—ooooop!" when she goes diving like a berserk comet through her schedule of tricks.

Think of the fastest roller coaster you ever rode on in your life. Multiply it by a million, add a 3000 horse power Diesel—lift it 20,000 feet into the air—and you're riding in the Snorter.

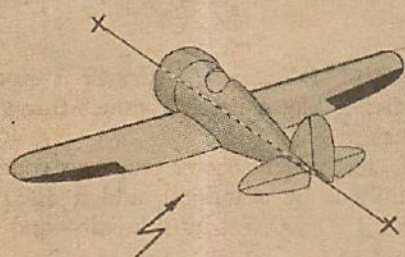
Wow! Hold your hat!



Airplane Controls,

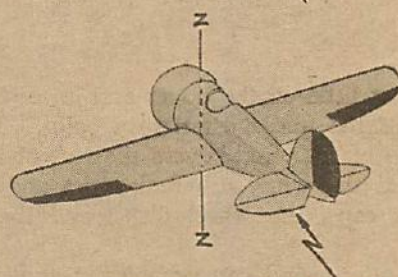
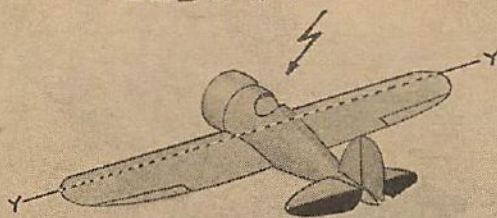


SIMPLE CONTROL SYSTEM OF AN AIRPLANE :
 A-AILERON, B-ELEVATOR, C-RUDDER, D-HORN
 ON ELEVATOR, E-HORN ON RUDDER, F-HORN ON
 AILERON, G-CONTROL STICK, H-RUDDER BAR, I-
 ELEVATOR CONTROL CABLES, J-RUDDER CONTROL
 CABLES, K-AILERON CONTROL CABLES, L-PULLEY.



X-X, IS THE
 LONGITUDINAL
 AXIS ABOUT
 WHICH THE
 SHIP ROLLS
 OR BANKS BY
 USE OF THE
 AILERONS.

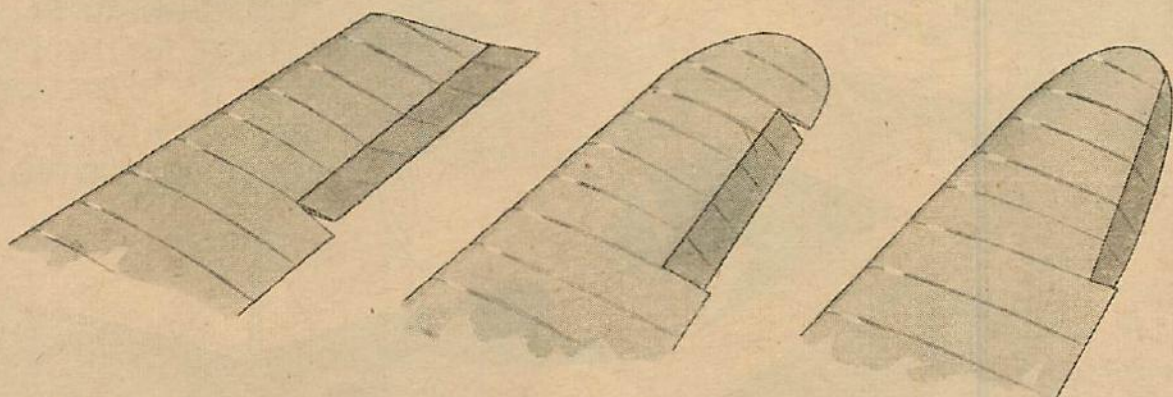
Y-Y IS THE
 LATERAL
 AXIS ABOUT
 WHICH THE
 SHIP PITCHES
 BY USE OF
 THE SHIP'S
 ELEVATORS



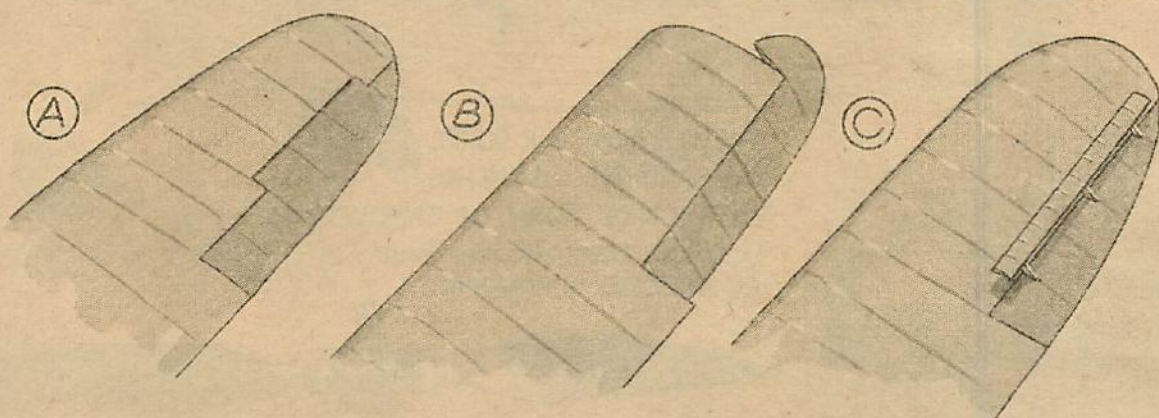
Z-Z IS THE
 DIRECTIONAL
 AXIS ABOUT
 WHICH THE
 SHIP TURNS
 BY USE OF
 THE RUDDER
 AND AILERONS

(CONTROL SURFACES USED TO MOVE ABOUT EACH AXIS SHOWN BLACK)

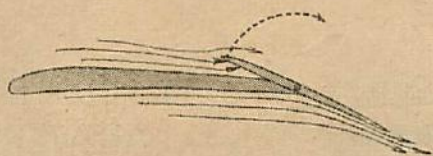
Axes, and Ailerons



THREE POPULAR TYPES OF UNBALANCED AILERONS. THESE TYPES ARE USED ON MONOPLANES AND ON UPPER, LOWER, OR BOTH WINGS OF BIPLANES



THREE TYPES OF BALANCED AILERONS. (A) - IS THE "DOVETAIL" TYPE, (B) - THE "OVERHUNG", & (C) - THE AUXILIARY.



PROFILE OF WING "B" ABOVE SHOWING ACTION OF THE AIR ABOUT BALANCING AREA. THIS HELPS PILOT MOVE AILERON AGAINST PRESSURE



PROFILE OF WING "C" ABOVE SHOWING ACTION OF THE AIR ABOUT AUXILIARY BALANCING AREA. THIS HELPS PILOT TO MOVE LARGE AILERON

IF—THE MODERN FIGHTING PLANE COULD BE FULLY SILENCED IT WOULD BE THE MOST DEADLY WAR WEAPON IN THE WORLD.

BUT

THERE ARE TOO MANY PROBLEMS TO OVERCOME BEFORE ALL NOISE CAN BE ELIMINATED.

THE EFFECT OF THE CAMOUFLAGE MAY BE NOTED EVEN IN BLACK AND WHITE

BELOW:—THE BRITISH FAIREY 3-F. FITTED WITH THE VOKES SILENCER—ABOVE 500 FEET THE MOTOR IS INAUDIBLE.

THE U.S. ARMY AIR CORPS HAS COMBINED SILENCING WITH A NEW FORM OF CAMOUFLAGE—THIS DOUGLAS OBSERVATION SHIP IS THE FIRST ATTEMPT AT COMPLETE SHROUDING.



THE PROPELLER IS THE MOST OFFENSIVE NOISE PRODUCER ON A PLANE. THIS MAY BE GREATLY REDUCED BY GEARING FOR SLOWER SPEEDS AND MORE EFFECTIVE THICKNESS IN BLADE DESIGN.

ENTRANCE FOR EXHAUST

START OF VANE

INNER CONE

OUTLET

OUTER CASING

IS THIS THE ANSWER TO THE GREAT SECRET?

THE BLANVAC SILENCER.

THIS DEVICE WORKS ON THE PRINCIPLE OF SMOOTHING OUT THE PULSATING MOVEMENTS OF THE EXHAUST GASSES BY CREATING A WHIRLING STREAM BY MEANS OF VANES SET IN THE SILENCER. THE CREATION OF THIS STREAM FORMS A VACUUM WHICH ABSORBS THE NOISE.

35 Arch
WHITEHOUSE

The Deadliest Air Weapon in the World

by
Arch Whitehouse

WHEN Hiram Maxim invented his famous Maxim silencer for firearms in 1908, the world gave him grateful praise. The harsh, uncomfortable explosion of guns had at last been eliminated. The public was thinking, of course, in terms of sporting rifles and target weapons.

But the minute that Hiram Maxim fired his first shot through an army rifle, which sounded only as a dull metallic pop, he realized for the first time what a terrible device he had invented. As a result, silencers have been made illegal in many parts of the world.

Ever since airplanes have been flown, the average man has been wondering why the motors are not muffled or even completely silenced. He argues that, like gun explosions, they are a menace to comfort. In answer, air transport lines have spent thousands of dollars soundproofing their cabins to make air travel less abusive on the ears and nerves.

That is admittedly only a half step. The real problem is to silence the motor itself without material loss in power, to reshape the propeller in order to kill the tip-speed whine, and to redesign the whole machine so that in the air all slip-stream noise is held to a minimum.

What then? Then you have your silenced plane, says the average man. Comfortable for travel and easy on the nerves of those on the ground. The Utopia of flight.

But suppose all these devices for muffling the airplane are suddenly transferred to the military plane!

It means that flights of bombers can attack without warning. It means that fighters and attack ships can slip up on their targets, strike a terrific blow, and get away before those below know what has really happened.

The power of the silenced military plane is too terrible to contemplate. It would render useless all the delicate anti-aircraft "listening" equipment. It would stifle every modern device for range finding. The silenced airplane, combined with modern high explosive, lethal gas, and high-speed gunnery, would be able to deliver a blow that might stop the most powerful military power in its tracks.

One wonders whether such a device has actually been invented. Suppose, for instance, that the United States army air corps possesses such a silenced ship. Suppose, also, that this machine has been painted in camouflage style so that it is almost impossible to see. There is no reason to imagine that camouflage has not progressed in efficiency since the war, as have other military measures.

All right, suppose such an air weapon has been devised and successfully flown. What would be the attitude of the air corps towards displaying it, or manufacturing it in great numbers? It is reasonable to believe that no such move would be made.

After careful testing and checking of every point, the

machine would be dismantled, we believe, and carefully stored away where it could not be touched until it was actually needed. No air official in his right mind would come out and state that his country had such a weapon. The risk would be too great. Too many men are involved who might be reached by a foreign power, and the plans would not be safe even if locked away in the secret vaults of some unknown fort.

Weighing all this then, we must admit that there is a great possibility that such a machine has been invented and probably flown. We who follow military aviation closely are struck by the fact that every so often we get word of a new device for muffling aircraft motors, but just as suddenly all news of it is cut off, and those who should know act as if no such device had ever been considered.

Nevertheless, the United States air corps has been testing many such devices. One was a muffler for a Curtiss 12-cylinder V type Conqueror engine mounted in a Douglas observation plane. At 8,000 feet, the plane could not be heard. Later on, when a new design in camouflage was added, the ship was not only silent at that height, but was practically invisible!

One naturally wonders whether silencing, so important for comfort in commercial planes, has not been sacrificed for secrecy about silencing military types.

Abroad, we hear of many new silencing devices. Recently in England a Vokes silencer was tried out on several military and commercial type ships. Those who witnessed the test declared that at 500 feet the motor could not be heard. On the ground, the engines were as quiet as high-priced automobile motors. The propeller could be heard, of course, and therein lies the greatest problem.

THE tip of a prop turning at 1,800 r.p.m., or about 30 times a second, creates a great amount of noise. If the propeller could be redesigned to do the same work at a slower speed, the noise would be reduced in proportion to the drop in speed. If it could be geared down to half speed and the blades changed in some manner to make up the loss of thrust, the sound would be greatly lessened. As it is, once a plane has been lifted clear of the ground and brought to its working height, the speed of the prop can be reduced materially.

The sound created by a propeller is actually caused by the whirling tips. The air through which they beat is an elastic medium; it attempts to close the gaps left by the blades. This attempt takes the form of vibration, the basis of all sound.

At high speed, and with two or more blades, this vibration is increased in intensity and the actual sound increases in proportion. Then, the (Turn to page 78)

Trail-Blazing for AIR TRAILS



by

Clyde Pangborn

WHEN a man ties up with something big and worthwhile, he likes to tell the world about it. That's the way I've felt about Bill Barnes-AIR TRAILS and its Air Adventurers, and that's why I recently made a flying tour of the country.

Talking about oneself is something else again. But down from headquarters comes word from Commander Carlson that I'm supposed to describe that trip. If you'll just regard this as a report by one Air Adventurer to the rest of the members concerning a club activity, I'll do my best to oblige.

The nice part of it is that it wasn't really *my* trip. It was intended to be a combination shakedown flight of the new Uppercu-Burnelli transport in which I expect to try a non-stop world hop this year, and a launching of our new AIR TRAILS Magazine. I was just there to handle the controls. Unfortunately, the long-range fuel tank installation in the big "Flying Wing"—part of the special equipment to be tested—wasn't ready in time. Rather than cancel our arrangements to meet club members throughout the country, we took off, one day late, on Wednesday, Sept. 12, in a red Bellanca Skyrocket. There were two of us, Mr. E. L. Robbins, assistant to the president of Street & Smith, and myself.

It was the Air Adventurers in the cities along our route who made the tour a success. I wish I could tell the rest of you about the whole trip in detail, but I haven't the space, so I'll just have to report the high spots.

From the moment we left Long Island until our return 28 days later, we were in the air almost every day. Our flight log shows landings at 49 places; on some days our wheels touched airports in as many as five cities. You see, we had a lot of visiting to do, and we had to do a lot of flying to keep up.

Heading westward, we stopped at Cincinnati, where we had time before nightfall to take up five Air Adven-

turers in a hop over the city—the first of many boys who flew with us during our tour.

Chicago gave us an overwhelming reception the next day—about a thousand aviation fans almost mobbed the faithful Skyrocket at the Municipal Airport.

Heading southwest, our favorable flying weather continued. At Kansas City, your wing commander had the unusual experience of having himself and his AIR TRAILS message broadcast by television! At Lincoln Air School, in Nebraska, we met a fine group of future pilots. Colorado showed us some striking scenery in Pikes Peak, standing against a blue, cloudless sky, and the famous Garden of the Gods.

The Grand Canyon, however, had a thunderstorm lying in wait for us, and California drenched us with a rain squall and then muffled itself in fog. Our radio was out of order, to make matters worse. We searched the mist-hidden Los Angeles valley for Grand Central Air-



Chicago gave us an overwhelming reception.

port without success. Just as we were about to give up and turn back for a desert landing, an opening in the fog uncovered Clover Field, where we landed.

Up the coast we journeyed, having our radio expertly repaired at Tacoma by Oren Jones, an Air Adventurer, and seeing some fine views of the coast's snow-capped

mountains. At Seattle, a big Boeing transport soared to meet us, carrying newsreel and newspapermen. We touched Canada at Vancouver and returned to Wenatchee, my home town, for a visit.

Then we headed eastward. We hopped the continental divide and got a foretaste of winter, cold weather and strong winds causing us to don our overcoats. Wooded mountains gave way to brown, barren plains. A rough tail wind booted us across Minnesota's hundreds of lakes. Over Lake Erie we met snow. After trips to Toronto and Montreal, we went on to Boston where we made our last guest flight with Air Adventurer members, and ended finally at Roosevelt Field October 9th.

It was a great trip. There were some disappointments mixed in, and to readers in Philadelphia, Harrisburg and Pittsburgh, which we had to skip, and in a few other cities where time or weather prevented us from making flights, I want to extend our apologies and regrets, and our hope for better luck next time. With your help, however, and with the help of others along our route, we have succeeded in spreading air-mindedness among a good many people and in blazing new trails for AIR TRAILS.

And now there's regular business awaiting us, namely:

WHAT'S YOUR QUESTION?

Question: Is there any advantage in sideslipping? If so, why? J. S., York, Pennsylvania.

Answer: Sideslipping has decided advantages in several situations. But first, let's make sure what we're talking about to avoid confusion. In nontechnical language, sideslipping is the sliding of a sideward-tilted plane *downward* to right or left; if the plane moves sideways while level, or if it is tilted and moves *upward*, the movement is called skidding. Skids and sideslips usually occur when the plane is being turned.

Pilots produce sideslips deliberately for a number of reasons. They sideslip to lose height quickly without picking up speed that they would get in a straight drive. They do it also to lose speed, because the change of direction kills much of the plane's forward momentum. Sideslips are handy—in fact, almost necessary—to offset sideward drift in landing across the wind. Finally, they are useful in stunting—the “falling leaf,” for instance, is simply a series of alternate sideslips—and in military tactics.

Question: Why do planes have wooden spruce ribs instead of chromium or steel? L. S., Stafford Springs, Connecticut.

Answer: The chief reasons in the past, I believe, have been light weight and manufacturing economy. At the present time, the former reason no longer holds true, because modern metals have been developed, such as aluminum alloys and stainless steels, that are practically as light as wood, and stronger for the same weight. As to economy, wood still has the edge, both in initial cost and in the ease with which it may be worked with ordinary tools in small-quantity production.

Metal is generally considered the better material for airplane construction, however, in almost every way. Probably wooden ships will be as obsolete some day as hot-air balloons.

Question: What is meant by aspect ratio? V. H., Ottawa, Ontario.

Answer: The aspect ratio of an airplane is the relationship of its total wing spread to its wing width or chord. In a biplane, the wing of the greatest spread is used. If the wing is a rectangle in shape, the aspect ratio is easily found by dividing the spread by the chord. If the wing is tapered or curved in outline so that the chord varies at different points, you divide the square of the spread by the wing area. You can see, therefore, that high aspect ratio indicates a long, narrow wing; low ratio, a short, broad wing.

Question: Can I get a pilot license before I am 16 years old? G. M., Memphis, Tennessee.

Answer: The government says that you must have reached your sixteenth birthday at the time that you make application; no exception has ever been made to that rule.

Question: What is the difference between an inside and an outside loop? T. K., East Norwich, New York.

Answer: A loop is a vertical circle. Assuming that at the start the plane is flying level and right side up, the pilot can loop in either of two directions: upward, in which case he finds himself circling with his head pointing inside toward the center, or downward, whereupon his head points outward from the circle he is following. That illustrates the two kinds of loops, although the circle's direction really has nothing to do with it, because you can make an inside loop by going downward, too—if you are flying upside down when you begin! It's whether the pilot himself rides inside or outside the loop that makes the difference.

Question: Who invented the parachute? J. R., Birch Hills, Saskatchewan.

Answer: It has been claimed that the Chinese thought it up 'way back, but the first authentic design on record is Leonardo da Vinci's, in 1514. He drew plans and wrote a discussion of it, but apparently never got around to constructing it.

Who built the first actual parachute is not definitely known, several hot-air balloonists in the 1780s claiming to have developed it. The first recorded successful human descent by 'chute was made by Andre-Jacques Garnerin on Oct. 22, 1797, over Paris. Garnerin jumped from a balloon at a height given in various estimates as 3,000 to 6,000 feet.

Question: Can you give me any information about rocket fuel—what it consists of? W. M., Carthage, New Mexico.

Answer: Rocket fuel is simply an explosive of one kind or another. Modern experimental fuels are generally liquids, since the earlier solid fuels such as gunpowder and dynamite were found to be too bulky and too weak. The liquids, which are several times more efficient, usually are mixed liquid oxygen and alcohol, oxygen and gasoline, or oxygen and hydrogen. They develop excessive exhaust heat, but also terrific acceleration.



The MODEL WORKSHOP

Conducted by Gordon S. Light

DAYDREAMING is every model builder's weakness. Give him pencil, paper, and an easy chair, and his imagination begins to wander. That strange look on his face merely indicates that he's deep in thought, and after a few painful minutes he'll begin to draw weird-looking sketches. Sometimes these sketches look more like Rube Goldberg inventions than suggested improvements for model airplanes, but usually there is some new "wrinkle" hidden in them somewhere.

Practically all worthwhile improvements can be traced back to some daydreaming modeler. An example is microfilm, the lightweight transparent covering used on indoor models. In 1935 every indoor ship at the national contest was film-covered. But five years ago microfilm was only a "wild idea" in the minds of several visionary daydreamers.

You'll find it interesting to follow through with your ideas and make practical application of them. New ideas keep model builders on their toes, stimulating investigation of new fields and making model aviation an experimental proving ground for developments that will later find their way into the large-airplane field.

Allow your imagination to follow ours while we daydream about some new ideas this month. Although essential details are worked out in this article and the accompanying sketches, you'll have to perform some mental and mechanical gymnastics to adapt them to your particular models. If you have pencil and paper nearby to jot down any ideas that might flash across your mind, let's get on with our daydreaming.

RETRACTABLE LANDING GEAR

Regardless of the type of model, drawing #1 will show you a way to draw up the wheels after the take-off. We haven't yet thought of a way to automatically lower the wheels for a landing. Perhaps you have, although it's pretty difficult to think of a mechanical device which will pinch-hit for the pilot's brain. However, a belly-skid

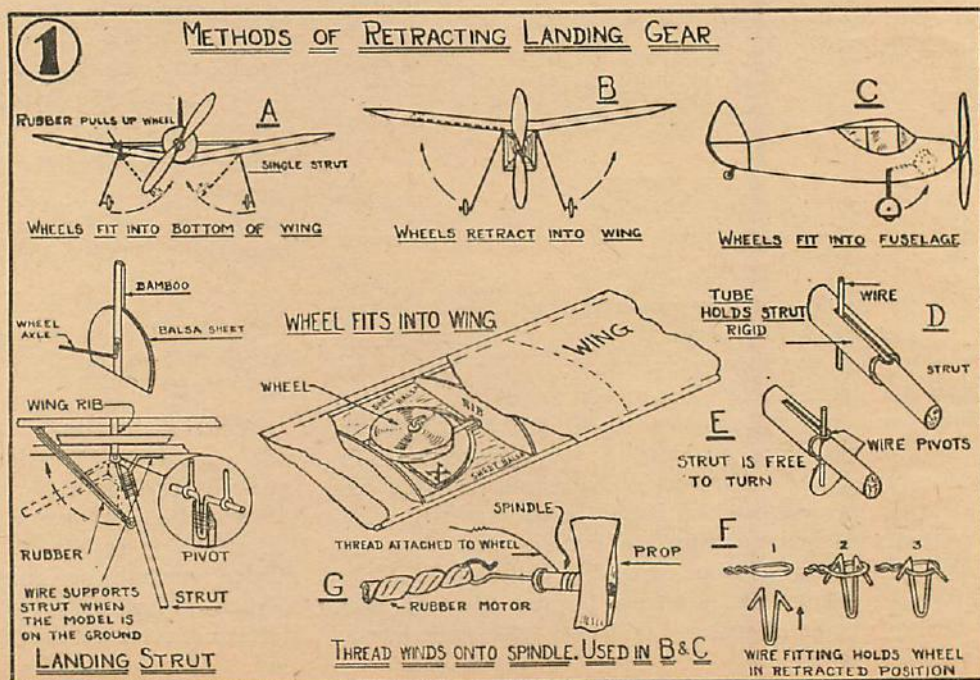
landing in a grassy field will not damage your model.

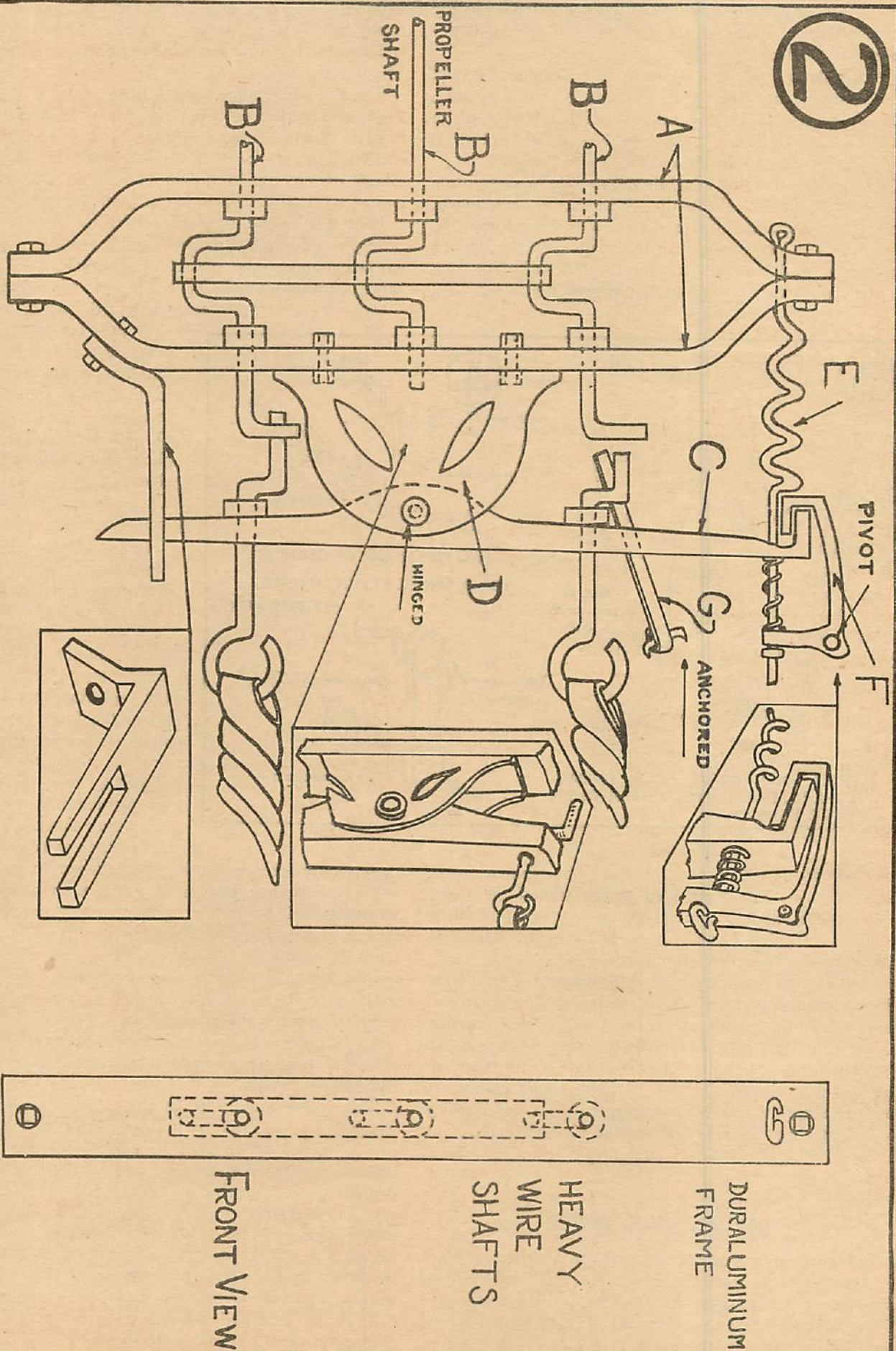
Retracted wheels will improve the flight of the model if the retracting device isn't too complicated or too heavy. The methods in drawing #1 qualify in both these respects. Here's how they operate.

Method labeled A is recommended for low-wing models. It is used on such large planes as the Beechcraft, Lockheed, Vultee, and others. Rubber bands pull up the wheels on the take-off just as soon as the model leaves the ground. The weight of the model, when it is at rest on the ground, holds the landing struts in position for taxiing. In retracted position, the wheels fit into the wing. Notice the sheet balsa (X) cemented to the outside of the wheels to help streamline them. If the wheels are not carefully faired into the wing, the resulting loss of lift will offset what is gained by retracting the wheels.

For high-wing models, retractable landing gears are more of a problem. One method is illustrated in drawing #1, parts D, E, F, and G. A piece of thread wraps around a sprindle G attached to the propeller and pulls up the wheels. A hook bent from fine wire to the shape shown in F will hold the wheels in retracted position.

A very weak grade of thread is used so that after the wheels are drawn up, the continued twisting of the propeller will tear the thread without slowing up the pro-





TWIN MOTOR DEVICE AS DESIGNED BY ALAN D. BOOTON SEE TEXT FOR EXPLANATION

pellor's spin. This means you'll need a new piece of thread for each flight. But once you've determined the correct length, changing the thread each time will not be much trouble.

Metal sleeves (D and E) have been designed to hold the landing struts rigid while the ship is on the ground, yet allow them to fold up into the wing after the plane has left the ground. These sleeves can be bent from thin sheet metal or duraluminum.

The bamboo landing strut should be free to slide inside the sleeve. The weight of the wheel should be sufficient to pull the strut out of the sleeve. On the ground, the weight of the model will push the struts into the sleeves, making a rigid landing gear for the take-off. As soon as the ship leaves the ground, however, the struts will

geared model about 50 per cent heavier than a single-motored job of the same area. And to complete the unhappy tale, the propeller duration—despite the worry and trouble of using gears—was increased by less than 10 per cent.

But a double-motor device being developed by Alan Booton of North Carolina represents an entirely different theory. Booton uses two motors, but they operate separately. That is, the device as illustrated in drawing #2 allows one motor to unwind and then puts the other one to work after the first has gone completely dead.

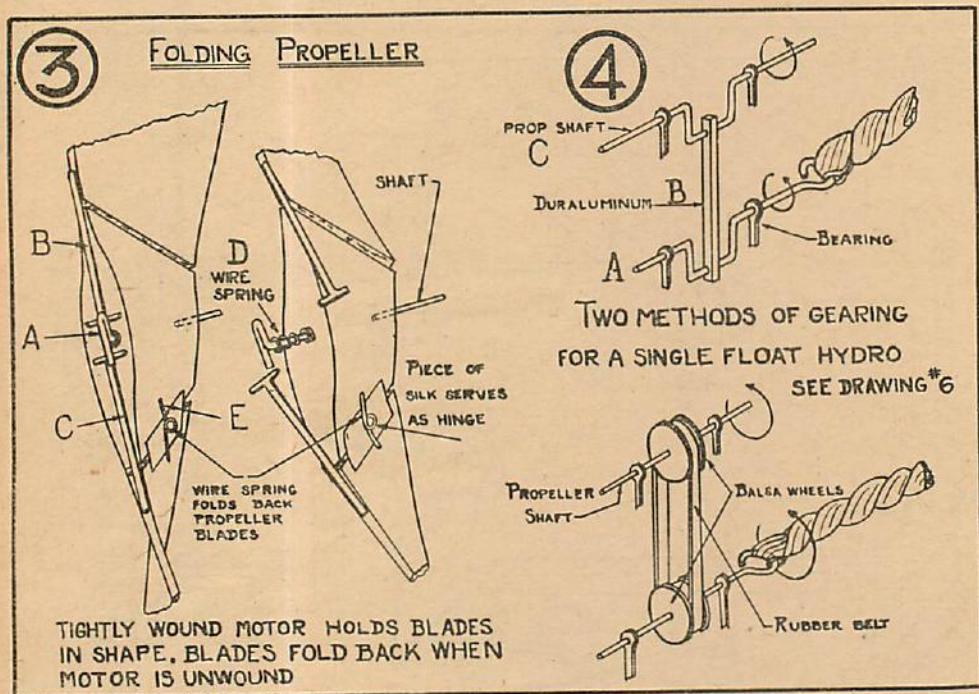
Booton has done a good job with this device. Follow carefully the explanation and you'll see how cleverly he worked it out. The frame A is made of two pieces of sheet duraluminum. Three heavy wire crankshafts, labeled B, are mounted inside this frame. The propeller is attached to the center shaft. Piece C is attached to the main frame by two bracketlike supports, labeled D. Piece C is free to pivot about a pin joint. Two wire shafts are mounted in C. The rubber motors are attached to these shafts.

Let's suppose the motors have been tightly wound. The lower motor begins to turn the propeller and completely unwinds. Now the upper motor is ready to spring into place. Consider the reaction of spring E when the force in the lower motor is not present. It will tend to release the trigger F, allowing the piece C to spring forward and engage the upper shaft.

In other words, as long as there is any force remaining in the lower motor, piece C will press against trigger F. But with a dead lower motor, C will be pulled back by the upper motor, allowing spring E to pull trigger F. When the trigger tends to be drawn back, spring E—being slightly more powerful than the tightly wound rubber motor—will pull it and piece C forward, compressing the smaller spring, until C engages the upper shaft. Part G is simply a straight piece of metal, anchored in the nose of the model, to prevent the upper motor from turning until it has moved forward.

The double-motor device that Booton is working on weighs .3 ounces. It is a small size that can be fitted into a model of about 150 square inches. Ruggedly built, it has nothing to fear from many-strand motors. A double-motor device offered for sale a few years ago was unfortunately too weak to withstand the rubber motor strain. That's why no substantial increase in duration resulted. But Booton's device eliminates this weakness by distributing the strain of the motors, permitting lighter construction and sure-fire performance.

With a successful double-motor device, we can expect propeller duration to be boosted to the neighborhood of 3 minutes as compared to 1½ minutes common on present ships. Such a flight is (Turn to page 75)

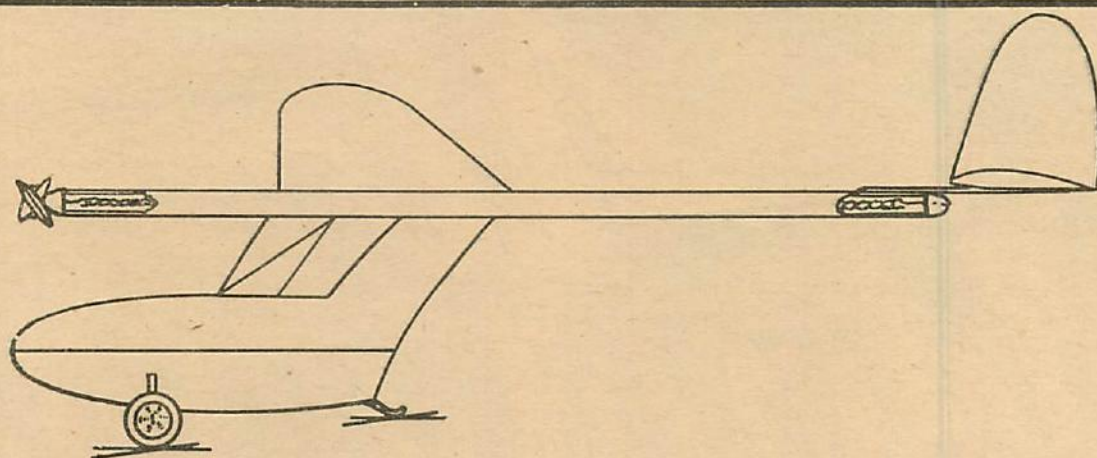


fall out of the sleeves to the position shown in E. Small pieces of wire attached to the end of the sleeve prevent the struts from dropping out of the sleeve entirely. In this position they are free to swing, so that they can be pulled up into the wing.

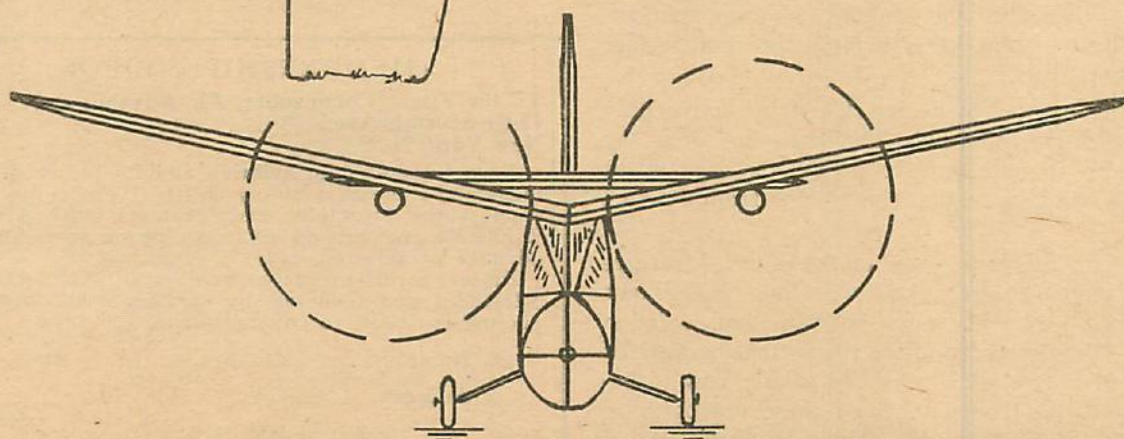
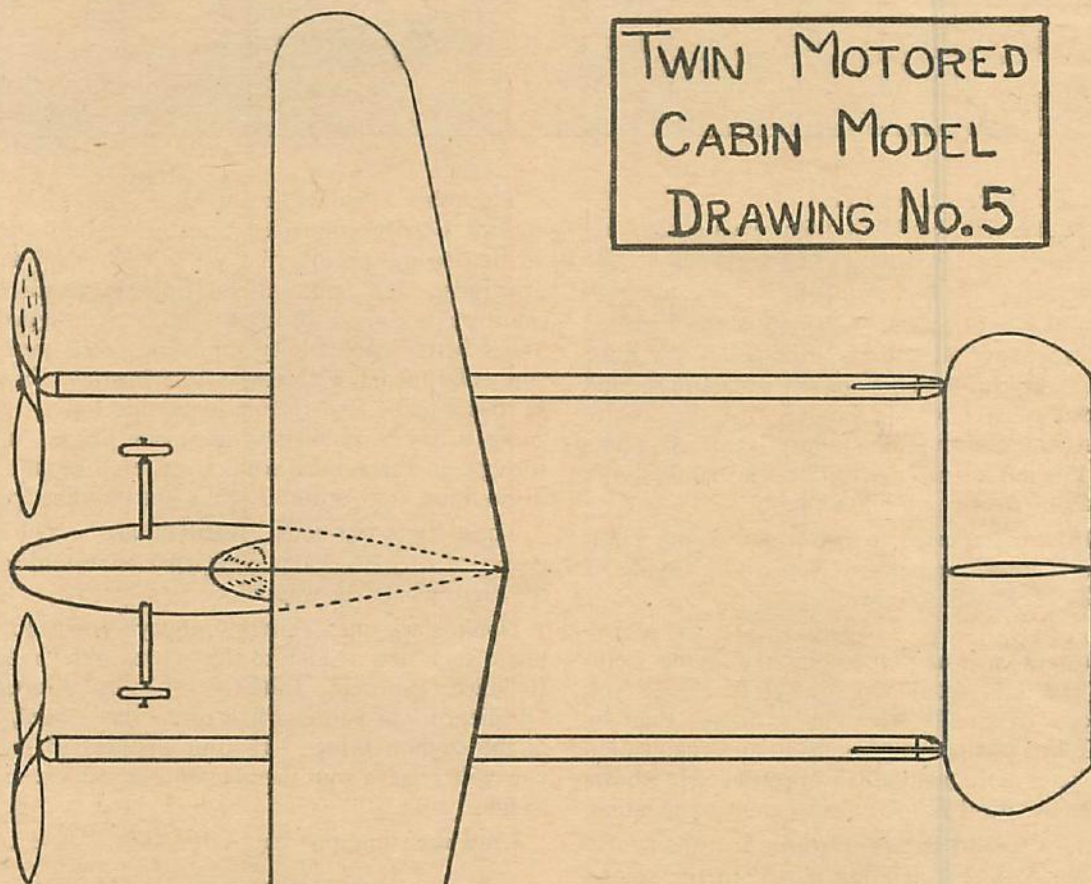
Drawing up the wheels into the wing of a high-wing ship is a trifle awkward, so another method is illustrated in C, where the wheels are drawn up into the front part of the fuselage. The Grumman military airplane is an example of this method. The front sides of the fuselage are covered with sheet balsa. Niches large enough to accommodate the wheels are cut in the balsa. Remember—cement sheet balsa to the outside of the wheel so the fuselage will be thoroughly streamlined when the wheels are retracted.

DOUBLE-MOTOR DEVICE

Double motors that operate through a series of gears in turning the propeller have done little to lengthen duration. In most cases the weight and the friction of the gears necessitated more powerful motors with a consequent reduction in the number of turns that could be stored in the motor. The weight of the extra rubber plus the weight of the gears made the weight of the



TWIN MOTORED
CABIN MODEL
DRAWING No.5





ATTENTION, Air Adventurers!

I want squared shoulders, trim, even ranks, and straight lines as we take our formation this month. It's dress parade and we want to look our best.

This is an important occasion. We are being honored by an airman whom we all know and respect. We must honor him, in return, by showing in appearance and manner that we appreciate the standards of the service that he represents. We must carry ourselves as fit pilots of the future, for in that way we can best prove that ours is an organization worthy of his support.

Air Adventurers, I present to you a new Wing Commander—Lieutenant Commander George O. Noville of the United States Naval Reserve.

IF I could present each of you to our new Wing Commander in person I would do so, but he knows you already, if not individually by sight or name, then by character. He knows that you belong to an organization with a rigid Creed and an unselfish purpose. He knows that your foremost ideal is the advancement of aviation.

When he first came to our pages three months ago to tell us about the part that aviation played in the second Byrd Antarctic Expedition, of which he was second in command, he grew interested in our work. Now he has decided to enroll. He has become an Air Adventurer and we have given him the rank of wing commander, held so far by only one other person, the famous flier Clyde Pangborn.

Wing Commander Noville has taken up active duty in our organization, as Clyde Pangborn has done, by writing for us an authoritative article on navy flight training. He will be a regular contributor from now on.

HIS article for this issue—one of the unusual features—is accompanied by a series of fine photographs that show vividly how the navy is training its aviation candidates. I know you're interested in that because of the number of letters we've received asking how to become a navy flier. The number of these photographs, by the way, is the reason why "This Winged World" has only two pages this month instead of four.

The other surprise feature is Frank Tinsley's article on Bill Barnes' improved Snorter. Many of you have written to me urging that we publish solid scale model drawings. Bill had finished tinkering with his gang's Snorters and had brought out a redesigned version. What better opportunity for some crackajack plans for you solid-model builders? We hustled Frank out to Barnes Field. The result is in this issue. And we're going to try to publish at least one plane, American or foreign, in three-view scale form each month hereafter, in addition to Gordon Light's outstanding performers.

Those two top-notch features are a tribute to the power of the pen—your pens, that have told us, through the mail, what you wanted.

Don't slack up. There's always room to grow. I invite each new reader to think over our Creed of Self-Reliance, Courage, Initiative, Loyalty, Integrity, and Obedience. If you can live up to that Creed, then send in the coupon below. If your application is approved, you will receive our membership certificate and winged badge.

Until next month—happy landings, Air Adventurers!

Your Flight Commander,

Albert J. Carlsson

(MEMBERSHIP COUPON)

To the Flight Commander, Air Adventurers,
79-89 Seventh Ave.,
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.

Name Age

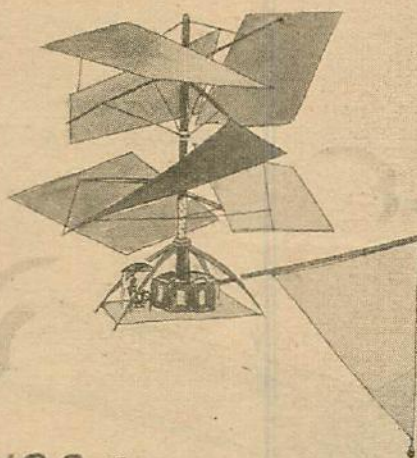
Address

☐ Check here if interested in model building.

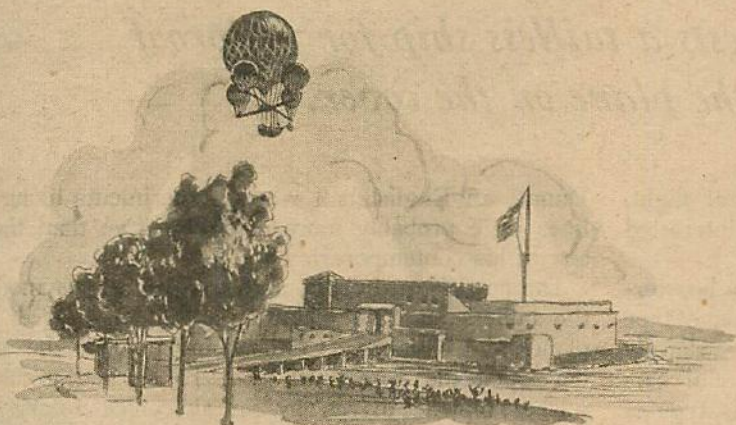
PICTORIAL HISTORY of MAN in the AIR



1815 ELIZABETH GARNERIN (ABOVE) AND HER UNCLE'S WIFE, JEANNE-GENEVIEVE, ARE THE FIRST WOMEN BALLOONISTS AND PARACHUTE JUMPERS



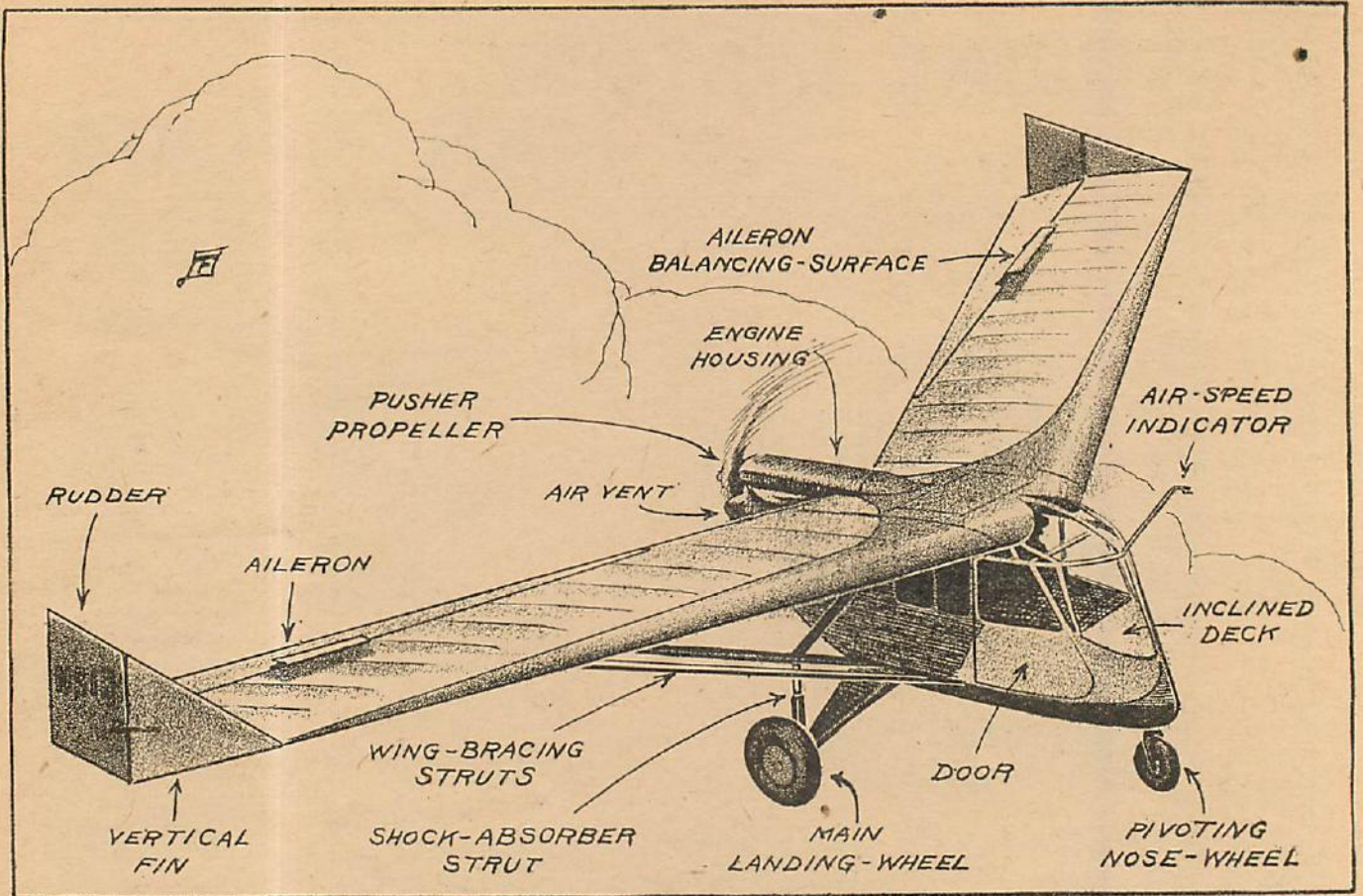
1825 VITTORIO SARTI, OF BOLOGNA, ITALY, IS THE INVENTOR OF A HELICOPTER OF AN ORIGINAL BUT UNSUCCESSFUL DESIGN.



1826 NEW YORK SEES ITS FIRST BALLOON. ROBERTSON, OF FRANCE, MAKES AN ASCENT FROM THE BATTERY, OCT. 10TH.



1830 AMERICA ENTERS THE AIR. CHARLES F. DURANT, THE FIRST AMERICAN TO FLY ON WESTERN CONTINENT, ASCENDS FROM CASTLE GARDEN, N. Y., SEPT. 9TH 1830



The Waterman Arrowplane

The government tests a tailless ship for foolproof flying—the plane on the cover.

EVER since the earliest days of mechanical flight, the possibilities of tailless aircraft have interested students of airplane design.

The term "tailless" is usually taken to mean a heavier-than-air machine of the true fixed-wing airplane type which depends for fore and aft stability on sharply swept-back wings rather than upon separate tail surfaces supported by a fuselage or booms. This type of plane, if properly built, is inherently stable. It is usually designed in the form of an arrowhead with the motor and pilot's seat in the center, and the wings projecting outward and rearward at a sharp angle.

The many obvious advantages of the tailless craft not only from the safety point of view, but also from that of structural efficiency, may well cause us to wonder why it has never been developed to the point achieved by its more conservative cousin. In the pioneer days of flying, primitive gliders of this type were built by several designers working independently in various countries, frequently without the slightest knowledge of each other's efforts. Among them were Etrich-Wels, an Austrian pilot whose early powered ships were later developed into the famous Taubes of war memory, and J. W.

Dunne, an Englishman whose experiments along these lines were probably more comprehensive than those of any of his contemporaries.

Dunne designed, built and flew numerous models of the tailless airplane including gliders, powered monoplanes and biplanes. Commencing in 1905, he steadily developed the type until by 1913 he had perfected a pusher biplane driven by an air-cooled rotary motor that performed very creditably indeed. After the outbreak of the war, Dunne's patents and services were taken over by the American firm of Burgess Company and Curtis of Marblehead, Mass. There the design was refined and improved and in 1916 and 1917, a number of ships were turned out with considerable success. These included both land and seaplanes and at least one flying boat. They were all biplanes powered with Curtiss water-cooled motors.

With the signing of the Armistice and the consequent collapse of a war-expanded aviation industry, the Burgess Company went out of business, and American interest in the tailless type of plane languished. In England, however, a war-time flyer and designer, Captain G. T. R. Hill, caught up the torch. He associated him-

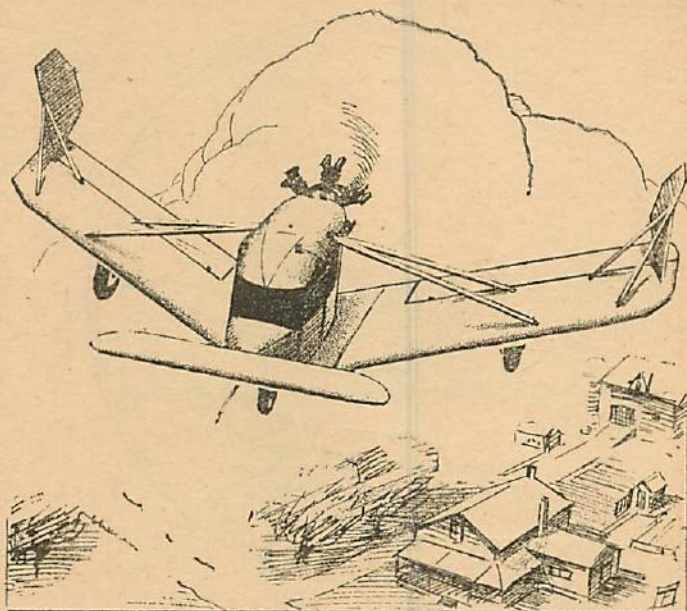
self with the Westland Aircraft Works and set to work in their great factory at Yeovil, Somerset, on the problem of advancing the type still further along the road to recognition.

He started with small two-seater monoplanes of the pusher variety. The current one of the series is known as the Pterodactyl, Mark IV. It is powered with an inverted air-cooled Gypsy III engine of 120 h.p. and is fitted with a highly ingenious bicyclelike tandem landing gear. Among the favorable features of this ship are the realization of a high degree of lateral stability at low speeds—a quality inherent in the swept-back wing—the provision of powerful controls effective at all speeds, and a degree of safety against spinning that has been achieved by no other type to date. The Pterodactyl has the further advantage of a seating arrangement whereby the pilot and passengers are placed in the nose of the machine with a consequent increase in visibility and comfort.

At the present time, the British government is testing a military model of the type. It is a two-seater biplane fighter, powered with a Rolls-Royce Goshawk engine, and is designated the Pterodactyl, Mark V. This ship is undoubtedly the strongest and most powerful tailless plane that has been built to date. It looks as though it could withstand enormous stress, and its builders claim that the broad-arrow shape of the wing has enabled them to design an extraordinarily rugged form of internal structure.

On our own side of the Atlantic, the fight to develop the type has commenced anew. For a number of years, Waldo D. Waterman of Los Angeles has been interested in designing aircraft from the safety point of view. He has brought out a number of planes of unconventional appearance, which have had unusual safety features. He became interested in the possibilities of the tailless type and commenced a careful study of its history and aerodynamic characteristics. The result of his labors was the forerunner of the plane on the cover.

The first Arrowplane was a cabin monoplane of the low-wing type. The power plant consisted of an air-cooled radial motor mounted high on the rear of the cabin nacelle, from which position it drove a pusher propeller. The wings were swept back at a sharp angle and were equipped with long, narrow ailerons and with vertical rudders springing from the upper surface of the tips. The ship had long V type bracing struts which inclined from the top of the cabin to a point halfway out on each wing where they con-



The first Arrowplane had an auxiliary wing.

nected with both spars. On the lower face of the wing, directly below this connection point, was mounted one of the three low-pressure wheels which formed the landing gear. The third was mounted in a full swiveling castor under the forward end of the cabin. In addition to the main wings, this early Arrowplane was furnished with a small auxiliary wing placed in front of the nose of the ship.

When the department of commerce decided on its new policy of promoting the development of safe, low-priced popular airplanes, Waldo Waterman attacked his problem with renewed gusto. He designed the present Arrowplane, incorporating in it the lessons learned from its predecessor.

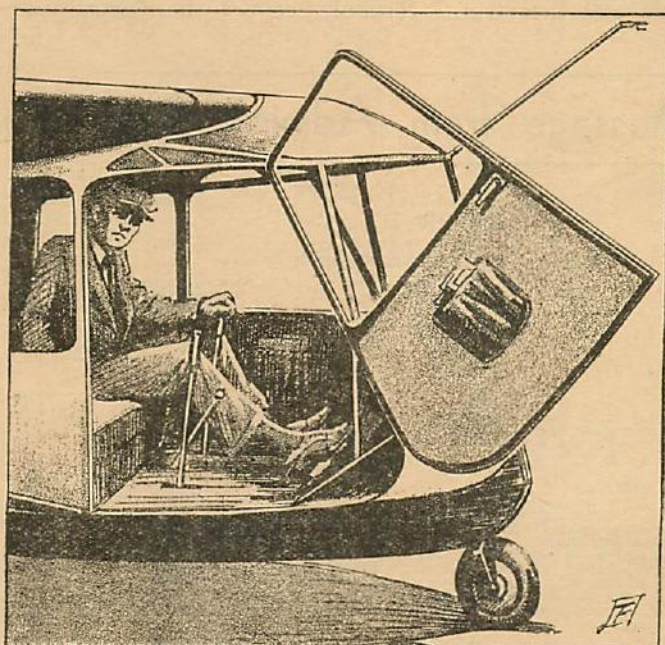
He abandoned the low wing, radial engine, and auxiliary front wing. Still retaining the basic form, he redesigned the landing gear and changed the rudder arrangement, eliminating the bracing struts which had helped slow down the speed of the preceding model.

The new Arrowplane is a tailless, externally braced, high-wing monoplane powered with a 4-cylinder inverted air-cooled engine developing 95 h.p.

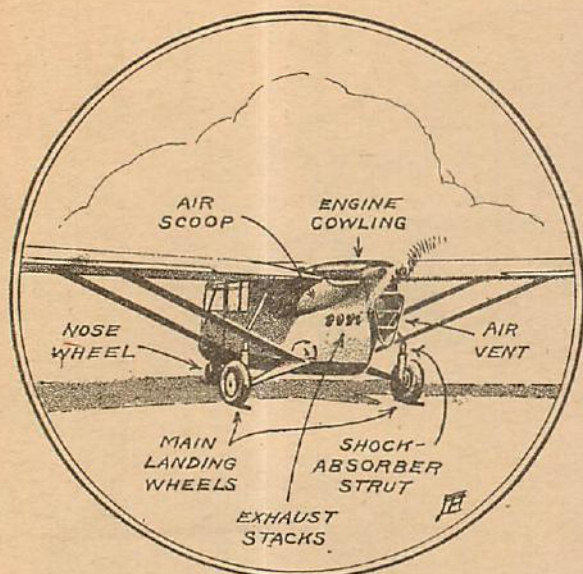
The ship is a two-place cabin job, featuring dual controls, side by side seating, and improved visibility. The passenger cabin closely resembles a medium-sized coupé in general form except that

the instrument board is set low and the enclosed deck above it slopes sharply down to the nose. This ingenious device further improves the view forward and downward.

Back of the cabin and separated from it by a sound-proofed fire wall is the engine compartment. The engine is mounted high up in the nacelle with the drive shaft



The passenger cabin resembles an automobile.



A rear view of the Arrowplane fuselage.

on the same level as the wing, thus insuring ample propeller clearance even in high grass landings. The engine is cooled by a stream of air which enters the compartment through large air scoops mounted on each side of the nacelle directly behind the windows. The heated air is expelled through a specially designed opening in the rear of the motor cowling.

Each wing is strongly braced by two parallel inclined struts which spring from the bottom longeron of the nacelle and terminate halfway out on the wing.

The rear strut also forms part of the main landing wheel mounting, which consists of a vertical oleo shock absorber unit placed between the axle and the strut. Landing stresses are transferred to the main nacelle structure through a third member connecting the strut and the upper longeron.

The front wheel is movable, as in the earlier models. In this type of three-wheeled undercarriage, the large main wheels are set behind the center of gravity. That position, in conjunction with the freely turning front wheel, makes even the roughest landing reasonably safe by eliminating dangerous ground loops and nose-overs. It also permits the application of brakes immediately upon touching the ground and materially shortens the landing run.

The Arrowplane performs very well for a plane of its size and power. It has a top speed of 114 m.p.h. and cruises at 90. The rate

of gasoline consumption is six to seven gallons an hour, which gives an average of between thirteen and fourteen miles to the gallon. In testing this plane, John H. Geisse, chief of the development section of the bureau of air commerce, flew it cross-country from Los Angeles to Washington, D. C. Here is what he says about its performance:

"The Waterman airplane, in its present condition, which must be termed experimental, is not exactly fool-proof, but is very close to being so. In the condition in which it was flown from the west coast, the airplane could not be stalled or spun by any normal or reasonably abnormal use or abuse of the controls. Due primarily to the type of landing-gear used on this airplane, a safe margin of minimum gliding or flying speed over stalling speed is perfectly feasible. With this gear, landings can be made up to 80 m.p.h. without danger and the brakes immediately applied. If it is desired to do so, the plane can be glided straight into a landing without any flaring near the ground, thus removing entirely the need of accurate judgment of height above the ground. In other words, it is practically impossible to get into trouble except by actually running into an obstacle.

"The tailless feature of the airplane offers possibilities of reduction in production costs and also reduces the hangar space required. By putting the plane into a hangar wing first, or sidewise, a hangar of about 22-foot span can be used. As hangar construction costs mount rapidly with increase in span, this is an important consideration. In the event that roadable airplane bodies are found practicable, the tailless feature will have an added advantage as only the wings will have to be removed."

There, my air-minded readers, you have what the department of commerce thinks of the Arrowplane. It certainly seems to be a worthy descendant of the carefully thought-out but primitive machines of Dunne and Burgess.

As Mr. Geisse says, the ship is still in an experimental form. What it will eventually develop into, no one knows. It seems to me, however, that in order to qualify as a truly useful, popular-priced ship, an airplane should be capable of using the greatest possible variety of landing places.

If John Jones is going to be persuaded into forking out his hard-earned dollars for a flying machine, he is going to demand one in which he can go places with reasonable speed and comfort, and land safely when he gets there, whether his destination be on land or water.

This means that the machine will have to be amphib- (Turn to page 79)

A Message from Admiral Byrd

REAR ADMIRAL RICHARD E.
BYRD
THE STORY OF THE
BYRD ANTARCTIC EXPEDITION II

October 25, 1935

Manager
LEO McDONALD

General Electric Building
570 Lexington Ave
New York City

Street & Smith Publishing Company
Bill Barnes Air Trails
79-89 Seventh Avenue
New York, N. Y.


ATTN: Mr. P. Orlin Tremaine

Gentlemen:

I was very pleased to learn that you were publishing a series of articles by Lt. Commander Noville on the Byrd Antarctic Expedition II. I feel that it is a great educational contribution to the youth of the United States. I believe that your reading audience represents the coming pilots and explorers who will carry on when we of the present generation are forced to stop, and that you are doing a real service, as well as presenting a very entertaining chapter in history, through the publication of these articles.

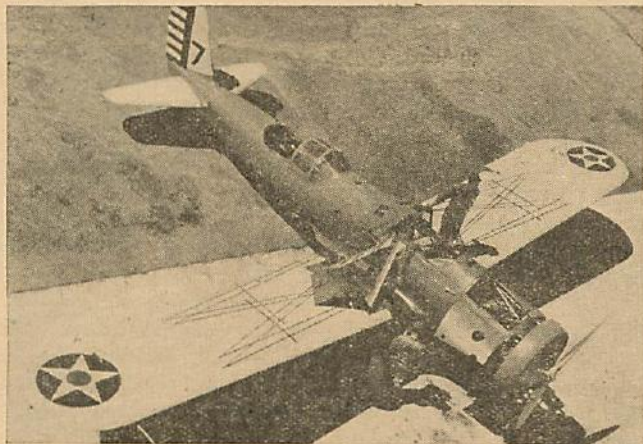
May I extend my heartiest good wishes for the success of Bill Barnes Air Trails and my greetings to the members of the Air Adventurers Club.

Cordially and sincerely

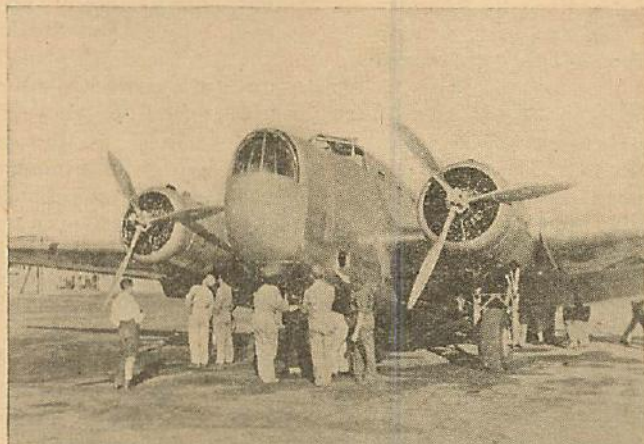

 Rear Admiral Richard E. Byrd, U.S.N.
(Ret.)

AIR TRAILS GALLERY

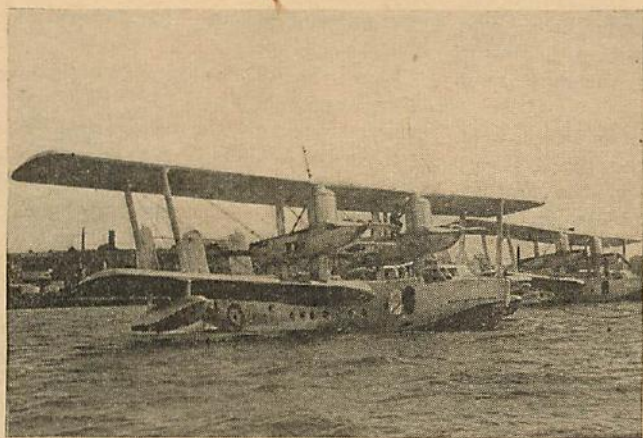
A Picture Page of Modern Planes for the Collector



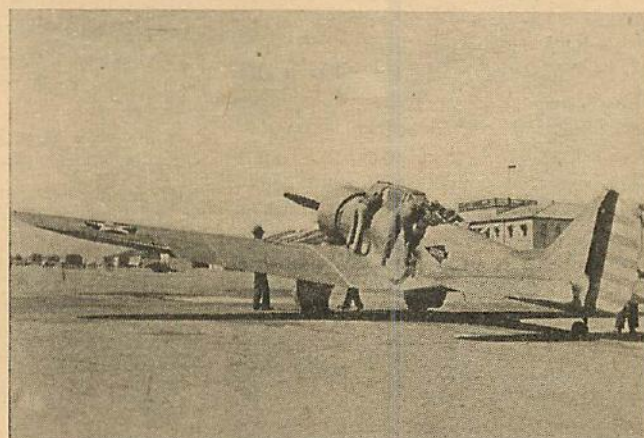
CURTISS Shrike, Air Corps' A-12 2-seat attack, in an unusual view. Its speed is quoted at 200 top with 750 h.p. Wright Cyclone.



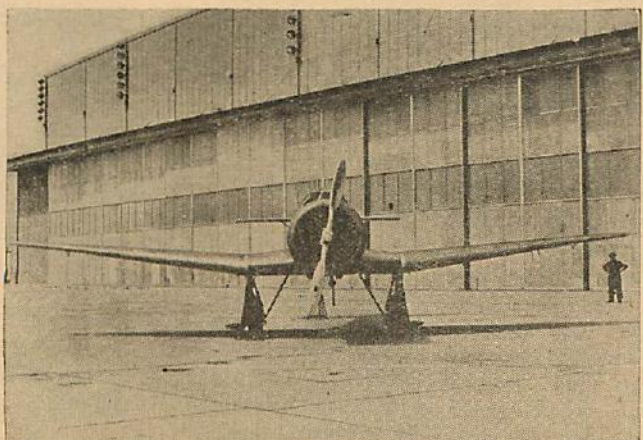
DOUGLAS experimental bomber, competitor with Boeing and Martin in army tests, is said to carry 4 1-ton bombs at well above 200 m.p.h.



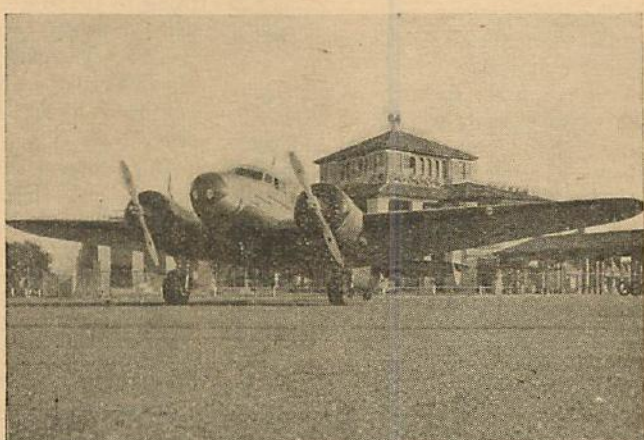
SHORT Singapore III long-range boats with 4 Rolls-Royce Kestrels, late additions to British fleet, yield only 145 m.p.h., 1,000-mile hops.



NORTHROP 2-seat attack model, testing for the Air Corps, is said to be similar to Northrop Gamma mail plane capable of 215 m.p.h.



JUNKERS Ju160, most modern of German firm's transports, can carry 6 passengers at 211 m.p.h. on single 9-cylinder 700 h.p. B.M.W. Hornet.



LOCKHEED Electra metal transport fitted as luxurious private plane for R. W. Norton is painted opal green, first Electra to shed aluminum finish.

THE BLACK GHOST

(Continued from page 15)

Bill leaped from the ditch and sprinted across the field toward his Stormer. Behind him a police machine gun was still chattering. Men were shouting, cursing.

Bill reached the Stormer, threw himself into the seat, worked the electric starter. The two propellers in the pointed nose swung over. The warm Diesels sputtered, caught and blasted into thunder. Bill's eyes went to the tachometer. He forced himself to wait. Then, releasing the brakes, he swung the pulsing ship around and rammed open the throttle.

The amphibian leaped into action, pounded across the stubby turf. The engines were bellowing. The speed was increasing. The wing flaps came down. A fence at the end of the field raced to meet him. And Bill yanked the control column into the pit of his stomach.

The Stormer blasted off the ground at an extreme angle and bulleted upward. The amphibian landing gear slid into its retracted position. The flaps moved up. And the shimmering scarlet bullet was away.

Bill held the stick back. He was crouched forward in the seat, his mouth a hard gash in a merciless face. His fingers were poised savagely above the firing trips.

The earth raced away. The Stormer plunged at the clouds, slashing through them, arrowed into the clear blue beyond. Bill's eyes stabbed across the sun-drenched firmament. He spotted the white biplane instantly. It was far away to the south, fleeing. Bill brought his racing ship into level flight and headed in hot pursuit.

The throttle was crowded to the last notch. The Diesels were howling. The air-speed indicator swam past the two hundred mark to two twenty-five, to two fifty.

The cloud blanket below was being rapidly dissipated by a strong wind and with it went the biplane's only chance of evading pursuit.

The Stormer's speed was increasing with every passing second. The needle swayed from two hundred and fifty miles an hour to three hundred. On and on—faster and faster. To three hundred and twenty-five—three fifty—

The gap between the two planes was dwindling with lightninglike rapidity. The amphibian's speed was terrific. It was only a matter of time before it would overhaul the other.

The Atlantic showed below, its surface storm-tossed. The white biplane was now angling obliquely to the right, striking back toward land. Fire jabbed from the exhaust stacks of its straining engine.

Bill waited, his thoughts aflame, his whole being nauseated by the slaughter

he had witnessed; his one thought to get the murderer. Some one had wanted Max Stonge out of the way; had killed him. Who had been responsible? The Black Ghost? There seemed no alternative. But whether or not the assassin in the death plane ahead was a hireling of the Black Ghost's, he had to be repaid for his life-taking—and repaid in kind.

Even as the grim resolve burned across Bill's mind, he looked down and saw the radio signal blazing. He flicked the switch over and went rigid as he heard a husky, rasping voice calling his name. He recognized the voice instantly—the Black Ghost!

"Bill Barnes. . . . Bill Barnes. . . . Urgent. . . ."

Bill pulled the microphone to his lips: "Go ahead. I'm listening."

The reply came immediately:

"This is the Black Ghost. I am informed that you are at the moment pursuing another plane with the intention of waging battle." The words were spoken slowly and distinctly. "You will do well to desist and return to your field. And do so immediately! This is in the nature of a warning—a second warning. Your answer?"

Bill's eyes glinted. Bitter anger swept through him. Then the Black Ghost *had* been responsible for the murder. He had dispatched the white biplane to kill Max Stonge!

With an effort he stemmed the hot words that rose to choke him. He said coldly: "Your pilot has been sentenced to death by his own act."

There was a brief silence. Then: "You are a fool. You ignored my first warning about bringing Stonge back. I was forced to annihilate him. I had planned certain punishment for you. If you persist in your present mad endeavor, I will be forced to add something to that fate. Stonge was afflicted with a strange form of leprosy. So will you be. You will die in horrible agony. No one will be able to save you. Yet, you may avoid this—if you return at once."

Bill's fingers slid down to touch the firing trips. His face was dark with fury. The man's suave words goaded him into a frenzy. Impulsively, he slammed the radio switch closed, cutting off the voice.

The Scarlet Stormer had sprinted closer and closer. Bill could now see the white blob of the enemy pilot's face as the man turned back to snatch hurried glances at his pursuer. The man must have realized, or been informed by radio, that he had no chance of escape in flight—that his only hope lay in fighting it out. For suddenly, the white biplane

whirled around on a wing tip and came charging back in a crazed attack.

It hurtled straight at the Stormer, its guns churning out smoking destruction long before they were within range.

The two ships plunged at each other like infuriated beasts. Bill crouched over the controls, holding his fire. And then, just before the enemy's hail of bullets reached the amphibian, Bill rammed the control stick forward. The Stormer dived precipitously and the biplane flashed past overhead, its torrent of bullets missing the amphibian's tail structure by inches.

The Stormer was diving vertically for the storm-tossed Atlantic below. Bill retarded the throttle and brought his shrieking plane around in a flashing outside loop. The machine was on its back, streaking horizontally to the water. Straight ahead was the diving biplane.

Bill rolled right-side up, pulled the stick back and, with a scream from the Diesels, zoomed up under the enemy ship. The maneuver had been executed in a flashing second. The enemy pilot hadn't a chance.

The belly of the biplane's fuselage flashed across Bill's sights. His fingers rammed down on the firing trips. The two powerful machine guns mounted in the wing stubs thundered. White jets of tracers and lead raced out, ripped into the fuselage, slashed it from engine to tail structure and back again.

Bill was coldly alert. He knew he had his man. His machine guns yammered savagely—and then the Stormer's speed carried it past and above.

Bill whirled his pulsing ship around thrust the stick down again, determined to deliver the *coup de grâce*. His fingers suddenly left the gun trips. The biplane was staggering drunkenly. He saw the enemy pilot throw up his arms. His hands covered his face. He sank down below the coaming.

Smoke was beginning to gush back from the engine housing. It increased in volume and with it came darting tongues of crimson flame. The biplane pitched forward and plunged. The wings whipped around once, twice—and the whole burning mass went into a tight spin. The smoke grew dense. The flames welled back in sheets.

Bill followed the machine down, his lips clamped into a white line. One of the wings crumpled back, tore loose and left the burning mass to twirl down like an autumn leaf.

The entire machine had become a ball of fire. A sooty, black trail scarred the sky to mark its going. And then, with a crash, the doomed ship hit the water.

Buck Rogers

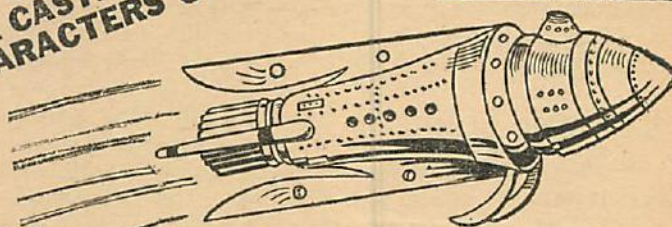


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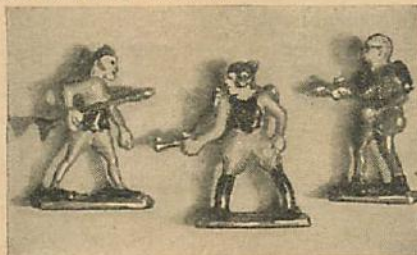
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A column of flame shot up. The sea rushed in to swallow the wreckage.

Bill swept the Stormer low over the spot. Nothing remained of the biplane but a few pieces of charred fabric and a circle of oil. He banked around, set his course for the home field and opened the throttle.

Then, just as he circled the airport, he switched on the radio in response to the signal. The Black Ghost's voice shuddered in his ears again. There were but five words spoken:

"You are marked for death!"

VII—SPECIAL AGENT

STEPHEN DRAKE was a special agent of the department of justice and a close friend of Bill Barnes. He was a slight, leathery-faced man in his early forties. He had cold, penetrating, gray eyes. His lips were thin and severe. He possessed unlimited courage and brains.

When Bill landed at twelve forty-five, he found that Stephen Drake had taken complete charge, and had slashed through the police investigation.

By one o'clock, the leper's riddled body had been hurried cityward in the ambulance; the police had departed, taking with them their wounded comrade; Dr. Carter had left, after satisfying himself that Bill had not contracted the dread disease.

Bill and Drake had formulated quick plans for a flight to Miami in the Stormer. The gull-winged monoplane had been run into its hangar. Mechanics swarmed over it, refueling, inspecting, fumigating the cabin in compliance with Dr. Carter's orders.

Inside Bill's office, the government agent issued a grave warning to the pilot and Tony Lamport.

"You two men are the only ones at the field who know that Stonge had leprosy," he said tersely. "I can't impress upon you enough the necessity of keeping this absolutely quiet. No one else must know. If it got out, it might not only panic the public but have much more serious results. Tell no one." He paused. "And also, if you value your life, keep quiet about—the Black Ghost."

Both men pledged their secrecy and Tony returned to his radio room.

As the door clicked shut behind him, Drake whirled on Bill.

"How soon can we get away?"

"Fifteen minutes. The best possible." Bill looked intently at the agent. "What's all this about, anyway? You haven't told me a thing. Who's this Black Ghost?"

Drake was silent for a long minute, his gray eyes locked with Bill's.

"Barnes, you've gotten into something, whether you wanted to or not. I heard those warnings. They're real. You've crossed the Black Ghost twice. You

shot down one of his planes. That means trouble."

The agent came to his feet and paced across the room, his hands tightly clasped behind his back. He swung around suddenly to face Bill.

"I need your help, Barnes. The department needs your help."

"You've got it," said Bill, readily.

"Wait a minute. Let me tell you what it's all about before you give your decision. The chances of your coming out alive are slim. I'm under orders to get the Black Ghost—dead or alive."

Bill's expression was bleak. "That suits me. I wouldn't mind tying into that guy, whoever he is."

The agent shook his head grimly. "You don't know what you're in for. The man's the worst criminal this country has ever known. I won't accept your word until you've heard all the details."

Bill sat down at the desk. "Listen: All morning I've heard nothing but threats. As you've said, I'm in this thing whether I want to be or not. I might as well go the whole way. Let's have the dope."

Drake shrugged. "Very well. I came here this morning planning to leave for Miami with Shorty Hassfurth. I would have if Dr. Carter hadn't told me about this Stonge business. That's why I waited. It's connected definitely with the job I'm on. That's why I wanted to take Stonge alive. I wanted to question him. The Black Ghost was too fast for me and silenced Stonge forever. By getting and using your secret wave length he was able to learn everything that went on. He knew I was at your field. Now, the only thing left for me is to carry out my original plan and get to Miami as fast as possible."

"We'll leave the minute the ship's ready," said Bill. "The Stormer's much faster than the Snorter. You have not lost much time by waiting."

"It isn't only that. I'm afraid the Black Ghost may have guessed my plan." The agent dropped down in a chair and leaned forward, his arms on the desk top. His face was flushed. He lowered his voice to a whisper. "Listen. There's a man lying in Grover Street Hospital in Miami. His name's Nicco. He's dying. He's got some vital information that we want. But he won't talk to any one but me. That's why I have to hurry. He can't have much longer to go. He has an advanced case of—leprosy."

Bill stiffened. "Leprosy! The same as Stonge!"

"Exactly. Both men were deliberately injected with the disease. It isn't the ordinary form of leprosy. It's worse—far worse. Ordinarily, leprosy isn't half as bad as it's pictured. There's a definite cure in the early stages and even in more advanced ones. And if the vic-

tim is incurable, death comes slowly and painlessly after years. But, in Stonge's case and in Nicco's, the disease has taken on a new and terrifying form—never before known to medical science. The whole ghastly process of ulcerous changes in the victim is speeded up. Instead of years, the time is reduced to days. Death strikes without fail, four days after the injection's been given. Nicco's case was reported just this morning. But he's had the disease three days already. He can't live much longer. That's why I must hurry."

Bill's eyes were thin. "The Black Ghost's threatened me with leprosy. Then he's the one responsible—"

"Yes. We're positive of that. He's using it to further his damnable scheme." Drake gripped the side of the desk and his hands were white-knuckled. "The department of justice is facing the greatest crisis of its history. There's something happening that would be incredible except for the definite proof that we have. The underworld is uniting under the leadership of one man—the Black Ghost. He's diabolically clever. He is organizing crime into one solid group. He's mapped out a campaign that is outrageous and yet has every chance of succeeding unless it can be checked immediately."

"If he should succeed, the entire country will be in the hands of the lawless. Murder, robbery—every known crime will flourish. Law and order will be swept aside. Yes, it's as bad as that. We in the department have been issued definite orders. Get the Black Ghost, and get him at all costs!"

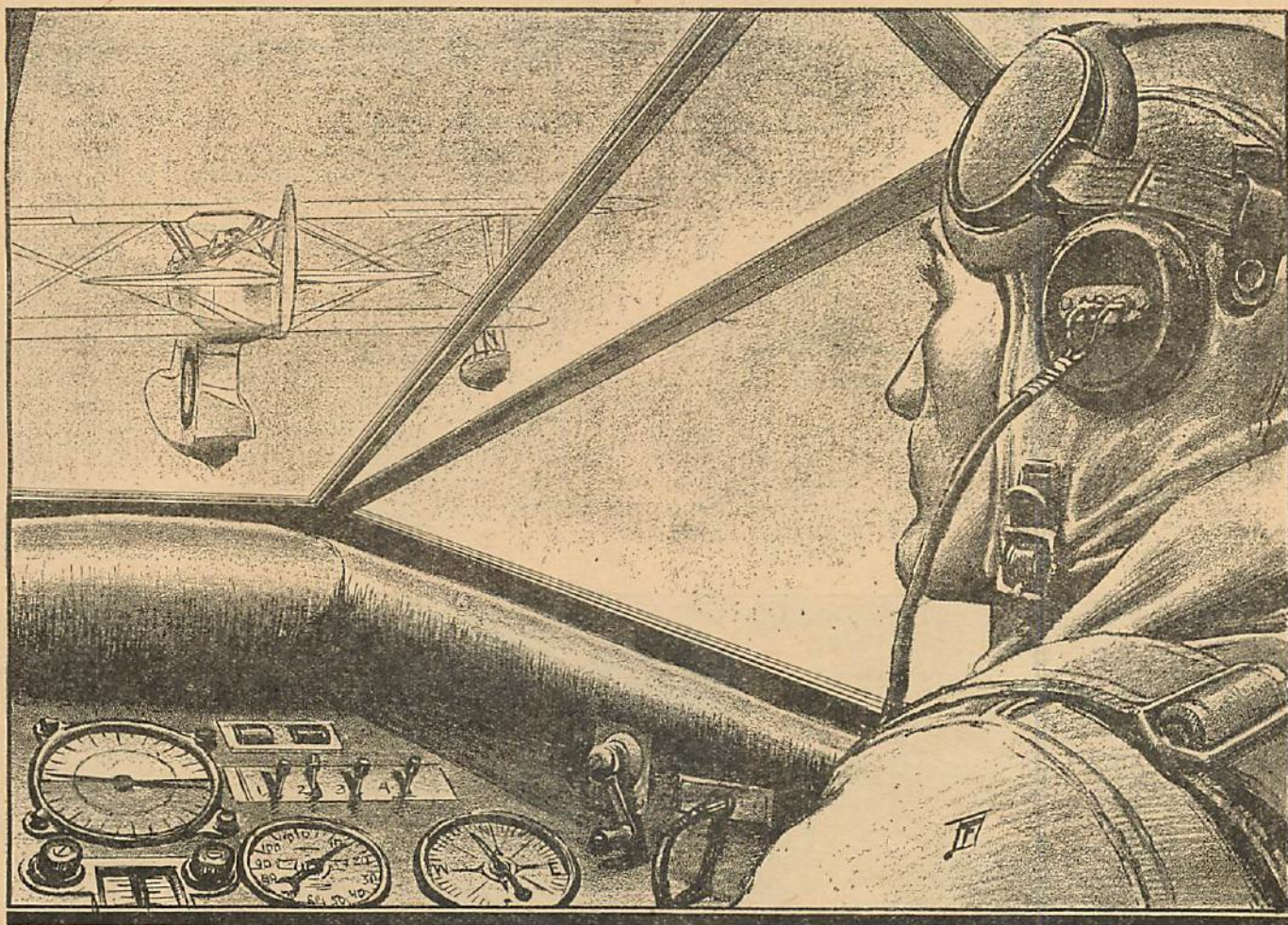
"But haven't you something to go on?" asked Bill. "Haven't you some idea who this man might be?"

"Yes. We're quite certain as to his identity. What happened to Max Stonge to-day cinches it as far as I'm concerned."

Bill frowned in perplexity. "And you can't put your hands on him?"

"No. That's the trouble. The man we suspect has been thought to have been dead for years. He was a notorious criminal during the prohibition era. He controlled bootlegging, dope, every racket in the East and the Middle West. He had a mob the size of an army with gangs in every city. He was able to crush out all opposition. He lived openly and laughed at the law. His income was in the millions. He was arrested repeatedly for murder and banditry and was never held or convicted."

"He became almost a hero to the public. He lived like a king, had a palatial residence on Long Island and a winter home in Florida. He owned speed boats, airplanes, armored cars. His equipment was valued at one time at five million dollars. He was known as King Zaro."



Bill saw a white biplane emerge suddenly from the fog dead ahead.

Bill nodded. "Of course, I remember him. You think—"

Drake cut him short. "Let me finish. King Zaro was making a farce of the law courts and the police. Finally, the department was set on his trail. He was classed as Public Enemy Number One. I was assigned to the case. We couldn't get a thing on him until we found a loophole—his Federal income tax returns. We checked up thoroughly and realized we had him for tax evasion. A prison sentence went with that. Then, when we went to arrest him we found that King Zaro had vanished. Every available agent was instantly put on the job. We traced him to Panama City and there his trail vanished into thin air.

"For years after that the search continued. I was kept on the case. We followed down hundreds of leads and found nothing. Then, two years ago we got a report that, when investigated, seemed to indicate that King Zaro had been killed and eaten by sharks in the Gulf of Mexico. We were pretty much convinced this had happened—until this Black Ghost thing came up.

"And we've definite reasons for connecting King Zaro with the Ghost. Listen. This Nicco in Miami is a big-time gambler. But, years ago, he used to be a gunman in King Zaro's

mob. He's now dying of leprosy. Max Stonge contracted the disease—and he used to be King Zaro's attorney."

Bill whistled noiselessly. "By golly—yes!"

"Two of Zaro's men have come down with the same virulent form of leprosy," went on Drake grimly. "That might be just coincidence. But not when you hear the rest. In the last month there have been five cases of the identical type of leprosy reported in this country. Stonge makes the sixth. And every last one of those victims had at one time been connected with King Zaro!"

VIII—TO THE SOUTH

BILL hunched forward in his chair. "Six of them! But, why would King Zaro be giving leprosy to his former gangsters?"

"We have to guess at that. He's probably using this disease to force his old men back under his command. Those six victims had all been successful from a money point of view. They wouldn't care to go back to the old life. They probably refused when Zaro ordered them to. That's why they got what they did. And by using them as an example, Zaro could put the fear of the devil into the others. That's only a theory but—"

Knuckles suddenly thudded on the office door. Drake stopped abruptly, came half out of the chair.

"Come in," said Bill.

The door opened. A grease-smeared mechanic, cap in hand, stood in the opening.

"Ship's ready, sir."

Bill was on his feet instantly. "Good. Come on, Drake."

The mechanic vanished and Bill and the agent followed on the run. The Stormer was poised on the concrete apron, its engines throttled down.

Drake was speedily helped into parachute harness, and installed in the rear cabin seat. Bill spoke briefly to Shorty.

"You're in charge. Don't know when I'll be back. Hold every ship for immediate action. Anything might happen."

"Right." Shorty's hard-bitten face was serious. "You'll have to admit my hunch was good after all, Bill."

"Your hunch—yeah." Bill whipped around as Tony came up.

"There was no time to change the radio, Bill," Tony said quietly. "I had to leave it the way it was."

Bill stifled a curse. "That's bad with that guy having our wave length. Don't try to contact me unless absolutely necessary. And be damn careful what you send out."

The pilot hastily climbed up to the cabin. He pulled on his helmet, connected the wires, jazzed the Diesels briefly, then released the brakes. The machine was rolling out onto a runway when Bill saw Sandy racing down the apron.

He stopped the machine and waited. The boy raced alongside, cupped his hands.

"When'll you be back, Bill?"

"I don't know. What do you want?" Bill asked, irritated by the delay.

The boy shouted to be heard above the engines. "Wanted to talk to you about some coins that—"

Bill snorted in disgust and rammed the throttle wide open. The thunder of the accelerated engines drowned out Sandy's words. The pilot gave him one furious glance and blasted the Scarlet Stormer down the gleaming runway and

long distance just before you landed at noon. Figured that the Black Ghost might gun out Nicco as he did Stonge. They've thrown a guard around the hospital. He's the last of the six victims alive. I got to know him pretty well when I was working on the Stonge case. That's why he won't talk to any one but me."

Bill held the Stormer to a steady climb. "There's no hope of saving his life or prolonging it? Can't the specialists do something?"

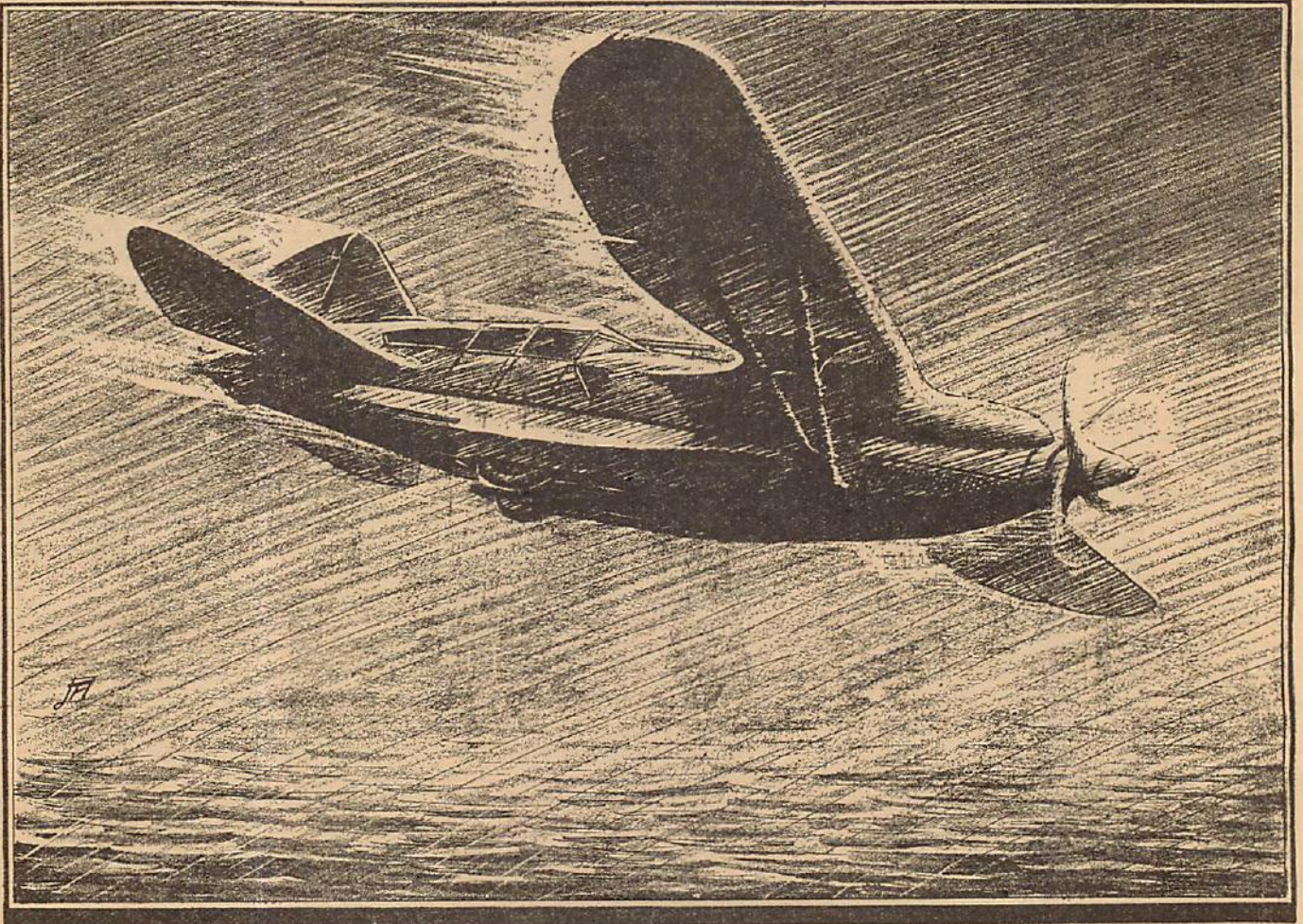
"The specialists!" Drake's voice was harsh. "Barnes, I've only told you about half of this thing. The rest is the worst. No, nothing can be done for Nicco. He's doomed. You mentioned specialists. Get this: Every last leprosy specialist on this continent and South America—is dead!"

"What!"

at that. Leprosy's been practically stamped out. The few men who specialized in it were pretty much in the background.

"Naturally, we traced back immediately and found that most of the doctors had apparently met accidental deaths; one had been murdered; another had committed suicide. But, we *did* find enough to convince us that the Black Ghost had deliberately planned their deaths. It's probable that even those specialists wouldn't have been able to do much with this new form of leprosy, but there you have the diabolical thoroughness with which the Black Ghost has worked. First he removed all hope of a cure, before giving the disease—"

"Only this morning, as you know yourself, word came that Dr. Lumsky, the famous Viennese skin specialist, had



The Stormer was thrown violently up on one wing.

into the air. He brought the ship around in a flat bank and headed down the sky road that led to Miami.

Once on his course, Bill connected the intercockpit telephone and spoke into the microphone to Drake.

"If everything goes O. K. we should be in Miami by six o'clock."

The agent's reply came over the ear phones: "Crowd her all you can. The sooner I get there, the better. I phoned

"There's not one living," went on the agent. "When these leprosy cases first appeared, the consulted doctors naturally went to call in specialists in the disease. That's when the astonishing discovery was made. No one realized until then that during the past year the half dozen or so doctors who had studied leprosy intimately, had all died. It may sound strange that the discovery hadn't been made before, but it's not so queer,

been murdered. He got it because Stonge was headed there."

Drake spoke rapidly, his words clipped. "But right now we've a group of doctors in Washington, working secretly and under guard. They're positive that they can cure this disease, but only if they get the patient within twenty-four hours of the time of the injection. After that it's hopeless. I'm telling you this, Barnes, for your own

information. You've been threatened with leprosy. If you're ever given it, rush at once to headquarters in Washington. And don't delay. That's your only chance. Twenty-four hours."

Bill sat motionless, his brain stifled by the full significance of the ghastly crime plot. The Black Ghost had left nothing to chance. He had planned his campaign of terror with a frightful thoroughness. He was moving relentlessly toward his objective—the overthrowing of the department of justice and the dominance of the underworld.

The Stormer streaked on, climbing higher and higher. The superchargers were working. The stony-faced pilot adjusted the pitch of the whirling propellers. The cabin was sealed and oxygen fed in. The altimeter went past fifteen thousand feet. Bill leveled off at twenty thousand. The speed of the hurtling amphibian advanced.

Both men were straining forward in their seats as if to will the plane to greater speed. Everything was centered on getting to Miami in time, before Death swooped and sealed the lips of the dying leper.

Drake talked coolly to Bill, telling him every last detail.

"If King Zaro is the Black Ghost, he would naturally have it in for the department. We ruined him. Broke up his empire. Drove him out of the country. If he's still living, the hate he must have for us has undoubtedly festered into madness. There's his motivation—revenge and the winning back of his former position.

"At the first of this week, James Morton, our chief, received a letter signed by the Black Ghost. In it he threatened the death of every department agent. The very next night four of our men were ambushed and slaughtered while on the trail of Whitey Roher.

"The thing is growing worse daily. Unless we get this madman, there's no telling what will happen. And our single hope is pinned on Nicco revealing something. The agents down there have tried to force him to talk. But he won't. He's suspicious of the whole lot. I'm the only one he trusts. It's up to me to get there. If I fail—"

Drake let the sentence hang unfinished and lapsed into silence. Bill was left alone with his thoughts. And through his brain, the whole picture that the agent had revealed re-passed for review in all its hideous details.

Under him the Stormer was racing nearer and nearer to Miami—and nearer and nearer to the seething destruction that was about to break as the Black Ghost prepared his hordes of criminal assassins for a fiendish offensive.

IX—MIAMI

THE STORMER landed at Palmetto Field on the outskirts of Miami as night

was swooping over the land. The flight had been rapid and uneventful. The amphibian was taxied to the hangar and left in charge of a competent crew.

Two taciturn government agents met them as they had stepped from the plane. Credentials were shown. Drake asked one question:

"Is he alive?"

One of the agents nodded: "Just."

They went directly to a dark limousine that stood in the shadow of the administration building, its engine purring. A uniformed chauffeur was behind the wheel.

The men embarked quickly. The car swung away from the airport. The agent seated next to the chauffeur placed a submachine gun across his lap. Drake and Bill were in the rear with the second government man who had eased his revolver out of a shoulder holster. The car turned sharply off the main highway into a deserted road that cut through the flat country. Ahead, the lights of the winter paradise of Miami cast a bright glow through the new night skies.

The powerful limousine picked up speed as the driver forced the accelerator to the floorboards. Bill could feel the terrific tension that gripped every man. No one spoke. Nothing was heard but the shrill singing of the treads on the racing tires.

The wilderness of tropical growth rushed by in darker tangled shadows on either side. The road was deserted. The powerful headlights cut like knives through the blackness that had fallen with true tropical suddenness. The stabbing ray of the air beacon at the field faded to the rear. The fast pace continued. They crossed a bridge. Damp air, heavy with the odor of marshland swept through the open windows.

Bill watched the headlight-bathed road ahead. His right hand involuntarily felt for the bulge of his automatic in his side pocket. His heart increased its beat as the tension grew. The road swung to the left. The heavy limousine swayed as it made the easy turn. And then—

Suddenly, not more than twenty-five yards ahead, an automobile spurted out of a narrow, side lane into the glare of the headlights and stopped, lengthwise, across the road, completely blocking it.

The driver of the government limousine cursed suddenly; slammed on his brakes. A dark figure leaped from the automobile ahead and dove for the scrub at the roadside. The distance that separated the onrushing limousine and the obstruction was eaten up in a split second. The rear wheels were locked. The tires were screaming. The car rocked violently. The headlights blazed. One of the agents shouted: "A plant!"

The limousine careened wildly, came up on one side, staggered back. Bill saw that they were going to hit. He braced his legs, threw his arms across his face. There was a terrific crash.

He felt himself shot forward. Something smashed into his head. The whole universe seemed to explode in violent fireworks. He heard a fearful grinding; the smashing of glass; human shrieks, and then, there was nothing.

His lapse into unconsciousness was momentary. His senses came back vaguely. An awful weight was on his chest. His body felt completely paralyzed. He had no sense of pain. He dimly realized that he was lying on his side in a twisted position. Acrid fumes stung his nostrils. Some one was groaning. He tried to move, tried to open his eyes, but agonizing pain stabbed him.

As if in a dream he heard voices; sensed that a beam of light was being played over him.

A gruff voice said: "Boy, what a mess! Look at this guy. He's washed up."

Bill knew that they were talking about him. He tried to tell the man that he was all right. But his lips wouldn't move.

Another voice came in: "This one's living. Pull him out. Hurry—"

The light went out. An eternity passed. Then again he heard the voices as if they were speaking from a great distance.

"It's Drake. Look—here in his pocket. He isn't hurt bad. That's a break. The king wants him. Get him over to the plane. Snap into it."

"What about these other guys? We just leave 'em?"

"You think we should arrange the funeral? Move. The cops'll be along any time."

And Bill knew no more.

X—NUMISMATIST

WHEN Bill had abruptly taken off from his home field that afternoon, Sandy Sanders was left standing on the concrete apron, still talking. He stopped, stood wide-legged, planted his fists on his flat hips and looked mad. The Stormer boomed down the runway and shot into the air.

"Gosh, he didn't even listen," the boy said in disgust.

Shorty walked over. "What's the matter, peewee?"

The boy inclined his head at the now distant Stormer. "I wanted to tell Bill something. You'd think he'd have waited."

"Say, Bill's in a hurry. He couldn't be bothered listening to your chatter. Who do you think you are, anyway?"

Sandy shot him a superior look. "It happens that I'm a numismatist."

Shorty blinked. "A what?"

"Numismatist, is the word. N-e-w-m-i—" The boy faltered. "Anyway—numismatist."

"Is that a fact?" Shorty shook his head slowly. "Well, that's how it goes. You see a guy practically every day for years and yet you never really get to know him. Now me, for instance. I always thought you were from Kansas, peewee."

The boy sighed. "I might have expected you wouldn't know what numismatist meant. When speaking to you I should have simply said that I'm a collector of coins."

The veteran ace looked searchingly at Sandy. "So that's what you are? Successful at it?"

"Extremely," said Sandy.

Shorty moved closer. His words grew honeyed. "You're just the guy I want to see, old palsy-walsy. Could you slip me a ten spot until pay day?"

The boy scowled. "You don't understand. The coins I collect are rare."

"You and me both," said Shorty. He grinned. "What'd you want to see Bill about?"

"Some coins."

The grin left Shorty's face. "Now look here, shrimp. You should know enough not to bother Bill with that hokey. If you want to have some cracked-brained hobby—O. K. But keep it to yourself. A couple of guys are killed; Bill goes dashing off with the G-men's ace man hunter and you're sore because he wouldn't have a cup of tea and chat with you."

The quick flash of anger that swept across the boy's face receded. He seized Shorty by the sleeve and moved closer.

"You've got me wrong. This may be important. Listen here." His voice went to a whisper. "When Stonge comes into Bill's office this morning, he dumps a big parcel of bills out of a wallet onto the desk. And some coins fall out and roll to the floor. He's in too much of a hurry to bother about them. Well, after they leave, I go back and hunt around. I find two dimes and a silver dollar. The silver dollar's been worn smooth and I see some pin-like scratches on the back of it. I'm studying coins, see? So, just for fun I take them up to my room and look at 'em through a magnifying glass. I got a beaut. I take a look at the back of this silver dollar. And what do I find?"

"I'll bite," said Shorty. "What?"

Sandy's voice trembled with excitement. "Under the glass those lines are really a series of letters and numbers and marks engraved in the metal. They're so small you can't see 'em with the naked eye. Golly, I think it's a code, Shorty. I copied it down on my typewriter. I was trying to figure it out when I heard the Stormer's figures.

That's what I wanted to tell Bill about. Maybe it's got something to do with Stonge."

"Let's see it," said Shorty abruptly, his bantering tone gone.

Sandy led the way to his room. Once inside he closed and carefully locked the door. He peered out the windows and then tiptoed across the room, bent down and raised one of the floorboards. Underneath was a shallow crevice holding three silver coins. He picked them up and brought them over to the table where a magnifying glass was lying.

"Take a look at the back of the dollar," he whispered.

Shorty picked up the magnifying glass in one hand and held the silver dollar in the other. He saw the three fine lines scratched on the back of the coin. He focused the glass. The lines abruptly became clearly defined letters, punctuation marks, and numbers.

n.m6yc.5i.vc3b6ct99.4b6c
8,j5b8exvi,j5vc.vbb.ite
b.3,ym95c2ctvcb,2b.3.c

"You see it?" asked Sandy eagerly.

Shorty squinted his eyes and inspected the markings thoroughly. "I see, all right. It's an awful jumble."

He put the coin and the glass on the table.

"I betcha it's a code," the boy said darkly. "I'm going to try to decipher it. I've copied it out on the typewriter." He gestured to his portable machine on the stand near the window.

Shorty went over and looked at the sheet in the machine on which Sandy had faithfully copied the markings. He turned back to the boy.

"It probably means nothing, kid. But you might radio Bill about it." He snapped his fingers suddenly. "No. You can't do that. I heard him tell Tony not to get into communication with him unless absolutely necessary. Well, if it turns out to be anything, we'll let him know then. See what you can make of it."

Sandy was trying to make something of it until two o'clock the following morning. The floor of his small room was littered with crumpled pieces of paper, heavily penciled. The boy's face was pinched and haggard. His hazel eyes were red-rimmed. He had made no progress.

The telephone rang sharply. He picked up the receiver and answered.

It was Shorty. He said: "Kid, I got some tough news. Bill's seriously hurt. Automobile accident. He's in Grover Street Hospital in Miami."

XI—ISLE DESPAIR

IN THE WATERS of the Caribbean Sea, a few miles off the rugged coast of Santo Rico is a small island. It is rarely seen and never willfully visited. Razor-sharp coral reefs lurk just below

the surface of the sea on all sides. Steamship lanes give the district a wide berth. The island is overgrown with lush, tropical vegetation. Its matted sides extend upward in gradually rising slopes to a high, level plateau.

The climate is warm and unchanging. Luscious fruits abound. The scenery is unparalleled. It has the setting for a paradise. But it was man-made into a hell. It is known as Isle Despair.

The island has a grim history. In 1890, Santo Rico was visited by a devastating plague of leprosy. Thousands died of the disease, and thousands of others were doomed to a living death. Frantic attempts were made to check the disaster. The afflicted persons were segregated and speedily dispatched to the then-deserted island off the coast, there to remain for the duration of their lives. Nothing was done for them except the building of a few crude shelters. And there they were left, isolated by their fellow men and isolated by nature.

The plague of leprosy died out on the mainland. But each succeeding year a few new cases came to the notice of government officials. These were promptly shipped off to Isle Despair to join their fellows in the death exile. No one ever returned.

And then, in 1910, a violent hurricane swept out of the Caribbean and smashed its way southward. Its center passed directly through Isle Despair. The wind-lashed waters roared over its shores. Trees were torn up by their roots. The lepers' shelters disappeared. And when the howling twister had passed, there remained but twenty-five persons alive out of the hundreds that had inhabited it.

The storm, with the resulting awful toll of life was, perhaps, a blessing. It focused the public attention on Santo Rico on the deplorable conditions that had been allowed to exist in the leper colony. A wave of reform swept the government. Adequate houses and community buildings were speedily built on the island. Modern sanitary equipment was installed. A small, up-to-date hospital was erected. A Dr. Gonzales, a clever young Santo Rican physician, volunteered his services and was sent as resident doctor.

And gradually public interest again waned and Isle Despair became virtually forgotten. The administration of the affairs of the island and the inhabitants was left more and more to Dr. Gonzales until he became a one-man government. He enjoyed his power and was able to spend most of his time laboring in his laboratory. The government never interfered with him. And, as medical science in the world advanced, there were but few new patients to swell the small population. No one ever visited the island except for the

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On the early morning of December 16th, 1936, as dawn glowed up from the east, four biplanes, painted dead white, droned south across the Caribbean until they were high over Isle Despair. There they circled.

Far below, near the center of the island a strong light winked on and off. The pilot of the first biplane cut his engine, and went down to land his ship on the smooth turf of the level plateau.

Squat, hangarlike buildings were concealed in the trees and matted undergrowth that bordered the clearing. Two men ran out from a hangar, grasped the biplane's wings and guided the ship in through the open doors.

The remaining planes landed in one-two-three order. Each one was of identical design and was painted white. Two of them were twin-seaters.

From the rear cockpits of these ships, two limp figures were removed and immediately carried down a narrow trail that snaked down the slope. Halfway down, a small path intersected with the main one and led to a large cave-like opening in the rock. The unconscious men were carried inside.

The pilot of the first plane continued down the main trail to a group of build-

ings far below, where the lepers lived. A few men and women who were moving around the building scattered immediately and disappeared. The pilot went to the door of the most pretentious building and knocked.

A muffled voice bade him enter.

He opened the door. Inside was a large room. It was expensively and pleasantly furnished. Bamboo screens masked the windows. At the end of the room was a long desk. A figure sat behind it—a figure of a man, garbed from head to foot in black garments. A hood covered his entire head. Only his eyes showed through slits in the mask.

The pilot stood near the door and saluted.

"They're here, your excellency," he said.

The man in black gestured with a gloved hand. His voice was a whispery husk when he spoke.

"You and your men are to be commended. See that the two prisoners are carefully guarded. Let each remain in ignorance of the other's presence. Feed them and answer no questions. I will interview them later. That is all."

The pilot again saluted, turned smartly around and went out, closing the door after him.

The black-garbed man stood up and crossed the room to an inner door. He opened it.

"You hear that, Dr. Gonzales?" he said. "They're here. At last I've got them."

The room beyond was a long, white-tiled laboratory. It was spotlessly clean. A seedy-looking man in a filthy white smock came out of it. His eyes were red-rimmed, his gaunt face dissipated. He wore an untrimmed Vandyke and a scraggly mustache.

"Yes, I heard," he growled. "And I'm sorry for it. It would have been better if those planes had fallen into the sea and destroyed the whole lot." He spat in the direction of a wastebasket. "You're a fool to do this. We were going all right until you got this notion. Now, anything can happen. Why didn't you shoot them down and be done with it? Less trouble—"

The man in black sat down at the desk. "You watch your tongue, Gonzales. You drink too much lately. I know what I'm doing. And I won't be interfered with. You've been very useful up until now—but, remember, doctor, you're not essential to my scheme."

Dr. Gonzales chuckled mirthlessly. "Not essential, eh? Just what would happen if I talked to the government about what's been going on here? It'd make a pretty story. Imagine what would happen if I said that the much-sought-after King Zaro was one of my patients here, eh? That he's changed

his name—that he's the Black Ghost—that he's using the island for his base of operations—eh? Where would you have gotten if I hadn't experimented and discovered this new form of leprosy? Not essential! You wouldn't last much longer without me. I'm the only man who can keep you going and you know it. You'd be like those other lepers, weak and useless. Not essential, you say!"

The man in black looked at him, his eyes shining through the mask holes.

"You are right, my dear doctor. I was hasty. But do not forget. If you talked, you would be putting a noose around your own neck. You haven't been any saint. When I arrived here I found you a tyrant, using your patients like slaves. You have taken my money and become my partner in crime. We will share the profits—and also any losses."

He shook his head. "Enough of that. I am thankful for what you've done for me. If we continue to work together as we have in the past, we will have unlimited money and power. My plans are advancing rapidly. With these two prisoners in my power, the first step is made. My—our—reign of terror will soon commence. We cannot fail."

Dr. Gonzales rubbed his hairy face. "Well, be careful. I don't want any government investigation. These planes make an infernal racket. Some one's liable to wonder about the activity around here. But go ahead. I am with you. The plan seems flawless. All we must watch is the divulging of this place as your headquarters."

"No one's ever going to find out. I will go now and speak to Stephen Drake. The other will be held in solitary confinement. He will not be allowed to see anything."

The man stood up, crossed the room and went out.

XII—THE THREAT

HE MOVED slowly up the trail until he reached the cross path. He turned and entered the cave-like entrance.

A man, clad in white drill, was standing at the entrance, a heavy revolver strapped around his waist. He came instantly to attention.

"Take me to Drake."

The man led the way into the back of the cave and through a narrow opening into a narrow passageway. He stopped before a metal door fitted solidly into the rock. He took a key from a ring, inserted it in a lock and turned. Heavy bolts slid. The door swung open.

Inside was a small cell. It was in semilight, bars of sunshine cutting through from a small window high up in one wall. Stephen Drake was standing, his feet spread apart, his fists

clenched, staring toward the two men in the doorway. His clothes were ripped and stained. A white bandage was wound tightly around his head. His hair was stiff with dried blood. His face was pale and his eyes hard.

The guard had his revolver out and leveled. He moved inside, gesturing Drake back. The man in black followed. No word was spoken until he said: "Mr. Drake?"

The department agent was staring fixedly at the strange black-garbed figure.

"Yes."

"Sit down." The man indicated a small camp cot with a gloved hand. He himself lowered himself to the only chair in the cell. "I've come for a little talk with you." He turned to the gunman. "Watch him well, Gus. He is a reckless fool. If he should attempt anything, shoot him in the stomach. That's where it hurts."

The guard nodded.

"You probably know why you've been brought here, Drake," the other went on. "You were captured while on your way to see a man afflicted with a strange form of leprosy. You were under the delusion that this Nicco would be able to tell you something about the Black Ghost, who he was, and where he lived. I saved you that trouble. I had you brought here so that you could see for yourself. I don't need to introduce myself."

Drake scowled. "No. I know you're the Black Ghost and I also know that you're King Zaro."

The man in black nodded his head. "Excellent deduction. You are correct. The intelligence of department of justice men must be improving. You used to be a stupid lot."

"Perhaps," said Drake. "But we were smart enough to force you out of the States."

King Zaro's gloved hands clenched. His voice was calm when he again spoke.

"And for that you and the others will pay. Before many months are over, the department of justice will be just a memory. You will stay here, Drake, as my guest. And perhaps you would like to know that I also brought another guest along. He's a very valuable man. I am holding him for one million dollars' ransom. If my instructions are followed and the money is paid, he will be returned. You must know him well, Drake, for he's your esteemed chief, the head of the department—James Morton."

The agent blanched. His eyes darted for one fleeting second to the revolver in the hand of the guard. He sank back on the cot.

"Morton—here?"

King Zaro laughed. "He's here. It was very easy to take him. My department of crime agents merely over-

powered the men in charge of his car as they waited before his residence in Washington. Morton came out, was chloroformed and brought here by plane. Simple. Upon the payment of one million dollars he will be sent back—but only after he is injected with leprosy."

Drake leaped to his feet.

"Why, you—"

The guard pulled the trigger of his gun. The explosion blasted through the narrow confines of the cell. The bullet flashed past the agent, with inches to spare, smashed against the stone wall and ricocheted wildly. Drake stopped short.

"Enough of that," said King Zaro. "Sit down. You did well, Gus."

Drake's eyes blazed furiously as he resumed his seat.

"You can't get away with this sort of thing, Zaro. You'll be caught. You'll be shot down like the mad dog you are."

"I am not afraid to die. I have been facing death for years. You see, Drake, I myself have leprosy."

Drake started.

"And you and your fellows are entirely responsible," went on King Zaro. "You forced me to flee. You trailed me down to Central America. I was the one who circulated that report about my death in the Gulf of Mexico. Instead of that I was in the jungle. A family took me in and hid me. I didn't know that one of them, the daughter, had leprosy. She gave it to me. Your activities forced me to remain in hiding and I was unable to get the treatments that would have cured me. There was no way out until it was too late. I went to Santo Rico. There was no chance of recognition. My face had changed. Changed!"

The man's voice suddenly rose to a shrill pitch. "I used to be handsome. But this damnable disease has given me a new face, a horrible, animal face. I'm afraid to look in the mirror. I will allow no one to see me with my mask removed. I was sent for treatments in Santo Rico. The doctors pronounced me incurable and sent me to Isle Despair. That's where you are now. Not that you'll ever have the opportunity of telling any one."

"They brought me here to die. I found Dr. Gonzales in complete charge. He ruled the place. I was able to get my vast fortune smuggled here. The doctor and I got together. We talked over a plan. He agreed to help me. No one ever came here. We could work openly. The lepers were completely under the dominance of Dr. Gonzales. I contacted some of my old lieutenants. They were still loyal. We proceeded with the groundwork of my plan. I had plenty of money. Hangars, machine shops, storerooms were built up there on

the plateau and masked by the heavy vines and creepers. I had planes purchased and flown here. We brought in mechanics and machinery. I flew many times to the States to supervise operations. Guns and ammunition were smuggled through and stored here. And all the time you thought your old enemy, King Zaro, the clever fox, was dead." The man laughed harshly.

Drake remained quiet, his face impassive.

Zaro was hunched forward. "I enjoy telling you this, my friend. It will show you that I am still just as clever as ever. My scheme called for the reunion of my old organization as a nucleus around which the underworld would be united. But I realized that I might have some difficulty with certain members of my old crew. Dr. Gonzales has been experimenting with leprosy for years. He had discovered a new and deadly form of the disease. It was my idea to use this on any of my old comrades who went against my wishes. I could hold the threat over the others. Their unswerving loyalty would be assured.

"We tried the injection on several of the lepers here. It was very successful. They died rapidly. But before I sent orders out for the reunion of my organization, I carefully prepared the ground by exterminating all the doctors who specialized in leprosy. It was just a precautionary move. And now there is only one left, and all the fools outside have forgotten him. He's here—Dr. Gonzales.

"You probably know the rest. Last month I learned that six men had refused to obey my orders. The injections were given. They are now all dead. Oh, yes, you might be interested to know that Nicco lived until ten o'clock last night and when you didn't turn up, he got tired of waiting and died. No, he didn't talk. You see, you would have been in time if you hadn't had that very unfortunate accident."

The agent gripped the side of the cot tightly. "What about the others in the car?"

King Zaro shrugged. "Two were killed instantly. Another died later. Bill Barnes is still living, according to

my last radio reports. He is in Grover Street Hospital in Miami. I rather hope he pulls through. He's caused me undue trouble. He's destroyed one of my planes and killed one of my pilots. I have promised to give him this new leprosy. I don't like to go back on my word."

Drake watched the man in black, his eyes mirroring his horror. King Zaro was violently insane. The fact that he was babbling on, boasting of his accomplishments and his ambitions was definite proof. The agent sat back on the camp cot, his body unrelaxed, and said nothing.

King Zaro rubbed his gloved hands together. "You must admit that I am brilliant. And the whole world will feel the full force of my genius. My plans are laid. Already operations have started. A number of department agents have already gone down before the guns of my loyal men. And more will be slain. Next week my crime schedule calls for the wholesale robbery of a city in New Mexico. It is in an isolated part of the country. Its banks will be loaded with money at this time.



The limousine careened wildly. Bill saw that they were going to hit— There was a terrific crash.

The campaign has been minutely planned. My men are ready. All lines of communication will be severed. We will smother any opposition with poison gas. The treasuries will be looted. A fleet of planes will be held ready to remove the loot and the men. We will strike like lightning and get away before any of your law enforcers will have a chance to act."

Zaro's voice became fainter, huskier, as he talked on. His eyes gleamed insanely at Drake through the holes in the mask.

"After that happens, I will return the esteemed James Morton, if my directions are followed. But you, Drake, will remain here as a safeguard against treachery on the part of your associates. I hold you responsible for what has happened to me. You were the agent in charge of the investigation. You were the one who pressed the tax-evasion charge.

"I must wear this mask until my dying day because of you. And you will be repaid for your trouble, Drake. A close guard will be kept over you. Then, later, you will be injected with *bacillus leprae* germs. Leprosy will sweep through you. Your flesh will ulcerate and whiten; your sight will weaken; your voice will be reduced to a hoarse whisper as the membrane of the throat thickens. Mutilation of fingers and toes will follow. The bones will be destroyed. The members will fall off. Lumpy excrescences will form on your face; the skin will thicken and sag. You'll never recognize yourself. And during those four days of dying you'll be locked in a room with mirrors on every side. You'll watch yourself change into a lion-faced man—a monstrosity. You hear me!"

Zaro came to his feet, his arms raised, his voice shaking with wrath. "Your face will change as mine changed. You'll look no longer human. You'll shriek in horror as you gaze at yourself in the mirrors. And then—you will die!"

The violent outburst seemed to utterly exhaust the man. He fell back against the wall, his thin shoulders stooped, his gloved hands clutching at his throat. A muffled cough came from under the mask.

The guard looked concerned. "You are all right, excellency?"

The Black Ghost straightened up, and moved toward the door. "I am all right," he said faintly. "I grew too excited. It is bad for me. I must go now and rest."

He stopped in the doorway and turned back.

"I will see you again, Drake. Think over what I have said—and suffer."

He went out. The guard followed, closing the cell door. The heavy bolts thudded back into place. And Stephen Drake was left alone.

XIII—INSTRUCTIONS

TEN DAYS from the time he had been admitted to the hospital, Bill Barnes was able to leave his bed and walk across the room. His injuries had readily responded to treatment, but his left side was still tightly strapped, holding in place two fractured ribs. The marks from the innumerable lacerations decorated his bronzed face. A dislocated shoulder was stiff and sore.

A strict guard had been kept over his room. No one but department of justice agents had been admitted. Even the members of his own band of aces had been forced to content themselves with terse hospital reports as to his condition.

A pretty nurse, immaculate in white, starched uniform attempted to help him across to the easy-chair by the window. But he made it under his own power. He sank down and stretched out his long legs.

"Boy, it's a relief to get out of bed," he said.

The nurse nodded. "It must be. When they brought you in here we didn't think you'd be doing this for months."

He had been unconscious for twenty-four hours after the crash. And not until ten more hours had elapsed did he hear the details of what had happened—that the chauffeur and the two agents had been killed and that Drake was missing. Then, later on in the day, he learned the rest.

The Black Ghost had notified the department of justice that he had kidnapped both James Morton, the head of the department, and Stephen Drake, and was holding them. A week had passed before any further word had been received from the kidnapers. And then, negotiations were opened through the medium of a Canadian paper.

Shortly after Bill had been seated at the window, Walter Robinson, a department agent, came into the room. He was carrying an extra edition of a Miami paper. He gestured for the nurse to leave.

"Don't stay too long," she whispered as she went out.

Robinson seated himself in front of Bill.

"How're you feeling?"

Bill shrugged, and winced. "A little stiff but O. K. Anything new?"

The agent nodded. "Think you could handle your Stormer the day after tomorrow?"

"Could I? Say, that's just the thing that would fix me up. Something moving?"

The agent slapped his knee with the folded paper. "Plenty. Too much. Listen: The Black Ghost struck last night. Stuck up Colville, New Mexico. Got away with ten million dollars.

Slaughtered hundreds. The job was done to a fare-thee-well. All lines leading from the town were cut—telegraph, phone. A static machine drowned out all radio messages. Gas and electric current disconnected.

"The raid was timed perfectly. Poison gas bombs were exploded in every part of the city, at precisely eleven o'clock. The police were helpless. The raiders wore gas masks, and they shot their way through. Looted every bank and every source of big money. Blew vaults apart. Made a clean sweep of it. No word got out to the outside until six hours afterward. They had a fleet of planes. They loaded their stuff aboard—and vanished."

Bill was aghast. "That's incredible."

The agent opened the paper. A huge headline was smeared across the front page: COLVILLE LOOTED; HUNDREDS SLAIN.

"It's true enough. Every available army, navy and civilian plane is out searching for them. They haven't been sighted yet. And won't be—or I miss my guess. This thing was planned too perfectly for a slip-up. And then, right on top of that news, we get a communication from the Black Ghost. He boasts about the Colville job and tells us there'll be more. But the main part of the message consisted of giving us careful instructions how the chief, James Morton, is to be returned and how the ransom money's to be paid. That's where you come into the picture, Barnes. Or I hope you do."

Bill leaned forward. "Go on."

"Here's his plan. We'll have to go through with it. An Oceanic air liner will take off from its base at San Diego at four o'clock in the afternoon, day after to-morrow. It's to head on its usual course toward the Hawaiian Islands. The million-dollar ransom is to be on board, securely tied into a bundle. Sometime, somewhere, the Black Ghost's planes will contact it, after they assure themselves that there are no other ships in the sky. One of the planes will fly over the liner. A line will be dropped. The parcel of money hooked on. They'll draw it up. And then—if everything is satisfactory to the Black Ghost, Morton will be dropped in a parachute."

"A clever scheme," said Bill. "He isn't taking any chances. But what if he double-crosses you, takes the money and beats it?"

"The Black Ghost warns against treachery on our part. He's holding Drake at his place to be returned later. If his planes are attacked before or after the contact, or if they're followed, he warns that Drake will be killed. That ties our hands completely. But we have to take a chance.

"You enter into things this way: Your Stormer is equipped for high altitude flying. We want you to pilot it at

this time. You'll fly well to the north and at your ceiling on a parallel course with the air liner. Your plane will be out of sight. You'll be in close touch with the liner by radio."

Robinson got up suddenly, crossed the room in rapid strides and threw open the door. No one was there. He returned and sat down, drawing his chair closer.

"I just wanted to make sure. No one must overhear what I'm about to tell you." His voice became so soft that Bill had to strain his ears.

"A certain instrument is being installed in your Stormer—a supersensitive audiphone. It will register the sound of an airplane engine for fifty miles. I don't begin to understand how it works—but it does. Somehow it is so tuned or arranged that the noise from your own engines won't affect it. There's a needle on a dial. The needle sways to right and left. When it's at dead center you're headed straight for the origin of the sound. Over the dial is a small yellow electric bulb. The intensity of the light from it increases the nearer you come to the sound's origin.

"This is the plan: After the money is handed over and Morton dropped, the air liner will land to pick him up. And it will stay down there for some time, its engines cut. The enemy fleet will, by that time, be high-tailing it for home. From then on, it's up to you. By using the audiphones you will trail them, keeping out of their sight. All we want you to do is learn where their base is. Understand?"

Bill twisted his head. "I get it all right. It's smart. The contact will be made late in the afternoon. The darkness later on will help me. I won't have to stay so far away. And once the sound is straight down below, I'll know they've landed. That's all I'll want to know."

"You feel up to taking this job?"

"Say, try to keep me off it."

Robinson sighed. "That's a load off my mind. We were afraid you mightn't be in shape. Without you and your Stormer we'd hesitate trying this. You must realize that if you make any mistake and reveal your presence, Stephen Drake will die. You simply *must* keep miles and miles away all the time."

"I understand that," said Bill grimly. "And if Morton isn't returned or he's dead when he is, I follow out the same scheme?"

"Precisely. That'll make it all the more necessary for the locating of the madman's hidden base." The agent's expression was bleak. "We've got to get him, Barnes! Look what he did last night. Killed hundreds of defenseless people. We've simply got to get him!"

"You needn't worry about my lack

of interest, Robinson," said Bill quietly. "Stephen Drake is my friend—"

He didn't say anything more.

"I understand. I only hope we can get to him before anything happens." The agent stood up. "Your Stormer is being thoroughly checked over and fueled. Your own radio technician has worked over your radio and changed your wave length to conform with the changes made at your field and on your other planes. The set aboard the air liner will be tuned in with yours accordingly."

He extended his hand. "The day after to-morrow, then. You'll receive additional instructions."

Bill took his hand in a tight clasp. "I'll be ready."

XIV—RANSOM

TWO DAYS LATER, at precisely five fifteen in the afternoon, Bill sat in his Stormer at fifty-two thousand feet and listened intently to the voice that was coming over the ear phones.

"Aboard the Oceanic liner, *Meteor*. Proceeding in due west course." The radio operator gave intricate position readings. "Check, Barnes?"

"Got it. Everything O. K. here—at fifty-two thousand. Engines throttled down. Keeping even with you."

"Leave your set open, Barnes. More later."

"Right."

Bill's eyes studied the instrument board intently. High up, on the left-hand side, was the new audiphone dial. Its needle had swung at right angles and was pointing toward the left and south. The yellow light above was glowing. He realized that it was probably registering the roar from the multimotored air liner many miles away to the south. He carefully checked and re-checked his course.

The weather was giving the scheme an unexpected advantage. Clouds were massed solidly far below, the pilot sat uncomfortably erect, his body stiff and sore. The superchargers were working; the cabin had been sealed—the oxygen turned on.

Bill shifted the amphibian's direction a trifle to the north and then swung back again due west.

The radio operator aboard the *Meteor* that carried the million-dollar ransom called again.

"No planes sighted yet."

And again the same report came ten minutes later.

Bill kept the Stormer on its course and waited. His nerves were throbbing in his temples. The tension was growing by the minute. Would everything work out as planned? Would he later be able to follow the enemy planes to their base? He realized fully the tremendous responsibility that rested upon



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his shoulders. He alone could find the way to the Black Ghost's base. He alone could bring back news that would save his country from the peril of the Black Ghost. And yet, one slip—if he got too near—if the enemy observed him—all would be lost. And the Black Ghost had threatened to kill Stephen Drake if his instructions weren't followed to the letter.

At five thirty, the *Meteor's* radio operator sent a position reading and reported nothing new. Bill checked the reading carefully.

Then, exactly three minutes later the operator's voice broke over the ear phones excitedly.

"Sighted planes, Barnes. Heading up from the southeast. Looks like a whole squadron. Too far away to tell yet. Stand by—"

Bill sat, tensely waiting. The Diesels were throttled far down and the air-speed indicator dragged in an unaccustomed position.

Again: "Heading for us. Ten—no—fourteen—sixteen ships. Sixteen—heading straight up here. No other planes in the sky. Closer now—closer. Flying in fighting formation. Higher than we. Eight thousand. See them clearly through the glasses. Amphibian landing gear. Biplanes. Single-seaters and double. Painted white—"

Bill flew his ship automatically, drinking in the operator's words. In his mind's eye he saw the picture—the mammoth four-engined Oceanic air liner droning westward and, sweeping toward it, the tight formation of the Black Ghost's ships. His heart quickened. Drama was riding the skies. James Morton, the head of the department of justice, was being returned in exchange for one million dollars. The Black Ghost was staging a spectacular act.

The radio operator on the unseen *Meteor* talked on, his voice trembling with excitement, his words clipped.

"They're overhead—circling. It's the enemy all right. Formation now breaking up. Planes diving in every direction. Seem to be taking up definite positions. They've surrounded us. Ships to right and left, below and behind. One cabin plane is circling right overhead. The money's ready here. Tied up securely. We're waiting. Our co-pilot's opened his hatch, signaling. The cabin plane's swooping nearer—nearer."

The voice stopped for a long minute. "Everybody's excited here. The cabin plane's coming swooping back. They're lowering a cable. It's being looped back by the wind. There's a weight on the end. The co-pilot tried to get it and missed. You getting this clearly, Barnes?"

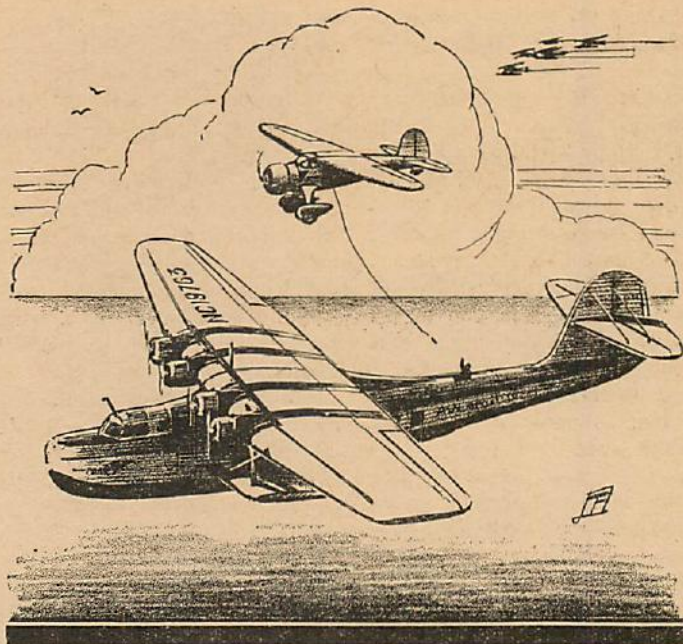
"Yes." Bill's fingers trembled as they held the microphone to his mouth. His

eyes swept over the audiophone instrument and he saw the needle was stationary, pointing dead south. The light above was now a blazing yellow.

"Enemy cabin ship banking around—trying another contact. Tricky stuff. Flying right above now, at our speed—lower—lower. The end of the rope is almost dragging over us." The voice suddenly increased. "He's got it! The co-pilot's grabbed the rope. The cabin plane holding exactly to our speed. They're hooking on the bundle of money now. Doing it quickly. The co-pilot signals. The rope's released. The cabin ship moves higher. The bundle is swinging back at the end of the rope—free now. They're pulling it up quickly. The other planes are holding to their positions. There's nothing we can do but wait. They're pulling in the rope. The ransom bundle's almost in their hands. There—they got it!"

Again there was a short silence. Bill felt perspiration running down his face. The enemy had the ransom. Would James Morton be turned loose? There was nothing to do but wait. He instinctively pulled the *Stormer* higher and checked his course. His part in the risky scheme was about to begin.

The *Meteor's* radio operator spoke again: "We're waiting, Barnes. The cabin ship's circled higher. The other planes are still maintaining their positions. They've got us bottled up. We're completely at their mercy—Wait a minute! The cabin ship's diving down, swooping low overhead. Some one aboard signaled 'O. K.' with a light. It's zooming higher. The other planes are diving away from us, banking around to the south. They're climbing, getting back into battle formation. The cabin plane's keeping clear of them. They promised to drop Morton in a 'chute—"



The man's voice rose shrilly, blasting in Bill's ears. "Something's being dropped from the cabin ship. It's falling away. It's a man— He's spinning straight down for the Pacific. Can't see from here if he's got a 'chute. The enemy ships are heading away, heading south. The man's still falling—yes—a 'chute! He's got a 'chute—it's opened!"

Bill waited, breathless from the suspense. He wouldn't receive the signal to start his strange pursuit until the *Meteor* landed and cut its engines.

"We're going down, Barnes. The 'chute's settling quickly, being blown to the east. We're going down for a landing. Engines being throttled— Stand by—"

The famous pilot crouched forward, waiting—waiting. He forgot his aching body, forgot everything but the hair-raising job that confronted him. Any minute he would get the word to go—

"We're down, Barnes. Taxiing in the direction Morton will land. He's alive all right. I can see him moving his arms. We're stopping near the place he'll contact the water. The collapsible boat is being lowered over the side. The co-pilot's dropping into it. They've killed the engines. Here's your signal. O. K., Barnes, get going and Heaven help you!"

XV—RECALL

BILL BARNES banked his *Stormer* gradually to head into the south. His blazing eyes were riveted on the audiophone dial. The needle was swinging wildly, swayed past the marker. The pilot nudged the controls. The needle flickered almost on the mark, then stopped dead over it. The *Stormer* was headed straight on the trail of the fleeing enemy ships!

Bill jerked the microphone to his

mouth. "Everything O. K. here. Following. Engines reduced. Will add to my altitude."

He listened eagerly for the *Meteor* operator's reply.

"Good. Watch your step. Keep her down around two hundred. Enemy fleet almost out of sight now. Boat near at hand. They're pulling Morton in now. Gathering up the parachute. The co-pilot's waving his arm back here. Looks as if everything's O. K. Keep you informed. Carry on—"

The yellow bulb over the audiphone dial was glowing brightly. Bill's eyes swerved up to shoot a quick, searching glance at the sky ahead. Below, the clouds continued. The directional needle on the dial stayed stationary on its mark. The Diesels were throbbing under a reduced throttle. The Scarlet Stormer, its broad, gull wing shimmering in the late afternoon sunlight, drilled on and on.

It was ten minutes to six.

Bill had left his radio set tuned in. The clear voice of the air liner's operator was heard again.

"They're rowing back to the ship. It's Morton all right. I can see his face clearly now. They're pulling alongside. Morton's being dragged up on the deck. Here he comes down through the hatch. He looks as if he's been through something. He's dropped down on a seat— Wait a minute—"

There was a two-minute silence. When the radio operator's voice sounded, it was hoarse and excited.

"Barnes! You'll have to come back here—quick! You're to fly Morton to Washington. They've given him—leprosy!"

BILL'S HEART thudded into his throat. He brought the Stormer whirling around, shoved the stick forward and headed back. The throttle was jammed forward. The engines picked up speed.

They had given Morton leprosy! The awful truth jabbed into Bill's brain. In Washington lay the only cure.

"Hurry! Land alongside," came the frantic voice of the operator aboard the *Meteor*. "We have to get him to Washington—fast. They can stop this thing there—but only if they get him within twenty-four hours of the time of the injection. Hurry!"

The Stormer was plummeting down through the clouds. The altimeter blurred as the scarlet bullet raced nearer and nearer the ocean. Bill's gaze whipped over the instrument board. He was heading directly back to where the air liner lay at rest on the ocean. But every second lost reduced Morton's chances.

He bellowed into the microphone: "When did he get the injection? How long ago?"

"I'm not sure—" There was a silence. Then: "Two hours ago, while in mid-air, on their way here. You should be able to get to Washington within the limit. But the sooner you get there the better. You're our only chance. The *Meteor*'d be too slow. All our plans have to be sacrificed to save Morton's life. Get here as fast as you can."

The Stormer arrowed out from the clouds and plunged on. The smooth surface of the Pacific raced up. Two miles ahead Bill saw the small match-like thing—that was the *Meteor*. He flattened out. The distance was eaten up rapidly. He closed the throttle, banked steeply around above the drifting air liner and went down for a fast, reckless landing.

The lowered pontoons swooshed through the water. The amphibian bounced once, twice—and was down. Bill taxied toward the mammoth passenger seaplane. The Stormer was dwarfed by her size. The collapsible boat was floating alongside the great hull. A man in the dark-blue uniform of the Oceanic Airways was at the oars. Another man sat in the stern.

Bill swung the Stormer nearer. The co-pilot in the boat was rowing vigorously, heading the canvas craft across the narrow margin of water that separated the two planes. Bill climbed over the side and lowered himself to the left pontoon. He stood there, waiting.

The boat was pulled closer and closer. Bill recognized the square-faced, muscular man in the bow as James Morton, the chief of the department of justice.

The Oceanic's co-pilot swirled the little boat next to the float on which Bill stood.

Morton looked up at Bill and smiled.

"Hello, Barnes. I guess you're to take me for a little ride," he said quietly. Not by one word or gesture did he show the emotion that must have been surging through him.

"Yes, sir," said Bill. "Quarters are cramped. You'll sit in the rear seat there." He pointed, and opened the small door in the side of the cabin.

"Good." Morton climbed through and settled himself in the folding seat.

The co-pilot in the boat beckoned quickly to Bill. The man's face was glistening with perspiration. Bill leaned down.

"We didn't tell him about the plan for you to follow the enemy planes," said the pilot. "Don't tell him! If he knew, he'd order you back on the job. He'd sacrifice his own life to catch the Black Ghost. Understand me?"

"Got it," said Bill tersely.

"O. K. He was given the shot two hours ago. That should give you plenty of time. But don't waste a second. Luck, Barnes!"

Bill straightened up, swung back into

his cabin. The co-pilot was pulling the boat rapidly back toward the *Meteor*. Bill shot a quick glance back at Morton and saw that the man had taken a helmet from the locker, put it on and connected the wires.

The Diesels boomed. The Stormer swung around to head into the wind. Bill rammed the throttle wide open and the great scarlet bullet pelted across the blue water and climbed into the sky.

The clock on the instrument panel showed six fifteen. Bill banked the throbbing ship around to head into the east—and Washington.

He crowded the throttle to the last notch. The Diesels were bellowing out mighty thunder. The air-speed indicator leaped higher and higher. Bill sat immobile in his seat. Two hours had already been sliced from the twenty-four-hour limit. That left twenty-two. Twenty-two hours to get to Washington. At his extreme speed, he rapidly calculated that he'd be able to get there in much less than half that time, barring accidents. But the sooner Morton could be put in the hands of the doctors, the better chance he'd have.

Bill switched on the intercockpit telephone and spoke into the microphone.

"You comfortable, sir?"

"Excellent, thanks. It is good of you to go to all this trouble, Barnes."

Good of him! Bill shot an amazed look in the rear-view mirror. The man was modest to a fault. Didn't he realize that practically every able-bodied citizen would risk his own life to save his? Did he realize that he was the head—the brains—of one of the greatest law-enforcement forces in the world? Didn't he realize how the public felt about him for ridding their land of the scourge of murderous hoodlums? Good of him!

Bill said simply: "We'll get there as fast as possible, Mr. Morton."

Neither man spoke for the next hour. The Stormer was flying again at an extreme height. The superchargers were working. The cabin had been sealed and the oxygen released.

The sun had set long since. Its dying reflections had faded out. Above, the stars were glistening and the sky was soaked in silvery sheen. Bill never for a second relaxed his vigilance. He had felt no great disappointment over the abrupt cancellation of the plans to follow the enemy fleet. For this emergency was much greater. It was life or death.

Later, Morton spoke to him: "You are a great friend of Stephen Drake?"

"Yes, I am, sir. I'm naturally terribly anxious about him." The pilot's eyes were hard.

"As you know, he is being held by this madman—at the same place that I was. I was kept in ignorance of that fact until we were flying up here." Morton's voice was cold. "I'm afraid for

his life. Drake was the man in charge of the investigation into King Zoro's affairs. If the Black Ghost is King Zoro, as we firmly believe, he will have it in for Drake. Unless we can rescue him soon, he may be killed. I only hope we can get to him in time. You have done wonderful work for the department in the past, Barnes. We recognize your ability. I also realize your personal feelings. I give you official permission to act in any manner that you see fit in this emergency."

Bill's lips tightened. He said: "I appreciate it, sir. Naturally, I will do my utmost to find Drake. You have no idea where the Black Ghost's base might be?"

"Only that it's somewhere in the tropics. The climate was very warm. I was kept in total darkness during my entire stay. That is all the information I can give you."

The conversation lapsed and was not resumed. Hours passed. Bill estimated that they had passed over Wichita. He reported his progress back to the radio operator aboard the *Meteor*. He corrected his clock on the instrument board as they passed beyond each time belt, advancing the hands one hour each time.

At precisely six o'clock a. m., Eastern Standard Time, the Stormer put thunder into the skies over Washington. They had made it in less than eight hours' flying time.

As the amphibian raced across the landing field toward the deadline, an ambulance sprinted out. Bill braked the machine to a stop, closed the throttle.

He slid over the side to the ground just as the ambulance raced alongside. Two white-uniformed internes leaped to the ground. A doctor came from the front seat. Motor-cycle police roared around.

James Morton was helped down from the cabin of the plane. Bill saw that the man had changed since he had entered the plane out on the Pacific. His face had lost its rugged look. His square shoulders were slumped. He looked sick.

Before he was escorted to the ambulance he turned to Bill.

"I can't thank you enough, Barnes. As much as I'd like to, I don't dare shake hands. Let's hope that I see you again soon."

A brave smile lighted his face and then he was taken into the ambulance. The doors were closed. The white vehicle darted ahead, streaked across the field and vanished with its flotilla of siren-shrieking motor cycles racing as escort.

A department agent lingered behind. He spoke to Bill.

"You've done a marvelous thing—bringing him back so quickly. The doctors are positive that they can rid him

of this frightful disease. If they do—it is all due to you."

"Any one would have done the same," said Bill. He leaned back against the fuselage, suddenly tired. His body ached from the top of his head to his feet. He rubbed a grimy hand across his face. The strain of the previous afternoon and night had been terrific. And it had been his first day out of the hospital. He looked up at the agent.

"Any definite orders for me?"

"Only that you are to return to your field and hold yourself ready for an emergency. But you had better come in and have something to eat and catch a nap. We've made arrangements for you."

Bill shook his head. "No. I think I'll take off for home. I haven't been there for weeks. I'd like to see the gang."

He took off from the Washington field during the next five minutes and flew wearily homeward. And, as if the elements were trying their best to plague him, he was forced to fight through a raging electric storm from Philadelphia to his home field.

XVI—HOME

BILL LANDED at the field at a few minutes after seven o'clock. It was teeming rain. The downpour almost obliterated the landing lights. He had radioed ahead that he was coming in and lights showed in the administration building and in the Stormer's hangar.

The amphibian taxied up on the concrete apron. Mechanics ran out, their coat collars turned up to protect them from the slashing rain. The Stormer was quickly guided into the shelter of the hangar.

The Diesels died. Bill climbed stiffly from the cabin and dropped to the concrete floor. His face was drawn and pale. Blue smudges were under his eyes. He looked half sick.

Shorty Hassfurth and Martin came to his side instantly. They shook hands warmly. No one at the field had seen the pilot since the day he had taken off with Stephen Drake for Miami. It seemed weeks and weeks ago.

Nothing much was said and no questions were asked but Bill felt a warm sensation in the pit of his stomach. He was home again with his loyal friends.

"Shorty, get Charlie to rustle me up some food, will you, like a good guy?" Bill said.

"Sure thing." Shorty started for the telephone.

Bill stretched and yawned. "I want bacon and eggs and plenty of it. And hot coffee. After that, all I ask is sleep and then some more sleep."

Shorty had the receiver to his ear. "In your quarters, Bill?"

"Yes. I won't have to walk so far to reach the bed." He turned to Martin.

"I hate to make you fellows work, but the ship must be checked over and refueled right away. There's no telling when I might have to head out again."

"Right, sir." The head mechanic strode away to the white-jumpered men already at work on the amphibian.

Bill waited until Shorty hung up and they started toward the door together. They hadn't gone more than ten feet when a small form came hurtling out of the teeming rain into the hangar.

It was Sandy. He was wearing a short leather jacket, shining with moisture. He wore no hat and his mass of tawny hair was soaking wet. He pelted up to Bill, shoved out a small hand and grabbed the pilot's arm by the other.

"Bill! Am I glad to—!" He stopped short from lack of breath.

The pilot squeezed the boy's hand tightly. "It's good to see you, Sandy," he said, his blue eyes softening.

Shorty looked at his wrist watch. "The kid must be sick. Whoever heard of him getting up this early?"

Sandy's face was flushed. "I haven't been to bed. I've been up all night."

"What's the idea?" Bill asked.

"I've found it. I've broken it down." The boy's voice was shrill.

Bill frowned. "Has he been this way long, Shorty?"

"It's important," said Sandy wildly. "It's a code. I've found the key to it. Just now. I heard your ship come in, and beat it over here."

Bill put up his hands. "Take it easy. If this is a game, let's put it off until later. I'm about dead on my feet."

"The kid may have something," put in Shorty earnestly. "He found some markings on a coin."

Sandy cut him short. He stood squarely in front of Bill, blocking his way.

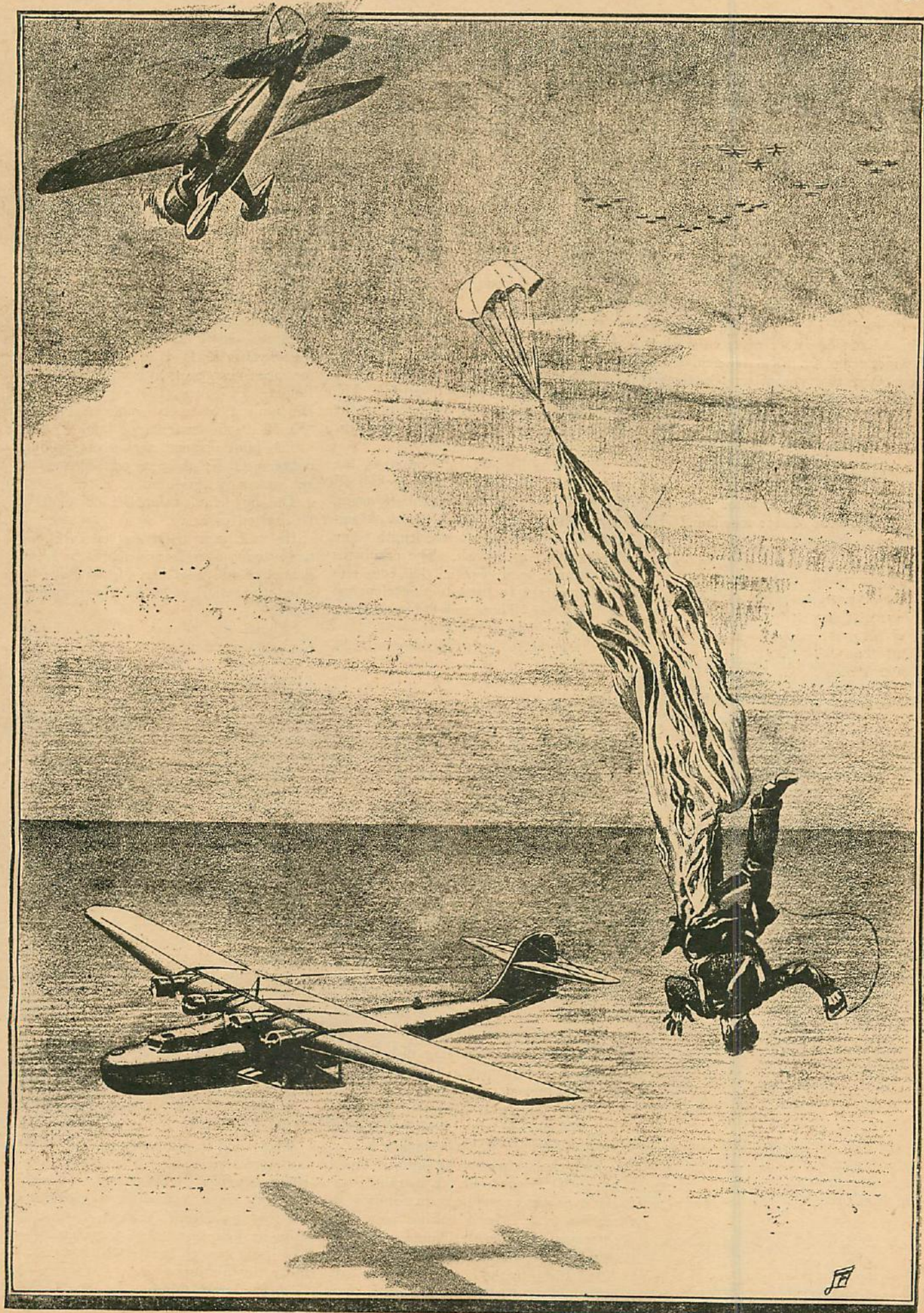
"You've got to listen, Bill," he pleaded. "Remember Stonge dropped some coins when he was giving you that parcel of money? I went back later and found them. A couple of dimes and a silver dollar. I examined them under the magnifying glass. There were some scratches on the back of the dollar. They magnified up into a series of letters and things. Ever since you left I've been trying to decode it. And finally I got it!"

Bill was instantly alert. A coded message on a coin dropped by Stonge! And the Black Ghost had been trying to get the lawyer back into his gang. "O. K., I'll take a look at it. Bring the stuff down to my room. Now beat it."

Sandy raced away ahead of them.

He was waiting in the living room of Bill's bungalow when the pilot and Shorty arrived. Bill pulled off his flying overalls and sat down before a table in front of a blazing fireplace.

Sandy put the silver dollar and the magnifying glass on the table. He was



Bill heard the operator's voice again. "The man's still falling—he's got a 'chute—it's opened!"

holding several sheets of paper in his hand.

"See those scratches on the back of the dollar?" the boy said eagerly. "Take a slant at them through the glass."

Bill picked up both articles, focused the glass. He suddenly leaned forward as the sharply defined marks came into view. He stared in silence, then looked up at Sandy.

"I see them, all right. You say this is a code?"

"Yes. I got the key to it. I was typing on my portable when I realized what it was. Look."

The boy had brought down his portable typewriter. He put it on the table, removed the cover. He placed a sheet of paper from the sheaf he held in his hand beside the typewriter. On the paper he had typed a reproduction of the marks on the silver dollar.

n.m6yc,5i.vc3b6ct99.4b6c
8,i5b8cxvi,i5vc-.vbb.itc
b.3,ym95c2ctvcb,2b.3,c

"That's what's on the coin. Now look at the keyboard of this machine." His voice was trembling.

2 3 4 5 6 7 8 9 0 /
Q W E R T Y U I O P
A S D F G H J K L :
Z X C V B N M , . -

"Go on," said Bill.

"The whole secret's there. Take that line starting with Q." The boy gestured with a pencil. "You come diagonally down to the right. Q becomes Z. W becomes X. E becomes C, and so on. Get it?"

Bill was breathing faster. "The other letters are transposed in the same way?"

"Yeah. Z is written E. X is written R. C is T. They go up that way. Then the other line is represented by the numerals: A is left out entirely. S becomes 2; D becomes 3; F becomes 4 — See?"

Sandy placed another sheet on the table. "Here's the code. I wrote it down."

| | | |
|-----|-----|-----|
| A— | J—7 | S—2 |
| B—U | K—8 | T—B |
| C—T | L—9 | U—M |
| D—3 | M—O | V—Y |
| E—C | N—I | W—X |
| F—4 | O— | X—R |
| G—5 | P— | Y—N |
| H—6 | Q—Z | Z—E |
| I— | R—V | |

"The A is left blank. This is how the message works out. I've decoded underneath each line."

A third sheet went on the table. Bill read:

n.m6yc,5i.vc3b6ct99.4b6c
youhveignoredtheclofthe
8,i5b8cxvi,i5vc-.vbb.itc
kingtkewrningrepprtonce
b.3,ym95c2ctvcb,2b.3,c
todivulgeseecretistodie

"Adding the A's where necessary and separating the words, the message reads like this"—Sandy pointed to the bottom of the page—

You have ignored the call of the king take warning report at once to divulge secret is to die

The words burned into Bill's brain. It was a message from King Zaro to Max Stonge! It established definitely that Zaro was the Black Ghost.

"Does it mean anything, Bill?" asked Sandy anxiously. "I don't know what goes on, but I thought it might be important."

"Important!" Bill almost bellowed the word. He stared savagely at the boy. "Kid, you've found something. You've found King Zaro's code!"

His brain was working feverishly. The code had to be put in the hands of the department of justice officials. It might prove vitally important.

He got up quickly and went to the telephone. He had the receiver half off the hook when he dropped it back again. The memory of the Black Ghost obtaining the private radio wave length came to his mind in a flash. The criminal's spies might be anywhere. The code was too important to trust to the telephone or the radio. There was only one other way. He whipped around.

"I'm going to fly to Washington right away!"

XVII—LIGHTNING

A KNOCK sounded on the door. Bill's hand instinctively dived for his automatic as he turned around.

"Come in."

It was Charlie, the field's chef. He came inside carrying a large napery-covered tray. His big face was beaming.

"Glad to see you back, sir. Nasty morning."

"Hello, Charlie. Put the stuff on the table there." Bill's words rapped out. He gestured to Shorty. "Get hold of Martin. I'll leave as soon as he's got the Stormer ready. Beat it down there yourself. You may be able to help."

Shorty left hurriedly.

The chef was removing dishes from the tray and arranging them on the table. He moved ponderously.

"That's all right. You can go," said Bill irritably, and then added: "Thanks a lot, Charlie. It looks mighty good."

The chef's face broke into a broad grin. "It is good, sir. I guarantee it." His eyes went meaningfully in Sandy's direction. "I've been baking pies ever since you left for Mr. Sanders here. I thought you'd better know."

Bill slid into the chair and began eating rapidly. Charlie's voice came in a meaningless rumble. The chef looked crestfallen and went out.

Sandy was standing beside the table, watching Bill intently.

"Can I go with you, Bill?" he said.

The pilot's jaws were working over a mouthful. He shook his head.

"Aw, nuts," said the boy, jamming his hands into his pockets. "Golly, I work my fool head off deciphering that code and you won't give me a break. I think that's lousy."

Bill shot a look up at him. Sandy's lower lip was protruding inches and keen disappointment showed in his small freckled face.

Bill swallowed and gestured to the window that was streaming with water. "You want to fly in that mess?"

"Sure. Gosh, I'd fly into a hurricane, the way I feel. I haven't done anything for weeks except exercise the little old Eaglet. Of course, that's pretty nice." He paused and his eyes brightened. "You'll let me come along, huh?"

The pilot downed a gulp of scalding coffee. "O. K. I guess you deserve to get your way this time."

The boy started for the door. "I'll be dressed in a sec."

He was back again, garbed in clean, white flying overalls and wearing a lined helmet of white leather, just as Bill polished up the last of his hastily consumed meal.

"Phone the hangar, kid. Find out how they're coming."

Bill went into his bedroom, found dry flying clothes and pulled them on. His whole body ached viciously. The flight to Washington didn't hold any pleasant prospects, but the code had to be taken there right away.

Sandy called to him: "Almost ready, Bill. 'Bout five minutes at the outside."

"Good." The pilot came back into the living room. He picked up the sheets of paper on which Sandy had typed the code and the message and stuck them into an inside pocket. The silver dollar was placed carefully in a small pocket; the top was buttoned.

Sandy waited, holding the door open. Bill snatched up his automatic, saw that it was fully loaded and jammed it into a leg pocket.

"You got one of these?" he asked the boy.

Sandy patted his hip. "When I go anywhere with you, that's the first thing I grab!"

A half grin came to twist Bill's lips. "That's what you think of me, eh?"

They went ducking out into the slashing storm and sprinted for the hangar. Heavy rumbles of thunder were jarring the very earth, and through the teeming downpour came crimson flashes of brilliant lightning. The morning light had been reduced to a slate-gray. Visibility was almost nil.

Shorty was standing in the hangar entrance when they rushed in. The engines of the amphibian had been started.

Martin sat in the cockpit, jazzing the throttle. The man-made thunder drowned out the other.

"It's awful flying weather, Bill," said Shorty. "I've been in touch with Tony. The storm seems general. It's a mess. I don't see how you're going to make it."

Bill peered across the landing field. It was bad. There was no getting around that. But there was no way of evading the absolute necessity of getting to Washington. Every lead had to be followed down—instantly. Drake's life hung in the balance—and hundreds of other innocent persons' as well—unless the Black Ghost could be caught and slain.

"I have to go, Shorty," he said quietly. "That's all there is to it. I think you'd better skip this trip, eh, kid?" He looked at Sandy.

"Skip nothing. I'm going. Hey, Martin's signaling O. K." The boy ran down and climbed into the cabin.

Bill followed. He shook hands with Shorty and Martin and swung up into his seat.

"I'll keep in touch by radio," he called down. He connected his helmet wires and spoke to Sandy over the phone. "Don't say I didn't warn you, peewee."

"I can take it." The boy was busily strapping on the harness of a seat-pack parachute.

Mechanics guided the throbbing, scarlet bird out through the open doors and into the pelting rain. The hatches over the cabin were tightly closed. Bill gestured the men at the wings aside. He signaled back to Shorty with a gloved hand and taxied the Stormer out to one of the runways. He straightened the ship out and rammed open the throttle.

A wall of gray raced at them. The amphibian pelted through the downpour and, with a scream from its engines, arrowed up into the sky.

If anything, the storm was worse up there. The rain came in sheets to blast against the climbing amphibian. Treacherous cross winds buffeted it, sent it careening up on its side. Lightning seemed to explode almost in Bill's face as he fought to put the ship on its course.

He gripped the stick tightly and opened the throttle wider. The raging elements gave him no rest. He held the ship to its course and fought on.

Ten minutes passed and felt like an hour. The lightning was stabbing down, its terrific glare almost blinding him. The force of the wind was increasing. He began to have his doubts about getting through to Washington.

Abruptly he switched on the radio and called his field. The ear phones rattled with static. He called repeatedly into the microphone. Finally he heard Tony Lamport's voice.

"Hear you, Bill. What——" His voice was drowned out.

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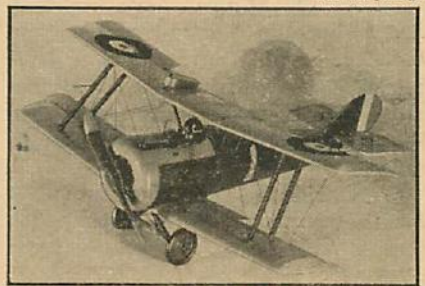
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"Storm's bad here," bellowed Bill. "Give me reports."

He had to repeat the request five times before Tony got it. He listened intently for the reply.

"Storm area extends——"

There was a blinding flash of light. Bill's cardrums were almost split open by a sudden blasting crash. The Stormer staggered and plunged downward.

Horror came to Bill. Lightning had struck the machine!

XVIII—THE SOUND

BILL FOUGHT the plunging ship like a madman. Lightning had struck it somewhere. He was positive of it. But the engines were still hammering out smoothly.

Again and again lightning slashed through the howling storm seemingly to be stabbing at the diving plane. Bill eased the control column back. His eyes were alive. The ship was responding. Its nose came up again—and it raced ahead on a level keel.

Relief swept through him. He struggled to put the pitching ship back on its course for Washington. The intensity of the storm seemed to be increasing rather than diminishing. He pulled the microphone to him and called Tony.

There was no answer. It was only when he was trying once again that he realized that the ear phones were dead.

The radio had been put out of commission.

He flipped the switch over to try the intercockpit telephone.

"You hear me, Sandy?"

"Sure. Golly, that was close. Did it hit us?"

"Seemed like. The radio's on ice, anyway." Bill peered ahead through the water-gushing glass. "Kid, I'm going to swing east. See if we can get through that way. Hold on."

He brought the Stormer around and headed east by southeast. The storm, he reasoned, had probably swept in from the ocean. Things might be quieter out there.

And his guess proved right. The storm seemed to be letting up. The flashes of lightning became less frequent. The rain was dwindling to a drizzle. Bill was in the act of banking around to nose into the southwest when his glance focused on the audiphone dial. The yellow light above was gleaming and the needle was swinging to the left almost at right angles.

Bill stared at it. A queer, shocklike feeling tingled up his spine. Somewhere out to the left the delicate instrument had picked up the sound of an engine. And instantly associated in his mind with the audiphone were the white planes of the Black Ghost. He frowned in indecision.

The chances of it being one of the Zaro ships—one or more—was about one chance in a thousand. Anyway, he had to get to Washington. He couldn't waste time chasing down long chances. The storm had held him up enough as it was.

He swung the Stormer around into the southwest. But, as he did so, something in him rebelled. Something was saying, "Why don't you go and have a look? It won't take long. It'd be better to make sure than to miss the chance. And what a chance you'd miss if it should be a white Zaro biplane. You could follow out the original scheme and trail it to wherever it was headed. It might take you right to the secret base. Don't be a fool—go on, see if you can get a look."

His inner instinct won. With a mental curse, he banked the ship around, headed almost dead into the east and jockeyed until the needle centered on its mark. And he knew then that he was headed straight for the origin of the sound—straight for the plane, whatever it was.

Sandy's voice sounded in his ears. "What's the idea? You heading for home?"

"No. Keep your eyes peeled ahead, fella. There's a plane somewhere in front of us. I want to see what it looks like." He hesitated and then added: "If it's a biplane, painted white, a duplicate of the one that riddled Stonge—yell blue murder at me."

"O. K."

Bill leaned forward in his seat, his eyes swerving from the yellow signal light to the sky ahead. Visibility was still poor. A heavy, foglike mist hung in the air. The rain had stopped. The electric storm had passed.

The yellow light steadily grew in intensity. Bill had had no actual experience in gauging the distance by the strength of the light. The thought that he might at any minute come upon the strange ship set his nerves throbbing. He'd have to act instantly when he saw the plane, to avert a crash.

Minutes dragged past. The bulb over the audiphone dial grew brighter and brighter. Bill felt his heart thudding faster in his side. The palms of his hands grew wet. His eyes ached from the intense watching.

The light was blazing. The needle was at dead center. Bill reduced the throttle. The Stormer's speed cut down. The signal bulb was now burning with a brilliant light. The pilot cut the throttle down again until the Stormer had barely flying speed. His mouth grew dry from his rapid breathing.

Always that foggy curtain ahead. At any second—

And then he saw it. Not more than twenty-five yards dead ahead. The whole picture was etched immediately

in his brain. A plane was dead ahead, flying in the same direction! It was a biplane, painted white, an exact duplicate of the one he had shot down in flames. It was a Black Ghost plane!

XIX—THE CHASE

HE SAW IT ALL in that flashing second. He threw the stick forward. The Stormer dived headlong into the fog and out of sight.

Sandy's voice was blasting in his ears even as the plane went into its abrupt dive.

"It's the same! You see it?"

Bill let the Stormer have her head until a thousand feet had vanished upward. Then he tugged the stick back and leveled off. His eyes were glistening. The thousand-to-one shot had clicked. It was one of the Black Ghost's planes.

"O. K., kid," he said. "I saw it. That changes our plans. We're going to follow it."

"How?"

"I'll explain later." Bill's gaze whipped to the audiphone dial again. The needle was spinning crazily. He headed the Stormer into the north and climbed back to his former altitude. Once there, he again banked around until the quivering needle quieted down in its upright position.

The glow from the light had dimmed. From now on he would be able to judge his distance. He settled down grimly to his task—and the strange chase began.

It was eight o'clock in the morning.

For one solid hour, Bill held the amphibian on the audiphone course, keeping the signal light barely glimmering. That would put him far to the rear of the enemy ship. The fog was thinning rapidly and visibility was steadily growing better. The biplane had headed directly into the southeast and held to that course.

Another hour passed. Bill reckoned they were far at sea, flying in the direction of the West Indies. The Stormer's speed had been cut down to one hundred and eighty. The fog had evaporated to reveal a cloudy, overcast sky, but visibility was excellent. Bill took a pair of power binoculars from the locker and inspected the sky ahead. After five minutes of futile searching, his gaze centered on a pin point of black far to the southeast.

Time dragged on. Eleven o'clock passed. Twelve—one. And still the yellow light showed and the needle stood rigid at center.

Bill tried to relax from his strained concentration and found it useless. His nerves were on edge. All his concentration was centered on the audiphone dial. At frequent intervals he focused his glasses on the black dot. Frequently,

anguish drilled through him when the black dot vanished from sight, and then, always later, he was able to pick it up again.

The Stormer drilled on at its reduced speed. Sudden winds buffeted it. A brief torrent of rain pounded on the wide-spread wing. But the bulletlike ship kept steadily on the trail, its gaunt-faced pilot eagle-eyed at the controls.

It was two o'clock, then three. And the strange chase kept on. Bill repeatedly tried the radio, and each time found it utterly dead and useless. He talked briefly to Sandy. The boy was keyed up, sitting on the edge of his seat, his hazel eyes peering past Bill to the watery horizon far beyond.

The clock on the instrument board showed four o'clock. Bill, checking his instruments and maps, realized that they would soon be in the vicinity of the Bahama Islands. His excitement increased. Morton had told him that the Black Ghost's base was somewhere in the tropics.

He eased the stick back and put more altitude under them. In the event that the ship ahead landed any time soon, it would be essential to be as high as possible.

Four thirty—four forty-five—

Bill had the glasses out and focused on the biplane. He frowned suddenly. It was losing altitude, or seemed to be. Immediately the pilot jerked the stick back and zoomed abruptly.

The yellow light was increasing in strength. Bill watched it intently. Was the white biplane going to land? The ocean ahead was beginning to be dotted with small islands. He inspected the map. They were coming directly into the Bahama group with its myriad tiny, uninhabited islands.

And then, at five o'clock, with his glasses full on the now closer biplane, he knew definitely that the ship was going down for a landing. Directly below it was a small island.

Again Bill pulled the Stormer higher, opening the throttle. The biplane was circling down. He could see it plainly now through the glasses.

He frowned. It seemed unlikely that the Black Ghost would have his base on the island to which the biplane was obviously dropping. The place was too small and too exposed. With the radio dead, he couldn't send out an alarm. It was entirely up to him. Something had to be done, and done quickly.

The Stormer was rapidly overhauling the island. The biplane had disappeared down below, undistinguishable against the darkness of the ocean.

It was after five. The sudden tropical night would be shutting down soon. Already the sun was plunging toward the western horizon.

The Stormer roared higher and higher.

Bill held to his course and flew directly over the island. His brain was working feverishly. If the island wasn't the Black Ghost's base, why would the biplane land? The only other reason seemed to be that it was running low on fuel. The island might have a secret gasoline cache. The white plane had been on a long flight. It was unlikely to have the enormous fuel capacity of the Stormer.

The pilot yelled at Sandy: "Get your glasses out and look down there."

Bill already had the hatch open, had switched on the automatic control and was leaning out, peering down through his binoculars at the island. He saw the biplane floating on the water—and there were no other planes.

He dropped back into his seat. A desperate plan flashed through his mind.

Sandy spoke excitedly: "Just one ship, Bill. The island looks deserted."

Bill had closed the throttle and eased the stick forward. The amphibian went down.

"O. K., kid. We're going to try something. If it doesn't work—it'll be just

afraid?" Bill knew from the quality of Sandy's voice that he was afraid, and that he was fighting down his fear. That was real bravery.

"Afraid—nothing! Just leave it to me." The boy's words were forced. A tremor came into his voice as he added: "Gosh, Bill, what if there should be two of them?"

"Let's wait and see."

XX—DEATH STRIKES

THERE WAS only one. Bill saw that instantly as he landed the Stormer on the calm water in the lee of the island and taxied toward where the white biplane was riding on its amphibian landing gear. The man was up on the small coral beach, crouched down behind a rock. The sun glistened on the barrel of his revolver.

Bill closed the throttle, allowed the ship to drift almost to the shore line and then released the anchor. He stood up and slowly climbed through the open hatchway and dropped down to a pontoon. Out of the corner of his eye he

His eyes suddenly widened. A curse came from his twisted lips. "Why—you're Bill Barnes!"

"Sure," said Bill easily. "All right to put my hands down now?"

So the man hadn't recognized the Stormer after all. From now it would be a game of bluff—desperate bluff.

The enemy pilot snarled. "Keep them up—or I'll drill you! You alone?"

"Not now," said Bill. He talked on quickly. If possible, he had to give the impression to the other man that he didn't suspect him of being a Black Ghost pilot. "What's the idea? I came down to repair my radio. I saw your plane here and hoped you might have some parts."

The man was suspicious. "Yeah? That sounds pretty phony to me. You make a wrong move and you get it."

He walked nearer, his revolver held tightly in a tanned fist. Cautiously he ran his left over Bill's clothes and removed the automatic and stepped back.

"You walked into something, Barnes," he said, his expression changing from suspicion to gloating. "I'm going to take a look in your ship. You stay where you are and, remember, I'll plug you if you make a move."

Bill scowled. "Say, what is this? Look in the ship if you want to. But what's the idea?"

"You'll get the idea soon." The man grinned evilly. He shoved Bill's automatic into a pocket. "I'll tell you all about it."

He moved out to the Stormer, his gun still pointing at Bill.

The airman stood waiting and praying that Sandy would act. The enemy stepped up on the pontoon, pulled himself erect. His eyes swerved back to Bill. And in that second Bill saw Sandy's head come into view through the open hatchway.

It was now or never. Bill yelled wildly and threw himself flat on the beach. The enemy pilot was caught by surprise. He pulled the trigger, shot wildly toward Bill.

And then—blending with the first explosion—came another.

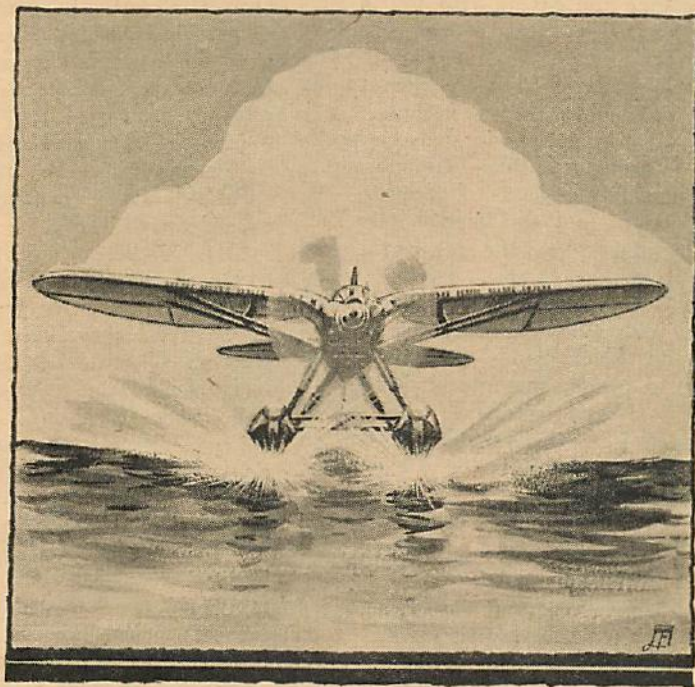
Bill landed flat. The enemy's bullet drilled overhead. The flier rolled over, looked up.

Sandy was standing, a smoking automatic in his small hand. The enemy pilot had dropped his gun, was pawing at his right arm. He tottered and fell into the water.

Bill leaped to his feet. He took a wild lunge from the shore, landed on the man as he was struggling to get up. The flier's right arm flashed down in a short, dynamite slash. The fist crashed against the enemy pilot's head, behind his ear. He grunted and went limp.

Bill grabbed him under the arms, pulled him quickly to shore, dropped him to the beach. His hands went over

The Stormer's pontoons swooshed through the water.



too bad." Bill spoke crisply into the microphone. "We'll land as fast as possible. That pilot's sure to recognize this ship. He'll be waiting for us, gun ready. You keep out of sight, and make sure you do. I'll get out and let myself be captured. Then—it'll be up to you."

The Stormer was diving more steeply, its pointed nose aimed for the island.

"I'll try to maneuver him around so you'll have a chance to get out of the ship unobserved. After that, see if you can get the drop on him—and shoot if necessary. Understand?"

"Whew—yes! I—I get it." The boy hesitated. "Golly, we're taking an awful chance."

"It's necessary, peewee. You aren't

saw that Sandy was out of sight.

His feet had no sooner touched the pontoon than a harsh voice said:

"Put them up!"

Bill looked around wildly, lifted his empty hands above his head and endeavored to look startled.

The man, clad in khaki overalls, slowly stood up and moved around the rock. His gun was leveled straight at Bill.

"Come in here," he said.

Bill, holding his arms above his head, stepped into the shallow water and waded ashore. He walked up on the small beach. The enemy pilot advanced to meet him.

"What do you want?" the pilot asked.

the clothing of the momentarily unconscious man. Bill recovered his automatic and stepped back.

Blood was flowing from the man's right shoulder where Sandy had shot him. He lay on his back, his eyes closed.

Sandy came hurriedly out of the plane and reached the beach. His face was white.

"I got him," he said miserably.

"It was neat work, kid," said Bill. "He isn't hurt badly. You didn't kill him."

The boy still held his automatic limply at his side. He gazed down at the prone man.

"Is he the guy you wanted, Bill?"

"One of them." Bill looked across the island. It was very small and covered with scrubby, tropical growth. His eyes suddenly narrowed as he saw something shimmering in the sun a hundred yards inland. Gasoline cans! The enemy ship had come down to refuel. There was a gasoline cache here.

He heard a sharp cry from Sandy and whipped around. The enemy pilot had suddenly come to life and was in the act of making a wild grab for the boy's automatic.

Bill's gun swung up; he fired in one flashing motion. The enemy pilot shrieked, twisted, crashed down to the coral. Blood was gushing from his side.

Bill was beside him instantly. The enemy pilot had been hit in the left breast, near the heart. The man was gasping. Blood was flaked on his quivering lips.

"You got me," he said, his words a whisper. "I should have known better. I should have shot you right away."

His eyes closed. His breathing was labored.

Bill knelt over him. The man hadn't much longer to live. If he would only talk before he died.

"Where's the Black Ghost's base?" asked Bill coldly.

The pilot's eyes opened. A ghastly smile twisted his bloody lips. "You'll never find it—"

"You're dying," said Bill. "You'd better clear your conscience. Speak up. Is Drake being held there? Is he still alive?"

"Yes, he's there—and—he'll stay—there." The man coughed. "The king found—out about—Morton—being—cured of—leprosy. He got—mad. You'll never—see Drake—again. The king—gave him the injection—at eight o'clock—this morning—"

Acid raced through Bill's veins. "You're lying! How do you know? You were up north at eight o'clock this morning!"

The man's eyes were closed. Again they fluttered open. "I got—lost in the—storm. I was ordered—to report—at the base. I heard by—radio—Drake

got it—at eight o'clock this morning—You'll never see—"

The man's body suddenly twisted. A racking gasp swept over him. He shuddered and was still. And Bill didn't need to feel for the heartbeat to realize that the man was dead.

XXI—SPEED

THE NEWS that the man had gasped out was stunning. Bill looked hastily at his watch. It was five thirty. That meant that already nine and a half hours had passed since Drake had received the injection. There was still a chance to save him—a slim chance—if only they could find out where the secret base was located.

Frantically Bill searched the dead man. He pulled out a small wad of papers, leafed through them quickly and cast them aside. From an inner pocket in the breeches worn under the flying suit, Bill found money—bills and coins. He took everything out, spread it on the beach. Instantly, his eyes riveted on a silver dollar. Sandy saw it at the same time and gave a yelp.

Bill seized it, turned it over. And on the back were a number of fine scratches. He held it up close to his eyes and could make out nothing.

Sandy was pawing through his pockets. "I brought it, Bill—I brought along the magnifying glass. I thought—" He jerked it out and handed it to Bill.

The pilot focused the glass on the coin. The thin lines leaped up until they were letters and marks. Bill didn't waste a second. He pulled out the papers on which Sandy had typed the code. A pencil came into his hand. He was writing furiously. His eyes whipped from the magnified letters to the code and back again. He decoded as he went.

When he was finished he had written:

The king calls his loyal
men report at once to
Isle Despair

The headquarters—at Isle Despair! Bill went instantly to the cabin of the Stormer. He searched rapidly through two maps before he found the small island off the coast of Santo Rico in the Caribbean Sea. It was unknown to him. He remained quietly in the seat for minutes, gazing at the map, sorting through the welter of thoughts and plans that had instantly rippled through his brain the second he had learned the Black Ghost's secret base.

When he went back to join Sandy he had a sharply defined plan.

He strode up the beach to where he had seen the gasoline cans and called to the boy to follow.

"We're going to gas up the biplane." Beyond where the cans stood he

found the main supply in a low, concealed hut which was covered over with vines. As they carried the fuel down to the plane, Bill tersely outlined his plan.

"You're going to fly the biplane down to a certain island near Haiti—Negra Island. I'll show you where it is later. It's uninhabited, like this place. We'll both land there. I'll change over to the biplane, leaving the Stormer with you. You wait there until I get back."

"And where are you going—to Isle Despair?"

Bill was emptying a can into the biplane's tanks. He nodded, his eyes steely blue.

"I have to." And for the first time he told Sandy about the Black Ghost, about the leprosy and about Stephen Drake.

The boy was wide-eyed when he finished.

"And you're going right to the Black Ghost's base? Golly!"

"There isn't time for anything else. I'll have to take a chance. Drake was given the injection nine and a half hours ago. If I'm ever to save his life I have to get him back to Washington before twenty-four hours elapse. I'll be flying the white ship. I'll be able to land there without any questions asked. Later —" He shrugged and hurried back to the gasoline cache for more fuel.

Sandy's face was thoughtful as he caught up with Bill.

"Why not let me fly the Stormer over to the mainland—to Miami—from here, and you go on in the biplane? I could phone Washington and tell 'em what goes on. Then I could fly from there to Negra Island and wait for you."

Bill shook his head. "Don't think I haven't figured that angle. It's too risky. Drake's very life will depend upon getting him to Washington before eight o'clock to-morrow morning, when the twenty-four hours are up. That means speed—terrific speed. The Stormer's the only thing that could make it. The biplane here would be too slow."

The boy frowned. "I don't get you. I'd have the Stormer back waiting for you in plenty of time."

"That's the point—would you? I don't doubt your flying ability, peewee; you know that. But the Stormer is tricky unless you're used to her. You aren't. Your flight would probably come off O. K., but if something happened—if you didn't get back or were late, Drake wouldn't have a chance. No, I can't risk any one else flying the ship at this time. That's why I'm changing to the biplane at Negra Island and not here."

Sandy didn't say anything for a minute. Then he looked up. "You're right, Bill. The Stormer is strange to me. Something would be sure to happen

when so much depended on it. Gosh, if the radio were only O. K."

They had been working at top speed as they talked. The biplane's tanks were filled. Bill brought Sandy a map and marked his destination.

"We'll fly there together. Have you done any radio work?"

"A little," said Sandy. "Tony's taught me some."

"Then see what can be done with the Stormer's radio. If you can get it working, get hold of Tony pronto. Tell him everything. Tell him to get in touch with Washington immediately!"

Sandy climbed into the biplane, started the engine. Bill hurried to the Stormer. He cast a look at the corpse of the enemy pilot. He'd have to be left there.

By the time Bill had started the Diesels, Sandy had swung his ship around. He waved a hand to Bill and opened the throttle. The biplane raced across the water and lifted into the air. Two minutes later Bill followed. They climbed to four thousand feet and the two planes roared into the south.

It was ten minutes to seven when Bill calculated that they were in the vicinity of the island where the change in planes was to be made. Daylight had long since gone, and the night was bright with a full moon.

By seven o'clock Bill had definitely located the small spot of land, had dropped parachute flares and gone down for a smooth landing.

Sandy followed and taxied his ship close to the shore line. The exchange of ships was made hurriedly. Every nerve was forcing Bill to hurry. He slipped into the front cockpit of the biplane, swung it around to face out to the open water.

"Got your instructions clear?"

"Sure, Bill. And I'll do my darnedest to fix that radio."

"O. K." He shoved out a gauntleted hand. "Wish me luck, kid."

The boy's small fist closed over his tightly. He didn't wish him luck. He didn't say anything.

Bill took off abruptly. He climbed to five thousand feet. The instrument board on the biplane was complete. He had brought a detailed map along. He checked his course carefully. The throttle was jammed wide open. Bill shot a look at the air-speed indicator and groaned. The needle hovered steadily at one hundred and eighty miles an hour.

His thoughts were in turmoil as the ship roared ahead. From rough calculations he realized he couldn't possibly get to Isle Despair before nine o'clock. And by that time Drake would have had leprosy for thirteen hours. That left just eleven hours' leeway—eleven hours in which to rescue him and get him to Washington. It seemed impossible. Bill's fingers fairly bit into the

control stick. It had to be done! Stephen Drake couldn't be left to die. He was too good a guy. He was Bill's friend.

Again and again his hand went to the wide-open throttle. Everything in him was crying for speed, and more speed.

Seven thirty! Every passing minute lessened Drake's chances. His life was slipping away with the tick of the clock.

Bill rode the narrow confines of the cockpit in wild despair. His eyes searched the sky ahead as if he could mentally draw the prison island nearer. It was then that he saw something out of the corner of his eye. He twisted his head around and gasped.

The moon was hanging in the sky far down to his right, and crossing in front of it he saw small dotlike things—many of them. And he knew that they were airplanes.

In no time they were gone—lost in the sky beyond the moon's bright circle. Airplanes—a whole squadron or more. He was positive of that.

The Black Ghost's? The criminal's fleet on the rampage again? Might they be taking Stephen Drake with them—somewhere?

He shook the questions away. No matter what—his sole job was to get to Isle Despair.

Eight o'clock passed. Eight thirty. Bill crouched over his maps, his eyes flicking from them to his instruments and back again. He couldn't make a mistake now. He had to hit Isle Despair on the nose.

And he hit it—at ten minutes after nine!

Isle Despair!

XXII—DOWN

HE WAS over the enemy's base—the secret hide-out!

He throttled the engine and dived down. He could see the black mass of the island near the brilliant moonlight. He pulled up at one thousand feet and circled.

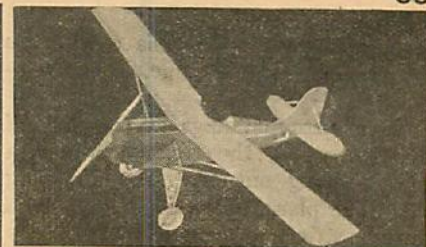
A strong searchlight blinked on, swung across the skies and finally settled on Bill's plane, bathing it in violent white light.

He went down lower. The pencil of light followed him. It was striking up from near the center of the island. A landing area below was abruptly illuminated.

Bill closed the throttle and went down.

His heart was hammering violently. He guided the ship lower and lower. Its speed dropped. Light-bathed turf welled up. The wheels touched and he was down.

He saw lights ahead, taxied toward them. His automatic came out of his pocket and into his hand. He settled



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his goggles firmly over his eyes. His lips were a firm, tight line. The show-down!

There were buildings at the side of the field under the trees. Two men came trotting out to grasp his wing tips. The plane was guided up onto a concrete strip and swirled around.

Bill cut his switches, gripped his gun firmly.

One of the two men, dressed in mechanics' overalls, came leisurely over.

"What happened to you, brother?" he said nasally. "You were due hours ago. The gang's left."

Bill realized that the biplane must have had distinguishing marks. The ship had been expected. The others had left! The planes he had seen! But where were they going?

"Got balled up in a lousy storm," Bill said gruffly. He threw a leg over the side and dropped to the ground. "I'd better get going after them. Where they headed?"

"You mean to tell me you don't know? Why, the king—" He broke off abruptly and came closer to Bill, his eyes narrowed and searching. "Say, you ain't Trimble. You're a—"

Bill lifted his automatic and slashed it down across the man's temple. The mechanic pitched to the ground.

The airman whirled around. He skirted the biplane's wing and saw that the second mechanic was in the hangar. There was no one else in sight. Bill walked toward him and called: "Hey, bud!"

The man turned around and looked out. Bill was standing in the reflected light from the building. The fallen mechanic was masked by the plane. Bill beckoned.

The man came out, growling.

"You got a match?" said Bill.

"Say, I'm a busy guy," the other whined. "All you pilots think you have to do is to yell and—"

Bill jabbed the snout of his automatic in his stomach.

"You start to yell and the gun goes off."

The man's eyes widened. His mouth opened and closed; no words issued.

"Turn around," ordered Bill.

The man obeyed instantly.

Bill raised his automatic. He had a fleeting moment of regret as he brought the butt of the gun crashing down on the man's skull. He caught him before he could fall.

After scouting quickly around the hangars, Bill could detect no one else. He dragged the two unconscious mechanics into the hangar, securely gagged and bound them, and dropped a tarpaulin over their prone figures.

From somewhere below he had detected a glimmer of light; he headed for it. He came upon a trail that led down the slope to the leper colony be-

low and went down cautiously, his automatic held level.

The silvery moonlight that had bathed the landing field above was blotted out by the tangled growth on either side. The trail snaked downward; it seemed endless. The light was still ahead of him and he quickened his stride.

Suddenly the ground leveled off, the matted foliage dropped behind. He was in a clearing. He saw houses. Saw people moving. Lights.

He crouched down and crept closer. The butt of the automatic was wet. He moved stealthily to a building, reached the wooden wall and inched toward an illuminated window. He risked a quick look inside—and horror drilled through him.

There were four people seated in a small room—three women and a man. The man's face was a mass of ulcerous sores. His skin was white. A stump ended where his right hand should have been. Three fingers were missing from his other hand. And the women—Bill leaned back against the side of the house, nauseated.

Two of the women's faces were horrible, beastlike masks. The skin was thick and loose, and hung down in folds. The other's face was like the man's, covered with running sores.

Lepers!

Bill felt a horrible fear. The sudden realization whipped up his memory. Isle Despair was a leper colony! Somewhere, at some distant time, he had read that.

If he didn't find Drake—if he didn't get him back to Washington before the twenty-four hours were up—Drake would be like those people, only worse. He'd been given the virulent form.

Bill left the shelter of the building. His gaze whipped across the clearing. He saw a large, low building. Light showed through bamboo blinds.

He crossed boldly to it. Caution fell away. It was almost ten o'clock. No more time could be lost. If Drake was on the island he had to be found.

He went directly to the door, put his hand on the knob and turned it. The door gave. He pushed it in quickly, slipped through. He was in a large, well-furnished room, illuminated by hidden lights. At the end he saw a desk. Beyond that was another door.

He crossed the room on tiptoe, his gun held ready. From somewhere to his straining ears came a rumble of voices. He reached the inner door and listened.

The voices were coming from somewhere beyond. He eased the door open, shot a look inside. He saw a room tiled in gleaming white. Lining one side of it was a long bench holding a mass of chemistry apparatus. A laboratory.

The place was empty. But the sound

of the voice was louder. At the end of the laboratory was a metal door. It was opened slightly and a brilliant light came through.

Bill covered the length of the tiled floor in quick, noiseless strides. He reached the end, looking boldly through—and went rigid.

Another room was beyond. It was boxlike. Lining the walls were great full-length mirrors. A series of lights blazed down from fixtures in the ceiling. A man clad in white drill was standing against the far wall, a revolver in his hand. Near the center of the room was another man, a stoop-shouldered, scrawny man, with an untrimmed beard and mustache. He was wearing a filthy smock and holding a gleaming hypodermic needle. And—lying at his feet, handcuffs around his wrists and ankles—was Stephen Drake!

XXIII—LEPROSY

BILL TOOK in the whole scene in one sweeping glance. It was Drake! There was no mistaking that, but he was scarcely recognizable. He looked pale and thin. A grimy stubble of beard covered his jowls. His clothes were soiled. A bloodstained bandage was wound around his head. His eyes were inflamed; his lips swollen.

The hunch-shouldered man was hovering over him. "You'll soon have had the disease fourteen hours, my dear friend. Fourteen hours! You will soon start to break out in ulcerous sores. Your body will feel the torture that is sweeping through it. And then, you will watch yourself change in these mirrors, my friend—just as Zaro promised you." He laughed shrilly.

"There won't be the slightest hope for you when Zaro returns. Those clever doctors in Washington may have cured Morton, but they won't be curing any one else by the time Zaro gets through. They'll all be dead. The whole beautiful Capital City of your great country will be lying in ruins. Zaro's taken every plane with him. And every plane is laden with bombs. Bombs for Washington, my friend—bombs to repay those fools for daring to cross us!"

Bill stood frozen. Zaro—the Black Ghost—had dispatched his whole air fleet to destroy Washington!

"He's leading them himself, Drake. He's going along to make sure the job is done properly. It wasn't planned in our scheme, but it is a master stroke. With Washington lying in ruins—so will the department of justice. The underworld, governed by our King Zaro, will rule supreme. No, there is no chance for you, Drake. Your humble physician, Dr. Gonzales, the discoverer of a new leprosy, is going to make doubly sure. I am going to give you another injection. I will watch the results ea-

gerly. It should make the disease even faster. I will watch and make notes."

Drake was lying on his side, his eyes closed.

Dr. Gonzales went down on one knee, grasped Drake by the arm and lowered the hypodermic needle. The agent wrenched himself free. He stared up wildly.

"Leave me alone. Let me die in peace." His voice was thin.

The doctor seized him angrily, swung the needle down.

Bill had his gun leveled. He pulled the trigger. The gun roared. The bullet smashed into Dr. Gonzales above his right eye, splitting his skull.

Bill hurled himself inside as the doctor crashed to the floor. The hypodermic needle flew across the room in a shimmering arc.

The guard, over by the far wall, brought up his revolver and fired. The airman felt something pluck at the cloth on his arm. He whirled. His automatic belched fire again and again.

Both bullets smashed into the guard's body. He doubled up. A piercing scream came from his gaping mouth. He hit the floor, slid across it on his face. He rolled over, tried to bring up his gun again and collapsed.

"Barnes!" The word was wrung from Drake's lips, almost a sob.

Bill was at his side. "Where is the key to the cuffs? Hurry!"

"The gunman—" Drake gestured to the prone guard.

The airman searched frantically through the dead guard's clothing before he found a small ring of keys.

Bill spun back to Drake, inserted a key in the handcuffs. It didn't work. He tried another with no success. His brain was screaming at him to hurry. The blasting shots would raise an alarm.

The fourth key worked. The handcuffs clicked open. Drake's wrists were freed. His ankles were freed.

Bill pulled him to his feet and held him as the man sagged.

"Can you walk? I have a plane up at the landing field. We have to get there—fast."

"I can manage." The agent held to Bill's arms and they started for the door. "It's too late, Barnes. You'd better go on without me. I can't get to Washington in time. I'm doomed to die. You go on alone. Leave me here as I am."

"I'll get you there!" said Bill grimly. "Come on!"

He took Drake tightly by the arm, half dragged him. They raced through the laboratory, across the other room and out through the door to the open.

Shouts were coming from outside. Lights were blinking on. Figures were running from the lepers' houses and thronging in the clearing in front of the buildings. The lights illuminated the

faces of the gathering crowd. The clearing was filling with horrible-looking creatures. People maimed and grotesquely disfigured, all shouting, shouting in Spanish. The lepers!

Bill shot once over their heads and yelled.

The mob broke before him. And Bill, forcing Drake along, raced madly for the trail that led to the landing field. He could hear the agent gasping for breath, trying to speak.

They reached the narrow path that wound up the wooded slope. Far above, Bill heard shouts. There were men up there. They had been alarmed by the shooting. They would be racing down the trail to the source of trouble.

He gripped his gun fiercely and went on. Drake crumpled and fell. Bill stopped, leaned down, threw him roughly over his shoulder.

"It's no use—I'm too weak— This leprosy is—" Drake was fighting for words.

Bill forced his aching legs to greater speed. The trail was steep. Drake's weight seemed to increase at every step he took. The shouts ahead were growing stronger. He heard the thudding of shoe leather. Men were racing madly down the trail. At any second the men would be upon them.

Bill shot a quick glance at the matted undergrowth lining the trail; he lunged for it. Creepers wound around his legs. He staggered and dropped down into a thorny thicket. A moan came from Drake. Bill clapped his hand over the agent's mouth.

The pounding on the trail had grown louder. He saw three men race past, and then another and another.

He pulled Drake up, fought himself free of the clinging undergrowth, and got back to the trail. With the agent over his shoulder, he again headed up. If there were any more men he'd have to shoot it out. No more time could be lost. The lepers would spread the news of what had happened. The men would head back in hot pursuit.

The trail seemed never-ending. Bill fought on, automatically. No one else came down the path.

He reached the top. His head was whirling dizzily. He staggered, almost fell and then spurred himself on. Ahead was the landing field with the biplane. Ahead lay—escape.

Somehow he reached the plane. It was standing where he had left it. The two mechanics obviously hadn't been missed or discovered.

He pushed Drake up into the rear cockpit, threw himself into the front seat, worked the starter. The propeller swung over. The engine spluttered.

Shouts were coming from below, growing louder and louder.

The engine caught. Bill nursed the throttle, his eyes darting from the

tachometer to the end of the field where the trail began.

The moonlight was illuminating the field brightly. There was no need for ground lights.

Bill released the brakes, swung the biplane around and taxied it hurriedly to the other end of the field. He whirled it to face down the field.

Figures were coming out of the blackness of the trail and heading down the field. They were shooting.

Bill threw open the throttle. The biplane lunged ahead. Its speed increased. It hurtled down the field straight at the oncoming enemy force. Bill's fingers slipped down the control stick. They found the gun trips. They rammed down on them.

The two machine guns, nestling in the grooves alongside the engine, burst into savage yammering. Lines of blazing lead laced out, stabbed across the field.

The biplane was hurtling faster and faster. Bill saw two men pitch up their hands and fall as the slashing lead cut them down. The grim-faced pilot forced his ship slightly to the left to avoid the prone bodies. Bullets were thudding into the wings; into the fuselage.

The bulletproof cockpit screen in front of him went into a million cracks as a ricocheting slug hit it. The white plane streaked past the still-firing survivors. The end of the field swirled to meet it. Bill tugged back the stick. And the biplane thundered steeply for the night.

XXIV—PURSUIT

THEY HAD ESCAPED!

Bill slung the pounding ship into the northwest and onto a course for Negra Island where the Stormer waited. He expected no pursuit from Isle Despair and there was none. Zaro had taken all his planes out, was leading them in a savage assault on Washington. Somewhere far ahead the death ships raced through the skies.

The throttle was forced to the last notch. The engine was thundering. Bill hunched over the controls. He didn't try to communicate with Drake. He could see the agent slumped back against the cockpit, his eyes closed.

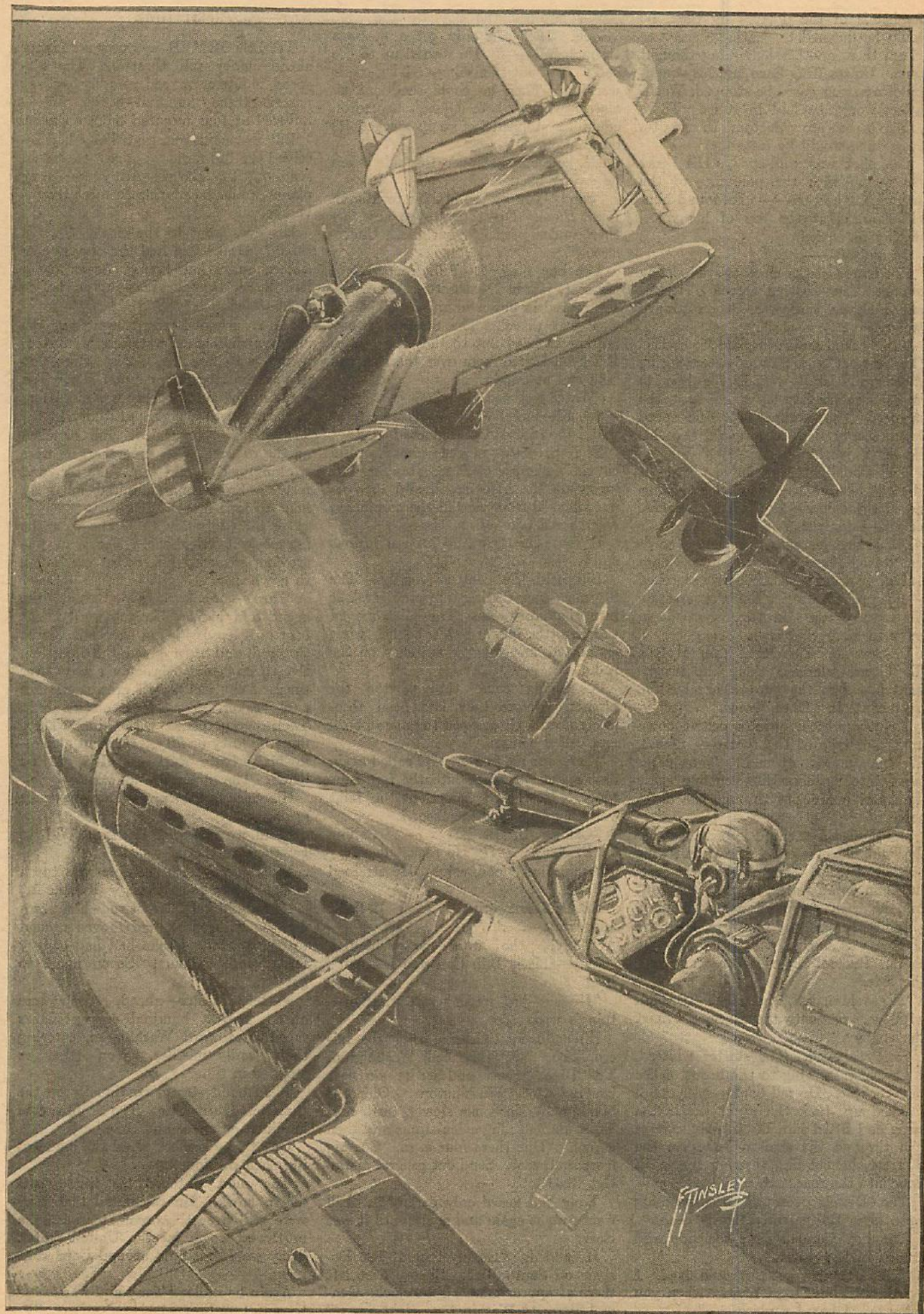
Bill looked from the air-speed indicator to the clock. It was a few minutes past ten o'clock. Ten o'clock! And they had to be in Washington early the next morning—Washington, nearly two thousand miles away.

The air was still. The white plane sliced through it, the engine straining at top speed. The altimeter held at four thousand feet. Time moved on.

Ten thirty! Drake had had leprosy fourteen and a half hours. The figures seared into Bill's brain. The limit was twenty-four hours. If Drake wasn't in



The night sky was filled with airplanes—a battleground of death-locked ships, of lines of tracers churning the air! Bill tore through the edge of the fight.



the hands of the doctors by then, he would be doomed to death.

And then, another horrifying thought came. Unless King Zaro and his squadron of assassins could be stopped, Washington would be laid in ruins. There wouldn't be any doctors to go to. Everything would be lost.

The pilot was wild-eyed. His heart was racing with the pounding of the engine. On and on— He found himself shouting at the top of his voice, praying for speed.

On and on—

The hands of the clock moved slowly around. They passed eleven o'clock—passed eleven thirty—crept on toward twelve.

Bill checked and rechecked his course. The Stormer and Sandy were waiting at Negra Island—waiting for him to come. Drake's fate lay swinging in the balance. The Stormer's terrific speed was the only thing that could save his life—save Washington!

The moonlight had faded. Only a silvery glow of the clear night shimmered through the sky. It was twelve o'clock—midnight.

Bill leaned far over the cockpit cowl, stared down. He was over Negra Island, or should be. His eyes searched—and saw nothing. Panic swept up. He reduced the throttle, went down lower in wide circles.

He saw it! He closed the throttle. His fingers fumbled along the instrument board to the flare-release button. He pushed it. Once, twice.

Two cylindrical objects pelted down from the belly of the fuselage. Small, silk parachutes opened. The flares burst into brilliant life, cutting wide swaths of luminosity through the darkness.

Bill circled lower and lower. He saw the light reflect on the scarlet gull wing of the Stormer. The flares were near the calm ocean water, making it bright. And he went down for a fast landing.

Sandy was waiting for them when the biplane was hurriedly taxied up to the shore. Bill cut the switches, went over the side.

"I got him, kid," he said. "Drake's with me. Get into the Stormer. Start the engines."

Sandy obeyed. The starter whirled.

Drake was trying to climb out of the rear cockpit. He fell back weakly. Bill reached up, took the agent under the arms and lifted him down. He carried him through the shallow water to the Stormer, helped him through the small door into the rear seat.

The Diesels were already booming smoothly. Bill gestured Sandy down.

The boy jumped over the side and landed in the water.

"Bill, I think I got the radio fixed. I was just trying to get Shorty when you came in. I heard a voice—"

Bill grabbed the boy by the arm. "Good. If I can only get a message through it'll—" He started up to the cabin without finishing. The radio working! Then he could send out an alarm. The Black Ghost's squadron could be stopped before it reached its destination.

He had one leg over the side when he swung back.

"Sandy, you fly the biplane to Miami. Land there. Don't try to go any farther, under peril of your life. Understand?"

The boy nodded. Bill dropped into his seat, jazzed the throttle. The Diesels roared in powerful unison. The anchor was raised. The Stormer swung around to head out to the clear water, Bill leaned once more over the side and bellowed at Sandy.

"Watch yourself."

"O. K.—luck!" The words were faint under the roar of the engines.

The Stormer moved ahead. Bill caught a glimpse of Sandy standing forlornly on the little beach and then he was whisked from view as the amphibian raced for a take-off.

It came off the water after a furious sprint.

Bill held the controls rigidly. The Stormer was tearing upward, straight into the northwest. The pilot moved the throttle forward, his helmet wires connected, and then he switched on the radio.

A singing came through the ear phones. Before they had been absolutely dead. He grasped the microphone and called Tony.

There was no answer. He called again and again, listening intently for some reply. He heard something, a faint voice, and his pulse quickened.

"Calling B. B. X. . . . Calling B. B. X. . . ." He repeated.

Again that small voice. He strained his ears.

"B. B. X. answering. . . . B. B. X. answering. . . ."

"Tony!" the word was shouted. "Tony—this is Bill. Can you hear—it's Bill!"

"I—can—just make you out. Something's wrong?"

Bill's fingers tightened over the microphone. "Get this: Call Washington. The Black Ghost and entire air fleet heading for Washington. Object—bombing." He spoke slowly, distinctly. He made lightning calculations and then added. "Due there four a. m. Coming from southeast. Send out general alarm. Get that?"

Tony had heard only part of it. Bill went over it again and again until it was clear.

He added: "Enemy base at Isle Despair off Santo Rico. Enemy fleet left there at approximately six o'clock. General alarm to Washington—right away!"

XXV—AGAINST TIME

THE STORMER was now screaming ahead under full throttle. The air-speed indicator moved steadily on. It passed three hundred—three fifty—hovered at four hundred miles an hour.

Bill was confident that Tony had received the full radio message. He would send out the alarm. Army and navy planes would be roaring to meet the invaders.

His eyes went to the clock. Twelve thirty! Drake had had the disease now sixteen and a half hours! Seven and a half hours to go! Washington before eight o'clock!

He crouched forward, watching the air-speed indicator, watching his instruments, watching the clock. His heart was hammering faster and faster. The speed of the hurtling ship was increasing as it roared to a higher altitude.

The cabin was sealed. Bill switched on the oxygen. The superchargers were working. On and on. Faster and faster. From four hundred miles an hour to four fifty.

He talked briefly to Drake over the intercockpit telephone. The man was growing weaker. His voice was fading to a whisper.

"Zaro's gone stark mad, Barnes," the agent told him. "He got word about Morton's leprosy being checked. I was tortured and then given the injection. I've been going through agony ever since. I can feel myself growing weaker and weaker. Zaro took off at dusk. Took every plane with him. There must be forty or fifty. He went along—in his private ship— It's painted black. The others are all white—"

His voice faded away. Later he spoke again.

"Will we make it, Barnes? Will we get there in time?"

Bill's lips were compressed to a twisted white line. "Sure, we'll make it."

But would he? Doubt rode him like a demon. The clock had moved around to one o'clock. Drake had had leprosy for seventeen hours! Seven hours to go!

Faster, faster—ahead, somewhere ahead, half a hundred enemy planes raced on toward Washington, carrying their deadly missiles. Would they be stopped in time?

Bill's hand stayed continually on the throttle. On and on. The Stormer was annihilating space and time.

One thirty passed. And the maddening pace continued.

The pilot watched his instruments like a hawk. He calculated that they were still over the ocean, tearing on a northwest angle for the United States. They would hit land around Cape Hatteras.

Again he radioed Tony and was forced to repeat and repeat his message.

"Bringing Drake back. Have ambulance at Washington airport. Tell department of justice!"

The Stormer was bulleting through the night. The air-speed indicator quivered at five hundred. The miles were swirling past. Get to Washington! Washington!

The word roared from the engines, in the winds, throbbed in Bill's brain.

On and on. Nearer and nearer.

Two o'clock—

The radio light blazed. He switched on, heard Tony's voice:

"Enemy fleet sighted at coast—Norfolk, Virginia. Shorty, Bev, Red and Cy racing to attack in Snorters. Two army squadrons with them. More coming!"

Zaro's fleet at Norfolk! That was near Washington—too near. They had to be stopped before they could reach the city—

Norfolk! It lay directly on the Stormer's hurtling course.

The hands of the clock moved on. The amphibian's terrific speed continued.

Two thirty. Bill figured that they were now over Cape Hatteras. The speed had been incredible. He moved the stick forward. The Stormer angled down.

Every passing second was an eternity. The altimeter swung lower and lower. Twenty thousand, fifteen, ten, eight—five—

Bill could see lights below. The sky was bright and clear. His feverish eyes stabbed to the clock again. Drake had had the disease now nineteen hours.

The Stormer screamed into level flight. Bill looked ahead—and gasped.

The sky was filled with airplanes! The enemy fleet and the defenders! The battleground!

A terrific battle was taking place. Small, matchlike things twirled in crazy courses across the heavens.

The Stormer raced nearer. Bill got a quick impression of death-locked planes; of lines of tracers churning the air; of ships plummeting downward in flames. And somewhere in the wild mêlée was his loyal gang of pilots, battling furiously against the blood-madened criminal and his murder fleet.

The amphibian tore through the edge of the fight, swung wildly aside to miss a white biplane and its blunt-nosed army attacker. Bill's eyes were flaming. He couldn't take part—he couldn't waste a second. His job was to get Drake to Washington.

It was already past three o'clock. The agent hadn't much longer to go. His very life was slipping away. The battle-locked planes swirled through to the rear. Ahead was Washington—

The enemy had been stopped! They would never reach the Capital to drop their devilish loads. Bill's eyes sud-

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denly narrowed. He leaned forward, looked down.

Far ahead, he saw a plane. It was flying low to the ground. He swooped nearer. It was heading directly for Washington. The glow from the Capital's lights showed brightly in the sky ahead.

The Stormer dived closer and closer. The plane ahead was a biplane. It was painted black. Bill recognized the design immediately. It was the Black Ghost!

XXVI—ATTACK

SOMEHOW, the criminal, in his black ship, must have slipped through. Somehow, he had avoided the fight. His intention was obvious. He was heading for Washington. And slung below the fuselage was the torpedolike shape of a heavy demolition bomb.

As if to conform to his quick decision, he heard Drake's gasping voice.

"That—plane— The Black Ghost — King Zaro—"

Bill's fingers came down over the firing trips. His whole soul blazed in one furious outburst. He didn't give the enemy ship any warning. It was no time for sportsmanship. The man riding in the plane was a mad dog—a mad dog that had to be exterminated.

Bill's eyes gleamed through the gun sights. The pointed nose of the Stormer was aimed like a bullet straight at the black biplane. It had two cockpits. Both were filled. The Black Ghost was riding as a passenger.

The enemy pilot must have seen or sensed the oncoming avenger. He tried to throw his ship out of the way just as Bill's fingers rammed down on the gun trips.

Lines of blazing lead pumped out from the Stormer's guns, slashed straight down.

Bill had a fleeting glimpse of the man in the rear cockpit. He was wearing a

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mask. He looked up wildly, tore off the black cloth. His face was that of a beast—a lion—a horrible face—His mouth opened in an unheard scream. And then the hurtling lead smashed into him, blasted him down into the cockpit, slashed across to annihilate the pilot and—

The Stormer plummeted past.

Bill, his face contorted with an unholy fury, tugged the plane into level flight, shot a glance back. The black biplane was diving straight down. Smoke was pouring from it. Flames licked back.

The Black Ghost—King Zaro—was dead!

At twelve minutes after three Bill set his ship down on the Washington airport.

He sat limply in the cockpit, utterly dazed by the terrific strain he had been under. People were thronging around. Drake was being lifted out. Bill saw the agent look up at him. Whispery words came from his lips.

"You got me back."

He was hurried away.

Bill heard the diminishing scream of a siren. He knew dimly that he had won—that he had brought Drake back in time. It was three thirty. And the ultimate deadline was eight.

He had won. The Black Ghost had gone down to a hideous death before the savage fury of his guns. The criminal's followers were meeting the same fate. Washington had been saved.

But would the doctors be able to check the horrible disease of leprosy that had been given Drake?

Government agents took Bill into the administration building, forced him to take a shower and eat. But he refused the nap they suggested. He waited anxiously for word.

It came at seven o'clock. The serum was working. Stephen Drake would recover completely.

He stayed all day in Washington and, after having one short visit with Drake in the hospital, Bill took off for his own field.

He arrived there at nine o'clock at night. The first person he saw as he taxied the Stormer up on the apron was Sandy. The boy was dressed in a well-pressed blue serge suit. A new fedora was on his head. Gloves on his hands. His shoes shone.

Bill swung down from the cockpit and stared at him.

Sandy plied him with questions. Bill related everything hurriedly and learned that the boy had flown to Miami as directed and come up to New York in

an Eastern air liner. The gang had all come through the fight successfully, bringing back battle-scarred ships. They reported the utter annihilation of the enemy fleet.

Bill listened quietly. Finally, he turned to Sandy.

"But, why the rig-out? You going to a wedding?"

Sandy shook his head. "No. I was just waiting around for you to get in before I leave."

"Leave?"

"Yeah. I guess you won't need me around here for a little while, huh?"

Bill looked intently at him. If the boy wanted a vacation, he could certainly have it. He had earned it. It had been only through him that Drake's life had been saved and the city of Washington rescued from chaos.

"We'll miss you, kid, but, of course, you can go. Where're you off to?"

"Paris," said Sandy.

"Paris!"

"Yeah. You see I've seen how important this coin collection—I mean this numismatist business can be. I'm taking it up seriously. That's why I'm going to Paris."

Bill scowled. "You mean you're going over there for some coins?"

"Well—just one coin. You see Shorty was telling me about a Latin quarter they've got in Paris."

SKYROTECHNICS

(Continued from page 22)

Presently Connie had the portly Mr. Gombel smiling, almost relaxed.

The middle-aged woman in the brown, mannish suit who sat just across from him had begun reading the evening paper; evidently she was too used to air travel to bother glancing about her. Connie, passing close to her, was a bit startled at a strong odor of cigars, but decided later that it must have come from the two men directly behind the odd-looking woman.

Through this work, Connie had developed intuitions akin to the gifts of certain taxi drivers and detectives. Her large green eyes, flicking across a passenger's face, brightly intimate or coolly defensive as the case might be, had become amazingly accurate in tabulating character.

The rest of her passengers, she decided, were business men or traveling salesmen, with the exception of the man who sat alone in the rear seat—a nondescript character whom she could not catalogue and liked not at all. He had looked her up and down each time she passed his seat, bold appraisal in his hard gash of a smile, and she had noted

with a little start that one of his eyes was steely gray, the other a peculiar hazel.

For a time she was busy furnishing newspapers, magazines, coffee, and smoking equipment to the various passengers. When she had finished she sat down at the front of the cabin, chiefly to be out of range of the inimical stare of the man in the rear seat. Rarely had she experienced a more repulsive reaction.

It was quite dark now and looking off at distant lights, one could quite forget one was traveling two thousand feet up in the air.

Connie was startled presently by a figure leaning over her and a voice close to her ear.

"I'll trouble you for my suitcase, miss; I need something out of it."

A broad hand thrust out a sizable tip to her. Connie glanced up into the grinning face of the man with the variety of eyes, and rose quickly to comply.

"I'd better help," said the passenger. "The grip's pretty heavy." He followed Connie to the luggage compartment.

A minute later, as Connie unlocked

the door, a blunt hand closed suddenly over hers, wrested the key from her grasp.

"I'll just keep that myself."

To Connie's amazement, the man had backed up against the wall and now stood facing the passengers. A revolver was in his hand. And glancing around, she saw that the middle-aged woman in the mannish suit had moved quickly to the rear of the cabin. She was holding a black automatic on the passengers from the rear. The faces of those who were seated carried the stunned expressions of men who have just had a swift drop in an elevator. Some were popped, some livid and green.

"All right, Nick, get busy."

The rasping order came from the old battle-ax herself and the tone, which was very much like a man's, explained much, including the cigar reek Connie had caught. A clever disguise for a dangerous job.

The man called Nick motioned Connie to one of the passenger seats.

"Park here, sister," he ordered. "You're off duty for the night, see, so relax and be a good girl."

Connie hesitated. She glanced forward, but the door to the control cabin was shut and locked as always during passage. Neither of the pilots could see or know what was transpiring behind them. Useless for her to make an outcry; even a revolver shot would not be heard above the roar of motors. She sat down, her mind blank for the moment.

"Just keep your hands in the air till we frisk you, gents, and nobody'll get hurt—I said *in* the air." The revolver suddenly menaced one of the passengers and the man snapped out of his startled daze and reached for the roof.

The gunman opened his grip and shoved it along the aisle with his foot. "You first, Mr. Gombel," he said harshly. "You've got about twelve thousand dollars' worth of stones in that grip. Hand 'em over. Don't stall, we know all about them."

The elderly jeweler went inarticulate, half paralyzed with fright.

"Come on; make it snappy!"

"You can't get away with a robbery like this!" Connie spoke up heatedly. "You'll be caught as soon as the plane lands in San Francisco."

"Yeah?" sneered the man with the queer eyes. "Think we're green, eh? This plane ain't going to land in Frisco, sister. We're flying her to a sweet little spot we know. That'll keep 'em all guessing for about six months."

He opened the black bag Gombel had thrust toward him and a grin of satisfaction spread over his features at sight of the contents, which he dumped into his own grip.

"All right, kick in, the rest of you birds, and no funny moves. I got a tube here that'll reach Honolulu, and so has Ma." He shoved the open suitcase along the aisle with his foot while, with his free hand, he went through each man's clothes, taking money, watches, and jewelry.

"What are you going to do with us?" demanded one of the passengers whose thick wallet had just been dropped into the bag.

"You gents are bailing out in a few minutes. We don't want your company where we're going."

"You're not going to murder us!"

"Not if you've got sense enough to pull a rip cord." He turned to Connie. "Unlock your emergency parachutes, Gorgeous," he ordered. "Get one out for each of these gents and show 'em how to strap them on."

"You think of everything, don't you?" said Connie. A desperate idea had just come into her mind.

"You bet we do, and never mind a chute for yourself. I think maybe we'll take you with us."

"So you're fool enough to add kidnapping to robbery, are you?" Connie shot back, though her mind had gone

numb in unreasoning dread. She was caught, trapped, yet it was senseless to make a scene—useless, too.

She moved over to the chute locker and killed as much time as she could getting out the tightly wrapped "guardian angels." Every minute, every second even, might be vital.

"Step on it, sister."

Protests arose from the passengers now. They balked, held back and argued at the idea of taking a plunge into the space and blackness outside. Faces became livid with terror, as each passenger was forced to strap on a parachute.

"I'm too old a man for a jump like that. I've never done anything of that sort in my life. The shock will kill me!"

"Never too late to learn, brother. Tonight's your night to try."

"For Heaven's sake let the ship land and unload us," pleaded the fat Mr. Gombel. "This is murder!"

"If it is it won't be hung on us. And since you're so ornery you're going to jump first, see? Over by the door with you. Or do I have to pump lead into you to make you move?"

But still the jeweler did not move. He gripped his seat, eyes glazed in a catalepsy of fear until the man called Nick jerked him forcefully to his feet and half dragged him to the door his partner had just pried open.

"Jump or we'll throw you out!" came the order. And in the end they had to throw him. They tore the jeweler's hands from a strut and flung him into space. His scream of terror as he pitched downward blanched the faces of the other passengers.

"If any of us live," said another middle-aged passenger, "you'll sweat for this. With those eyes of yours, we'll have a perfect description to give the police when——"

"At the rate you're going you won't live long enough to jump, brother. Come on, out with you!"

Again the hesitation, and a struggle, until the foot of the robber pitched the stubborn one into the dark. Then the door was closed against the whipping inrush of the wind.

"Listen to me, gentlemen," spoke up Connie, sharply and clearly. "You'll get down all right if you pull your rip cords. And as soon as you land, every one of you get to the nearest telephone and report the robbery. Every idle plane in the service will be out after these men in an hour——" She broke off abruptly as the gunman, Nick, made a dive forward and silenced her with a rough hand. But the words had heartened every passenger.

"That's another one you didn't think of, isn't it?" Connie taunted as soon as she could speak again. She hoped now that the robbers would refrain from forcing the other passengers overboard,

but the gunmen hesitated only a moment or two. Patently, what had been started had to go forward, and "Ma" snapped a sharp order to get on with the show.

"We're losing valuable time, Nick. We'll be over Frisco in less than an hour, and we've got to take the fight out of those pilots before that."

Abruptly, a buzzer sounded and a small light glowed at the rear of the cabin. Connie had been expecting this for some minutes, knowing that each time the door had been opened and a man forced overboard, the pilots would have felt a drag on the ship. Nick's eyes had swung round on her.

"What's that?" he demanded.

"The pilot's ringing for me," Connie said. "He'll be in here in a minute if I don't answer."

"You'll stay right where you are," snapped Nick, "and when he opens the door you'll tell him everything's O. K., see? We'll be right behind you; one crack out of you and we'll let you have it. That goes for the rest of you, too."

"Watch out; here he comes now!" warned the other gunman. "Back in your seats, you birds."

A key sounded on the other side of the control-room door. The two gunmen sat down in unoccupied seats; their weapons, still gripped in their hands, were thrust into coat pockets. Connie remained standing in the aisle a few feet in front of them, facing the door. As the co-pilot put his head into the cabin, Connie almost screamed.

There was a blithe grin on Mace Turner's face as he met her eye, and Connie knew that he must have been put on unexpectedly that night to relieve Sid Lehman, the regular relief pilot. He had waited to surprise her. In spite of what she had been through it was the hardest moment of the night, the tension of facing him there, her tongue tied with the knowledge of imminent death for them both at her back.

"We were buzzing you—Miss Morgan," Mace remarked, with an emphasis on the "Miss." "Anything wrong back here?"

"Sorry"—Connie's voice was toneless—"I was so busy I couldn't answer——"

The levity was instantly wiped from his face. His eyes swept the cabin and came back to her face.

"We felt the ship give a couple of kicks a few minutes back, as if a door had been opened," he said, quite casually.

"I can't imagine what it was," Connie said, without emphasis.

Mace hesitated, took in the lighted cabin again, his gaze returning to Connie. Her face, all eyes, seemed to leap at him across the intervening space. They had forbidden her to say anything under threat of death, but they couldn't control her expression. Without being

obvious about it, she was striving to convey to Mace her predicament, knowing the danger both to herself and him, sensing how the hands of both gunmen grew tense upon their weapons.

After what seemed an age, Mace turned about. "Guess it must have been an air pocket," he said casually, and withdrew into the pilot room. The key clicked again in the lock.

Connie prayed that he had gotten her telepathic message and had had the presence of mind to safeguard it.

"On your feet, you birds," rapped out Nick sharply. "We'll waste no more time on you. You, fella"—he singled out a young cigar salesman—"step out, or we'll kick you out."

Once more the door had been flung open. The passenger in question did not wait for violence. He edged forward, fear twisting his ashen face, and pitched into the dark.

A minute later, Nick, in the act of forcing the next man up to the door, spun around drunkenly and fell across a seat. His shoulder was broken. The pane of glass beside him had been shattered, apparently by a bullet from the empty air outside.

Connie's heart gave a wild surge. She knew instantly what had taken place. Once in the control room Mace had evidently tipped off Joe Riopelle, then crawled out on one of the liner's great wings to a position from which he could draw a bead on the robbers through the cabin windows.

Another spurt of flame; another window shattered before the bandits realized where the firing came from. Obviously the remaining passengers were wholly in the dark as to the source of the bullets. The second gunman, evidently unharmed, had dropped to the floor and crawled quickly out of range beside his groaning partner.

"Stewardess, turn off the cabin lights!" Connie was commanded.

"The switch is in the control room," Connie lied.

"Don't try to kid me, sister."

"Why do you suppose the control room is kept locked?" Connie retorted. "It's to prevent just such a robbery as this."

An oath told her the lie had worked. Then she waited for what she knew would come, a battle now between her and the bandit called Ma. Nick was still on the floor, out of the picture for the time being.

As if he had read her thoughts, the eyes of the other gunman fixed upon the control-room door. Abruptly then the plane careened sharply to the right, then to the left, like a ship in a heavy sea. The thundering of the engines was almost doubled as the plane suddenly zoomed downward, then shot up again and the careening was repeated more violently than before.

A lighted sign up in front of the cabin had been switched on. It read: "*Passengers, please fasten your seat belts,*" and the order, combined with the pitching of the plane, was not to be disregarded. Every one automatically sat tight. In the midst of the careening, Mace Turner jumped suddenly into the cabin.

The tossing and veering of the plane had been perfectly figured to give him an instant's edge on the armed bandit. At that, the roar of their two guns was almost simultaneous. The acrid odor of powder smoke filled the cabin. Mace's first shot told. The bandit fired twice; one shot went wild, shattered a window; the other slashed like a knife cut across the pilot's ribs. Then his gun flew from his hand and he reeled backward as Mace launched into him head-first.

They went down together, wedged in the narrow aisle. Mace, who was on top, seized every advantage, for he had greatly underestimated the other's strength, probably because of the woman's garb. He pommeled, gouged and kneed the other, but the fellow fought with the silent fury of a panther. His arms closed about Mace like tentacles, and the pilot retaliated like a long-lost brother octopus. They rolled back and forth between the seats, tangled with the metal arms and legs of the chairs. Connie and two of the passengers moved back and forth with the battle, trying to get in a telling blow and retrieve the fallen guns.

Unfortunately, a sledgelike blow caught Mace in the solar plexus and in

the numbness that followed, fingers clamped about his throat like steel claws. Connie screamed—then she brought something down violently on the back of the bandit's head. It was the heavy rosewood cane left behind by Mr. Gombel, and it knocked the enemy very effectively into the middle of the Chinese calendar.

Old Crannige of the concrete face and crusty disposition, sent for Mace Turner as soon as the plane landed in Los Angeles next morning. "Turner," he said, "the old man instructed me to call you on the carpet."

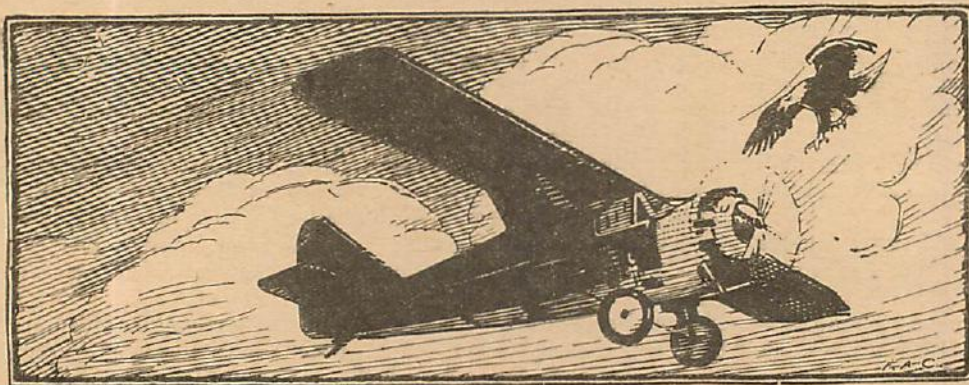
"Thought so," said Mace somberly. "Well, let's have it."

"You are accused," said Crannige, "of dare-deviltry in the pilot room, of assaulting our passengers and risking their lives by firing through the windows of a crowded cabin, and by the use of deadly weapons within the cabin. All of which is enough to practically put us out of business, according to the old man. In short, you were ordered canned and preserved on a black list.

"However," Crannige went on with dry humor, "the dawn found your name plastered all over the front page of every paper in town, together with that of Miss Morgan, the stewardess. It also disclosed the fact that one of the two robbers you trussed up—the one disguised as a woman—is no less than a public enemy, a fellow the police have been trying to catch for two years. Which, of course, makes you a public servant, if you get what I mean, and the old man too darned quick on the trigger.

"Last night's affair, instead of hurting the reputation of West Coast Air Lines, has increased public confidence in us and in flying. Fact is, you couldn't break away from W. C. Lines now without a fight. The old man got in touch with me an hour ago and the latest is you're moved up to second regular pilot under Chief Pilot Riopelle. I fancy something will be done for Miss Morgan, too—"

"You bet there will," said Mace, pausing at the outer door. "She's going to be Mrs. Mace Turner within an hour. So long."



THE MODEL WORKSHOP

(Continued from page 36)

interesting to watch. The model takes off and climbs. As the power of the first motor is exhausted, the model begins to glide. But only for a second or two does its nose point toward the earth. Then it again heads skyward as the second motor goes to work. When a single-motored ship's flight is almost ended, a double-motored model's has barely begun.

And speaking of multiple motors, there's a twin-motored, twin-prop cabin model outlined in drawing No. 5 that may interest the experimenters.

FOLDING PROPELLER

Regardless of how cleanly streamlined a model might be, a large propeller will handicap the glide. Drawing No. 3 shows a method of folding the propeller blades to fit alongside the fuselage during the glide.

The operation is simple. The front of the propeller shaft A is pulled tightly against the propeller by the force of the rubber. Two arms labeled B and C are attached to the blades of the propeller. During flight these arms are held firmly in place by the propeller shaft A. But just as soon as the motor is unwound, wire spring D pushes the shaft away from the front of the propeller, permitting arms B and C to swing free. A second spring E folds back the blades. Pieces of silk serve as hinges, while the springs are bent from piano wire.

A folding propeller will reduce drag to an even greater extent than a free-wheeling propeller. A model equipped with folding propeller and retractable landing gear would look and perform like a soaring glider. The altitude gained under power could be stretched into a glide of several minutes, substantially increasing the model's flight.

HYDROVANE MODEL

Every once in a while we get our modeling feet wet—that is, we build a hydro ship. Seeing a model rise off water is the high point of our model-building thrills. The hydrovane (drawing No. 7) is a ship that we have been dreaming about for the last half year. The Italians are credited with the first experiments with a full size hydrovane.

While the results have been rather poor, a model hydrovane will perform successfully, since it is not influenced by the troubles that haunted the real ship.

Unlike the conventional hydro model that rides the water's surface, a hydrovane settles fuselage-deep in the water. Two flat skidlike runners are mounted where the wheels ordinarily would be. A small propeller powered by rubber is

mounted in the rear of the fuselage. This small propeller moves the ship through the water at the beginning of the take-off. Since the two runners or vanes are slanted, they will rise to the surface as the model moves forward. When the model is moving at full speed, the vanes will plane the surface of the water like an aquaplane, making a take-off possible.

There'll be no suction to hold the vanes on the water as there is with ordinary floats. Another good point is that resistance is reduced, vanes being many times smaller than floats.

On landing, the model will plane on the water until it loses speed and settles.

All the parts of the hydrovane model will have to be waterproofed. The bottom of the fuselage must be water-tight since it will be partially submerged to provide buoyancy. The propeller blades must be treated with several coats of dope to prevent them from absorbing moisture and throwing the propeller out of balance. Until the model has developed full speed on the surface, the ends of the blades will be turning through the water. Since the tail will get liberally sprayed, you'd better make it out of sheet balsa.

Use enough rubber on the small water propeller, about $1\frac{1}{2}$ " in diameter, to drive the model at a fair rate of speed. As soon as the main propeller is clear of the water, it will revolve rapidly and soon pull the model into the air.

These winter months are no time to fly hydro models outdoors. But don't put off building a hydrovane model until summer, because you'll be able to fly it in the meantime, letting it take off from ice or snow.

SINGLE-FLOAT HYDRO

Another type of hydro model that should make an interesting model is the single-motor, single-float type illustrated in drawing No. 6. This model has had some worthy predecessors in the large-plane field. Loening, Grumman, Vought, and the new Fairchild all incorporated successfully the single float. There have



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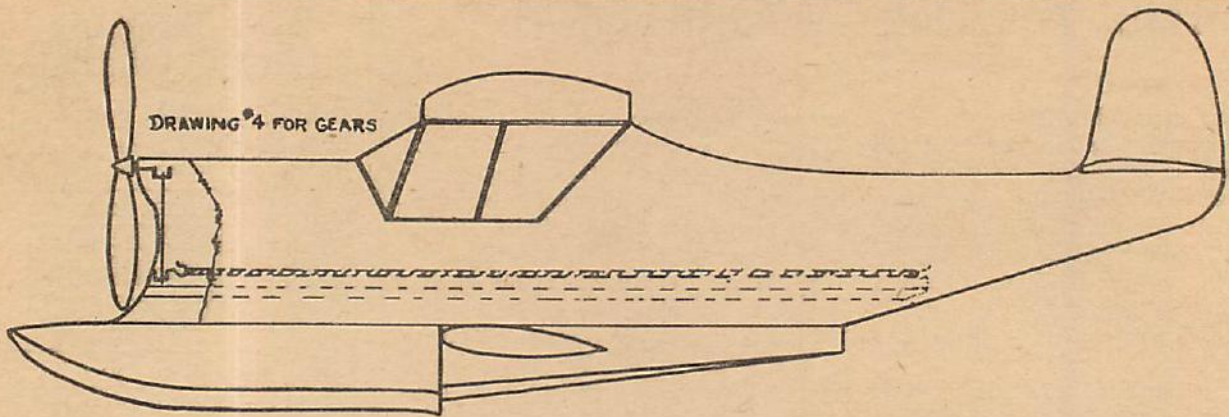
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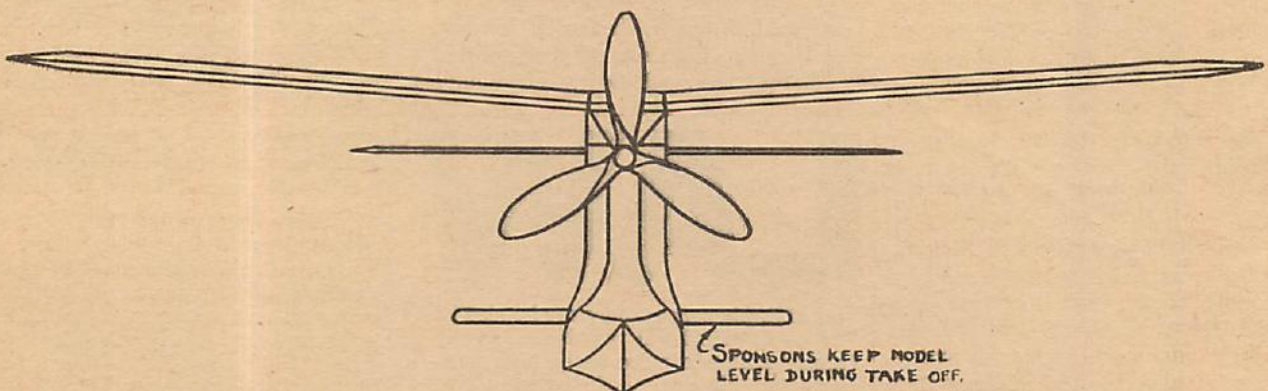
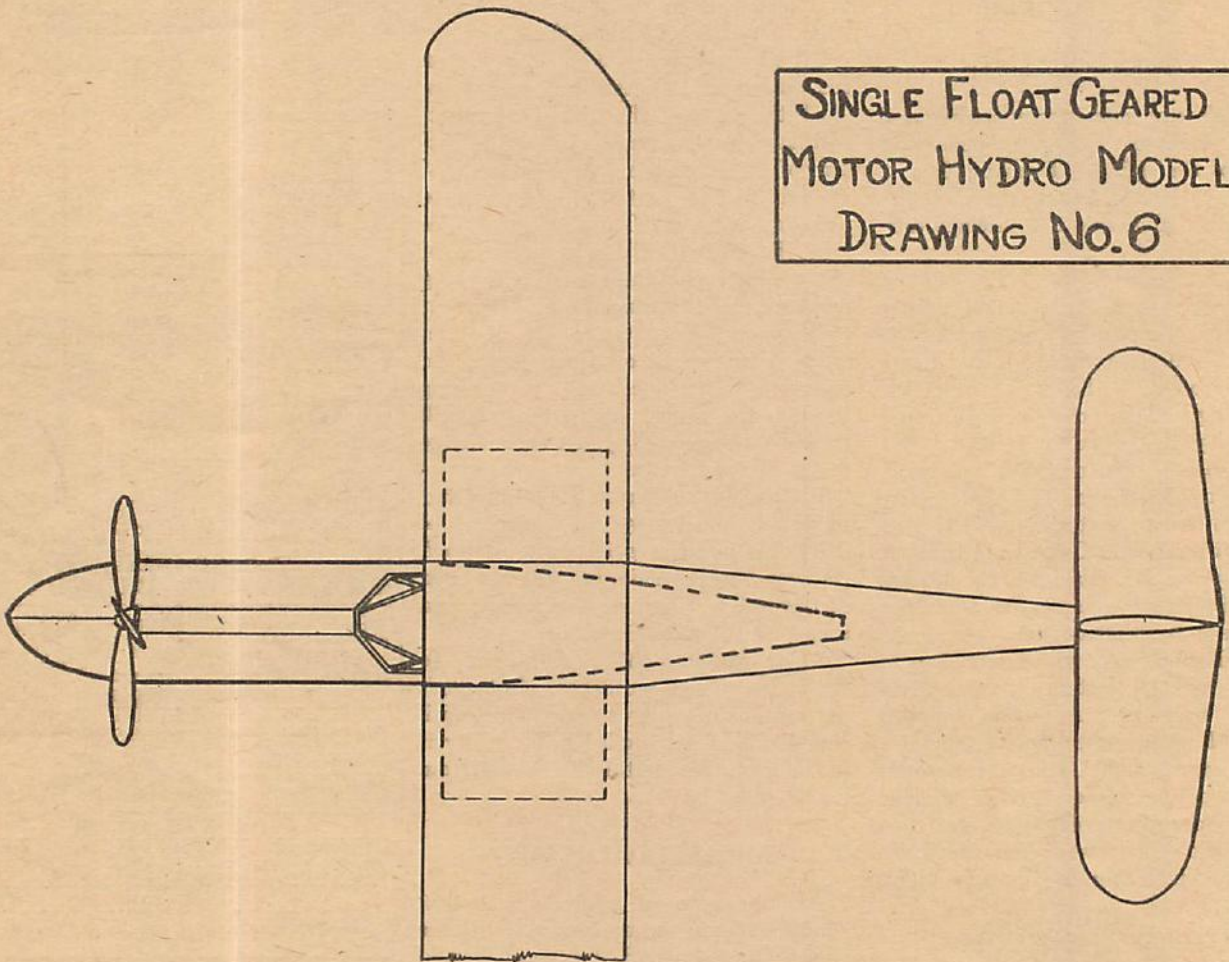
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SINGLE FLOAT GEARED
MOTOR HYDRO MODEL
DRAWING No.6



been, nevertheless, a dearth of single-float models.

Transmission of power is the big problem. The propeller must necessarily be mounted high, and the only space available for the rubber motor is in the bottom of the fuselage or in the float itself. By raising the propeller above the wings, the rubber motor could be stretched over the wing and attached to the tail. But, as a fine point of design, we insist the rubber motor should always be concealed inside the model. A system of gearing will enable you to do this in the single-float hydro.

Drawing No. 4 shows a crank type of transmission that can be used. The rubber motor turns shaft A. This power is in turn transmitted to propeller shaft C, by means of piece B, a metal connecting rod. It can be made detachable from crank A, permitting removal of the motor stick for winding the rubber motor, and thus clearing up the complicated process of trying to wind the motor through the rear of the fuselage.

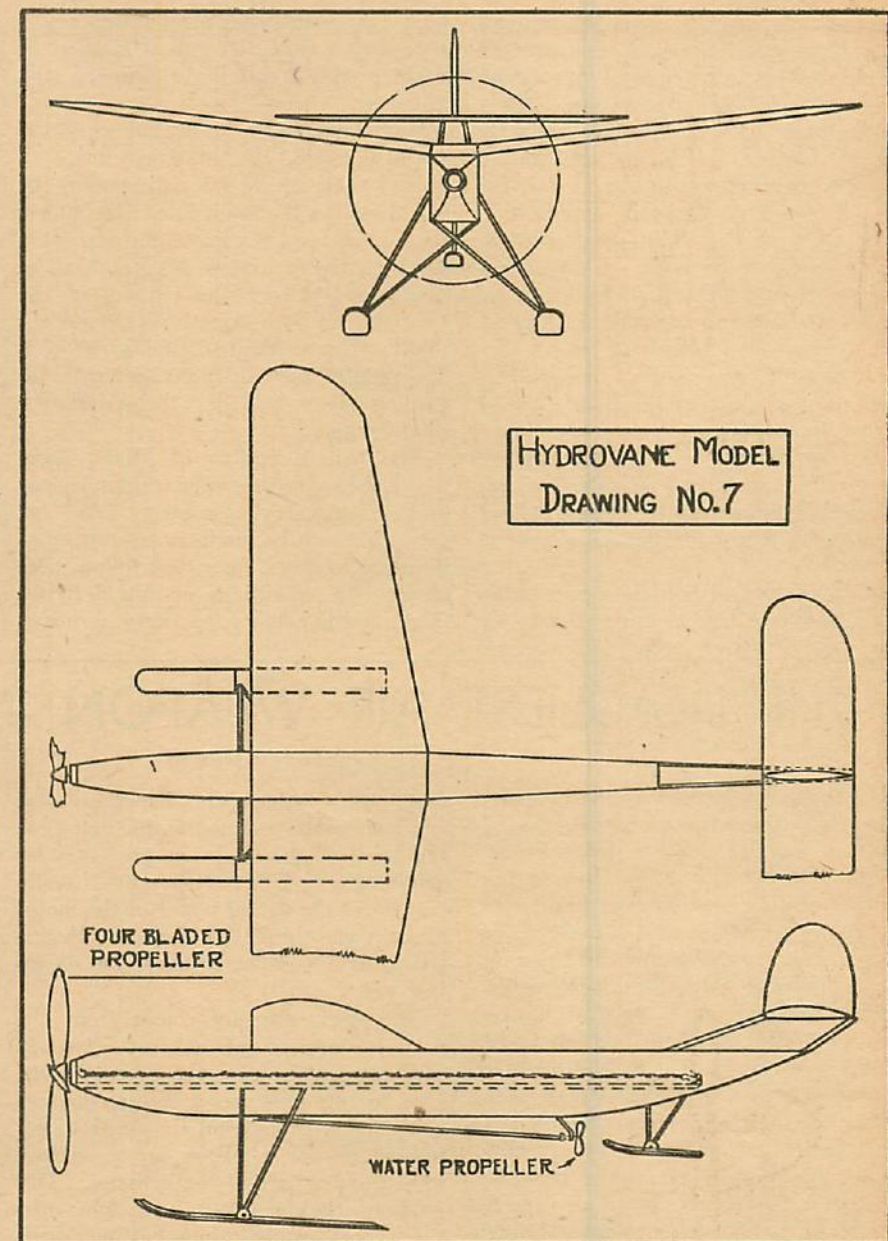
Another method of gearing is to mount pulley wheels to propeller shaft and motor shaft, connecting them with a rubber-band belt, as shown in drawing No. 4. This is an easy-to-build yet efficient method of transferring power. Howard McEntee used it successfully on his model of the twin-motored Boeing. The rubber belt slips a little, with resulting loss of power, but not enough to handicap the model seriously.

ADJUSTABLE PROPELLER AND WING

Despite all the new ideas and developments of recent years, designers have overlooked two features—adjustable pitch propeller and variable lift wing—that an ideal contest model should certainly have. Since the amount of power delivered by the rubber during flight is never constant, the propeller pitch and the wing lift should be changed along with the power. The pitch of the propeller should be substantially higher during the initial burst of power than during the middle of the flight when the rubber power is reduced to almost half.

A propeller which will change pitch automatically during flight is a headache for even the most fertile airplane brain. But we haven't given up hope. We've seen model builders accomplish the seemingly impossible before. At the last national contest in St. Louis, we talked with Carl Goldberg about adjustable pitch props. He said he was working on one for indoor models. So there may be some definite accomplishments soon.

A thin high-speed wing section gives a model the advantage of increased speed at the beginning of the flight in form of a steep climb. But it fails to deliver a good glide after the power is gone. If the thin section could automatically be



changed into a high-lift section after the first 30 seconds, the flight of the model would benefit.

By hinging the rear part of the wing the lift could be controlled. But how automatically to change the angle of this flap during flight is a difficult problem. Some scheme might be arranged where the increased air pressure at high speeds would hold the rear flap in a neutral setting. As the model's speed decreased, the lessening pressure would permit the flap to lower. We haven't finished our experiments with the wing flap idea, so we'll keep it for a future issue.

WEIGHT CARRYING AND SPEED CONTESTS

The annual Bamberger Aero Club convention acts as a safety valve for the model airplane hobby. It is an outlet for accumulated ideas and enthusiasm. The 1935 convention was held September 14. After greetings were exchanged

and a dinner was consumed, fifty model plane experts did six hours' worth of serious thinking and talking. From this lengthy discussion we've culled two important suggestions, offered by Irwin S. Polk, for unusual phases of model building—weight carrying and speed flying.

A weight-carrying event determines which model can carry the heaviest load. The winner is judged on the length of time the loaded model remains in the air. The load is in the form of lead which can be carried inside the fuselage. The lead is placed at the center of gravity so the balance of the model will not be disturbed. The models must take off under their own power.

Watch a heavily loaded model slowly lumber down the runway—the speed increases—the tail rises—and finally, daylight appears between the wheels and the runway. The model is in the air! It has conquered the same problem a heavily loaded transport plane is up against every time it leaves the airport.

As you increase the load, the take-off run becomes longer. The model's struggle to get into the air is physically exhausting for the spectators. They clench their fists and grunt. Silently they're rooting. If their enthusiasm could be transmitted to the model, the take-off would never be in doubt.

Design and flying skill would count in weight-carrying contests. Dame Fortune, a leading factor in most contests, would be forced into a minor rôle. A model carrying a chunk of lead is beyond the influence of the usual air currents. Every second of flight that it makes is earned.

Equally thrilling and entertaining are speed-model contests. Model airplanes have been stepped up in speed to about 60 miles an hour over courses of several hundred feet.

One difficulty in holding a speed contest has been the timing. Since the

flights are short, split-second accuracy is necessary. But Polk has a method of timing speed flights using ordinary stop watches.

One timer starts his watch when the model crosses the starting line. A second timer starts his watch when the model crosses the finish line. The timers then walk toward each other and, at a given signal, each stops his watch. The difference between the reading of the two watches is the length of the model's flight. This method of timing has been successfully used in many contests, including some held by the Pittsburgh model club.

The British Society of Model Aeronautical Engineers conduct annual speed and weight-carrying contests. We believe they can be made as interesting as duration contests, since they follow more closely the conditions of actual flying. The model's ability to carry a heavy

weight would prove its efficiency. And traveling at a speed of a mile a minute would be a severe test for any model.

Helpful Homer taxied into the shop on his monthly ill-will visit and promptly ended our daydreaming. I didn't recognize the dynamic aerodynamist.

He was outfitted in a mail-order flying uniform complete with goggles, silver-plated wings and flying helmet. He was getting air-minded in a big way. Every motion he made was an imitation of flying. His lips buzzed in imitation of a motor while he worked an imaginary control stick. He looped, spun, dove, and banked. A very convincing demonstration of two-feet-on-the-ground flying.

Seeing him reminded me that airplane "dope" is not only a liquid for treating wing covering, but a term that adequately describes Helpful Homer.

THE DEADLIEST AIR WEAPON IN THE WORLD

(Continued from page 31)

vibrations are added to by the excessive rotary speed and the sound becomes almost unbearable. Tests by scientists disclose that sound caused by rotation consists of a large number of harmonics, having as a fundamental a note of frequency equal to the product of the number of blades and the rotational speed.

The tearing sound, usually noticed from certain positions in relation to the whirling prop, is caused by the shedding of eddies from the blades—in all probability the most annoying difficulty that must be cleared up if we ever expect to silence the prop. You have probably noticed, while listening to an airplane fly overhead, that it seems to pass through one particular phase where the sound seems tremendous. This is the point where you are actually hearing the shedding of the eddies off the tips.

A more simple manner of explaining the chief noise created by the prop is to consider the screw of a steamship. When this screw turns in the water, the blades make "cavitations" behind them. When the water attempts to rush in and fill these "cavitations," a noise is produced. In the case of the steamship's screw, however, the speed is less and the actual vibrations are caused by water and air, and are not so striking.

In the case of the airplane propeller, it is evident that only by lessening the speed of the blades can the prop be silenced—as far as we know. But how much do we know?

In the case of the silencer for the engine, the problem is less complicated, because the forces that set up the air vibrations can be trapped through the exhaust. We know that it has been done with automobile engines and can be done with aviation engines. How-

ever, the problem of back pressure created in the normal automobile-type muffler is what has always prevented its universal use. This back pressure usually cuts down the actual power of the motor at least one-third. In airplanes, that is too great a sacrifice to make for silence just yet.

The back pressure comes from the partial stoppage of exhaust gases in their attempt to leave the exhaust ports. Due to this pressure, a certain amount of exploded gases from the previous explosive or power piston stroke remain in the upper part of the cylinder. This weakens the incoming fuel-vapor mixture considerably, thus cutting down the power.

The problem, then, is to design a muffler that will allow the exhaust gases to leave the engine ports at once. Then it must baffle them in such a way that their efforts to create vibration on the outer air are lessened or stifled entirely.

Take the details of the Blavac silencer which I have shown in the illustration. The designer, in the first place, has taken a muffler body that is unusually large, as compared to those used on automobiles. In that way he

has taken the first step toward snubbing the back-pressure problem. Then, once he has the gases trapped in the main portion, he runs them around an inner cone and creates a vacuum which absorbs some of the noise. To go further, he still keeps control of the gases, sending them through small ports until they are completely slowed up before passing out into the air to do their dirty work in creating air vibrations outside.

In other words, the pulsating movements of the exhaust gases coming from the exhaust ports are controlled and directed by means of vanes into a whirling stream around the center cone. This movement sets up a vacuum which muffles the noise inside the silencer itself, and then the swirling gases, now completely under control, are allowed to seep out through the small ports into the tube that leads to the atmosphere.

A few years ago, a silencer was tried out on a Loening amphibian using a Wasp engine driving a three-bladed prop. The exhaust collector ring ran up to an exhaust silencer arrangement mounted on the top wing. This silencer was known as the Venturi type, with an opening in the front for air which went clean through a central tube. The exhaust gases were trapped inside the main muffler casing, as in the Blavac model, and then allowed to seep through small holes in the central tube and join the air flowing through from the front. The exhaust gases entered on one side, producing something of the same swirling motion around the center tube.

Thus we see that the efforts to silence airplane engines have been made along the line of deflecting the movement of the gases and turning them into new



The Waterman ends a test hop.

directions until they are dissipated and eventually slip out into the atmosphere completely tamed. The automobile muffler is a heavier type which incorporates baffle plates. While reasonably efficient, and successful in deadening the noise, the baffle system is much too heavy for aviation practice.

Let us take figures to see what could be done in silencing an airplane. We will suppose that the noise of the present airplane is computed at 100 decibels. They tell us that with the Vokes muffler—or silencer, as they call it—the engine noise can be reduced

about 30 decibels, which leaves us with 70 to clear up. Now, if the prop noise can be eliminated to the extent of 30 decibels, we have 40 decibels remaining, which is about equal to the sound of a radio playing softly in the average apartment. If by cleaning up the plane's lines and removing much parasitic resistance, another 10 decibels can be removed, we have a sound equal to the average whisper.

Can it be done?

The silencer for the engine comes first. At present, the average silencer weighs about thirty pounds and its use cuts

down the r.p.m. about fifty less than the motor would turn up with open exhaust ports. Thus that point seems to have been cleared up.

Then we must tame the wail of the prop. Considering what has been done in the last four years with controllable-pitch propellers, there seems to be little reason why this feat cannot be accomplished.

Parasitic slip-stream and flutter noise is being lessened considerably with the elimination of struts and wires from all these modern fighters and bombers.

There's your silent plane!

THE WATERMAN ARROWPLANE

(Continued from page 42)

ious. With this feature in mind, I'm going to risk a guess as to what form such an aircraft may take. I feel that the manifest safety characteristics of the tailless type of airplane can be combined without any great difficulty with the convenience of amphibious landing gear. You see my guess below.

It is a pusher-type amphibian with the engine mounted in the same position as in the Waterman ship, but with shorter and broader wings—more similar in form to those of the Westland-Hill, Mark V. The wings are externally braced with hinged V struts and may be folded back for storage. The vertical control surfaces at the wing tips are

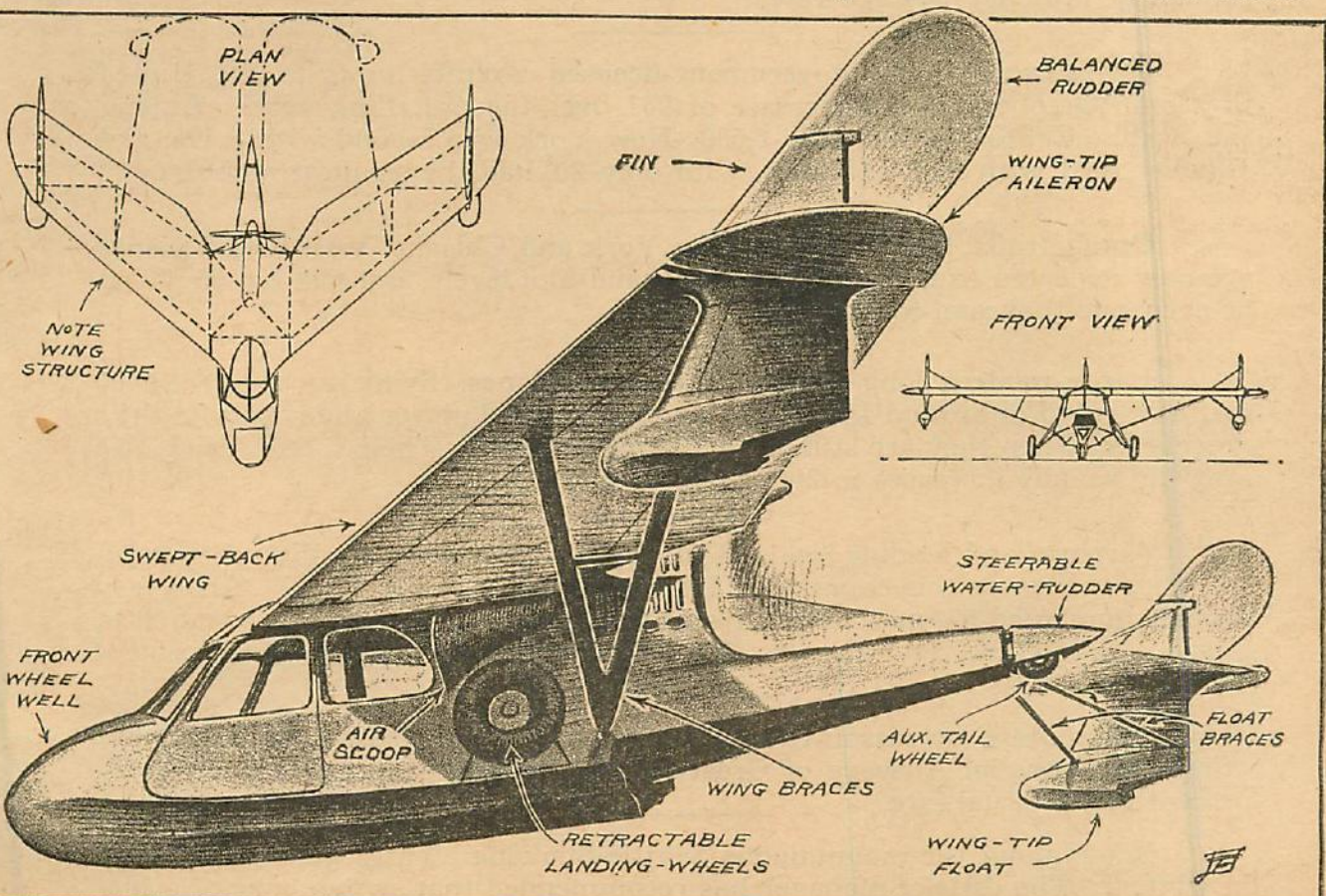
extended down to form streamlined supports for strongly braced wing tip floats. Ailerons are of the wing tip variety.

The bottom of the cabin nacelle is built in the form of a pontoon and extends well to the rear of the propeller. It is equipped with a steerable water rudder in which is mounted a small auxiliary tail wheel. The landing gear is placed in the same relative position as that of the Arrowplane, and retracts into the space below the motor compartment. The forward wheel, mounted on a full swiveling castor, swings upward and backward into the nose of the machine in flight or for water landings.

The plane is shorter in span and more compact than the Waterman and may be parked in a smaller space. Its adaptability as a road vehicle is also, I think, somewhat greater.

It is easy, of course, to put an aircraft like this on paper—much easier than it is to buckle down and really produce it. And that's what Waldo Waterman has done. In the Arrowplane, he has refined and brought up to date one of the earliest conceptions of thoughtful airplane designers. He has produced a safe and sane airplane wherein, in some developed form, the youth of America may yet find its wings and take to the air.

—FRANK TINSLEY.



A possible Arrowplane of the future, simple and safe to fly over land or water.

Do You Know That—

No matter how far a parachute jumper falls before he opens his parachute, he will never reach a speed faster than 119 miles an hour? This speed is the terminal maximum velocity of a human body in space.

To reach the maximum speed, the parachute jumper will have to fall for about 12 seconds, or a distance of 1,400 to 1,500 feet?

Airport projects totalling 344, involving the improvement of existing fields and the creation of new ones, have been approved by the Bureau of Air Commerce for government financing at a cost of \$16,817,282?

Eleven clocks in Pan American Airways' Miami terminal, the air gateway to South America, operate together electrically to insure uniform correct time, which is taken within a fraction of a second from the naval observatory in Washington?

A device known as a "slinger ring" for de-icing propellers while in motion has been perfected? It consists of a thin tube that extends from a hub ring along the leading edge of each blade and feeds out an anti-ice solution such as alcohol, under the pilot's control, for as long as five hours. The TWA line has ordered 60 for its twin-engined transports.

Australia is planning extensive aviation development in order to fly airmail at ordinary postage rates?

There were 14,763 government-licensed aircraft pilots in the United States on October 1st—an increase of 951 over the preceding year? Among the States, California led with 2,630, New York was second with 1,396, and Illinois third with 902. Nevada, with only 20, had the smallest number.

On air traffic lanes between New York and Chicago, west-bound planes are now expected to fly at odd one-thousand-foot levels, and east-bound planes at even one-thousand-foot levels?

Large modern long-distance transport planes, flying at about 10,000 feet at a speed of around 180 m.p.h., begin a gradual power glide down to their destination when they are still 50 to 100 miles away? Their speed during this long dip usually increases to 200 m.p.h. or more.

Airports and landing fields of all sorts—commercial, military, governmental, private—in this country on November 1st totalled 2,382? Army air-dromes numbered 63, and naval air stations, including marine corps and coast guards, 26. Of the total airports, 696 or 29 percent had night-lighting equipment.

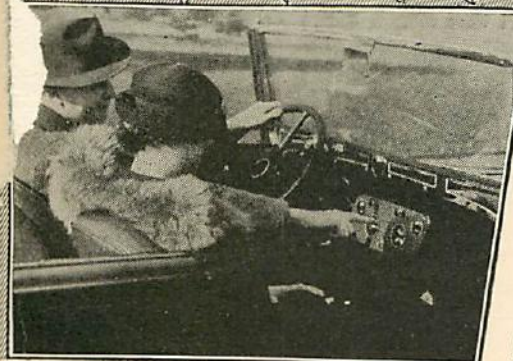
Commuters' or season tickets for regular plane passengers are being offered by Imperial Airways of Great Britain, whereby the traveler saves 20 percent of the usual fare?

Snow along the mountainous Seattle-Spokane airway gets pretty deep in winter? The district manager has recommended that switch boxes, usually attached to the automatic beacon light towers near the base, be moved up to the 30-foot level so that repair men won't have to dig to get at them?

New INVENTION

**3 to 7 MILES MORE
PER GALLON**

**MOTORIST SAVES
\$180.00 a YEAR**



**Saves up to Thirty Per Cent On Gas.
Provides Faster Pick-Up—More Power—
Greater Mileage and Smoother Running.**

GET FREE INFORMATION

VACU-MATIC

*the Carburetor Control
that "Breathes"*

AT LAST! Automotive engineers have smashed down the barriers to perfected combustion! The new VACU-MATIC solves the secret of greater power! With almost magical action, this amazing invention instantly puts new life and pep in any motor. It adds mileage to every gallon of gasoline . . . produces split-second pick-up, sensitive accelerator response, greater speed and smoother running

New- Automatic- Nothing Like It!

The self-starter—four wheel brakes—knee action—streamlining . . . and now VACU-MATIC! The greatest motor improvement of recent years! With it, engineers have achieved a practical means of balancing air and gasoline automatically for all speeds. Vacu-matic is entirely different! It is AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. Just put it on and forget it! Sharply cuts fuel wastes, saves dollars in gas costs, reduces carbon and gives your engine new pep, greater power and longer life.

Agents and Salesmen

If you are interested in earning unusual profits, check coupon. Exclusive territories are now being granted.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and welded into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Any motorist can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

The VACU-MATIC Co.

17-163 W. State Street

Wauwatosa, Wis.

SAVES GAS!

CHRYSLER

Have tried the Vacu-matic and it sure is fine. Better pick-up with a 30% gas saving. — John C. Martin, Pa.

PLYMOUTH

I am amazed at Vacu-matic performance. It's giving me 5 more miles per gallon. — Walter Zielinski, Ill.

FRANKLIN

With Vacu-matic I have increased my mileage from 10.1 to 14.2 miles per gallon. I figure I save over \$75.00 a year in gasoline. — R. K. Radtke, Wis.

SAVES \$180 A YEAR

On my Plymouth 6 I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of \$15 a month or \$180 a year. — F. S. Peck, Calif.

ALL WELL PLEASED

Enclosed find order for 12 more. Everyone I have sold is giving from 4 to 6 more miles per gallon. I have 3 more orders for V8 Ford. Every body is well pleased. — J. O. Carll, Texas.

NASH

On my Advanced 6 Nash gained 17 1/2% in mileage. The car will idle down to 3 miles an hour and then take gas without a complaint. — J. Showalter, Mo.

DODGE

Just completed 2310 miles on 92 gallons in my 1933 Dodge 6. This figures 25 miles while before I averaged only 20 miles per gallon on trips. — Al Fruzyna, Calif.

V-8 FORD

I installed both Vacu-matics and they work excellent. On my own V8 Ford I notice wonderful performance in pickup, get-away and gas saving. — Burt Burnett, Mich.

BUICK

Everything you claim about Vacu-matic is true. I now get 20 miles to the gallon. Before I was only averaging 15 1/2 miles. — C. Constantino, Fla.

CHEVROLET

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

Have been using the Vacu-matic for a month. I used to get 20 to 22 miles per gallon. Now I get 30 to 33 miles. It is amazing the difference it makes. — James W. Barr,

OLDSMOBILE

I am well pleased with Vacu-matic on our Oldsmobile. A test proved it to give 18 miles per gallon. Before we considered 13 good. — Arthur Williams, N. Y.

Above are just a few of the many unsolicited letters received from Vacu-matic users.

Guaranteed Gas Savings

The VACU-MATIC proves itself on every car. It is guaranteed to give worth-while gas savings, quicker pick-up, and more power or it costs you nothing. "On a test I gained an average of 4 miles on a gallon," writes Alex Wertz. "Vacu-matic is the best I have ever tried." Clarence Rutzin—"I have tried the Vacu-matic on several tests and find that I get between 5 and 6 miles per gallon increase, have more mileage, have greater pickup."

Free Details

Learn about this remarkable device that so greatly affects the entire performance of your motor. Learn why your car is costing you extra money to operate without VACU-MATIC. See why your VACU-MATIC equipped car will leap away from traffic without sputter or hesitation. Discover a new driving thrill and enjoy the savings. Get the facts! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY

7617-163 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

Name.....

Address.....

City..... State.....

☐ Check here if interested in selling proposition.

THE GREATEST NAME IN MODEL AVIATION

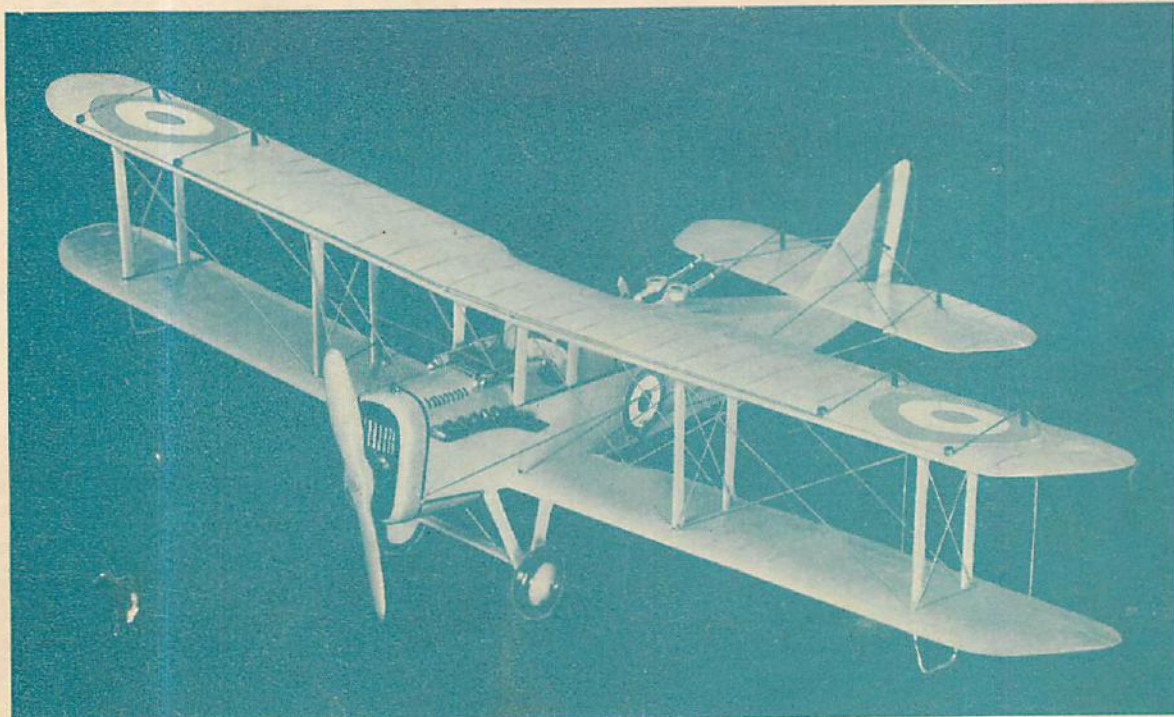
HAWK !!

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THE DE HAVILLAND 4 (of WORLD WAR Fame)



CONSOLIDATED P-30

4 for \$1.50 plus 10%
for postage

Exact 1/4-inch Scale Models—Solid Wood

You will like these kits. Try them. You will want more. Be the first in your neighborhood to have them.

Here is what you get

Each Hawk Kit contains all wood parts, as fuselage, wings, stabilizer, and rudder, **CUT TO OUTLINE SHAPE.** Die cast machine guns, propellers and wheels are furnished in each kit. Kits requiring radial motors have die cast motors included. All sets have formed metal seats, good paint, glue, insignia and real scale plans. **PROOF** of this can be seen in these pictures.

We offer you the following scale model kits (Non-flying)



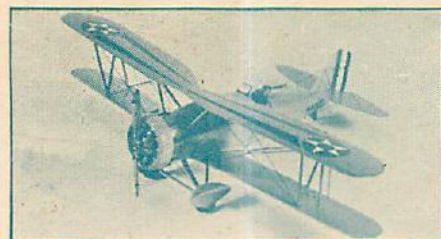
PFALZ D. 12

Douglas O-38
Ansaldo S. V. A.
Westland Wagtail
Fokker Triplane
Boeing P.26A.
Boeing F. 4. B-4
Curtiss Racer—
Navy Racer
Nieuport 17
Hawker Fury

Sopwith Pup
Nieuport 28
Halberstadt
Hawk P-6-E
Boeing P12-F
Monocoupe 90A.
Vought 65
S. E. 5
De. H. 4
De. H. 5

Fokker D-7
Fokker D-8
Pfalz D-12
Hawk P. 5
Albatross D-3
Pfalz D-3
Autogiro
Spad 13
B/J P. 16
Sopwith Camel

Shipboard Fighter
F.-9.C.2
F.E.2.B (Fee 1915)
Consolidated P-30
Thomas Morse S.9
Bristol Fighter F-2B.
B/J, OJ2, Seaplane
Curtiss Swift XP. 934
Lockhead Vega 5 C
Supermarine S. 6. B.



VOUGHT V.65

Special Price 4 KITS FOR \$1.50 plus 10%
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Price:—Single Kits 50c

FOR PROMPT SHIPMENTS—SEND MONEY ORDER; CASH AT YOUR OWN RISK. PRINT YOUR NAME AND ADDRESS. WE DO NOT SEND C. O. D. SHIPMENTS.

COMPLETE CATALOGUE 10c—DEALERS WRITE FOR PRICES

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