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BILL BARNES

DECEMBER
1936

AIR TRAILS



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FEATURES BY: PANGBORN-LIGHT-BOOTON-WINTER-CARLSON-TINSLEY

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—EXCEPT

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BILL BARNES AIR TRAILS

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This simple, fascinating, easy-to-learn course actually covers the ground so thoroughly, that my graduates now fill many types of Aviation jobs. At good salaries, too. Read the list of jobs in the center of this page. Check them over carefully. Then remember that they are but a few of the many jobs that Aviation offers the trained man.

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Get into Aviation now—when you can still get in on the ground floor of a new industry—when you have a chance to forge ahead without having to displace lots of older men. Aviation is a young industry, where young men earn real money. Most famous pilots are in their early thirties, or even younger. It is a young man's industry, which means that there are plenty of opportunities to forge ahead. But just because it is run by young men, don't get the idea that Aviation is a small business. Millions are being spent yearly to develop and improve

Here are just a few of the many well-paid jobs in the fast growing Aviation Industry

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Electrician	Motor Expert
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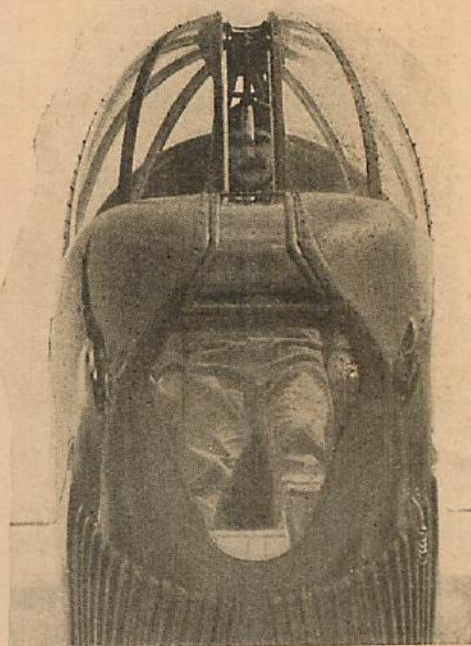
This Winged World



GASOLINE—700 gallons of it—showers down on the bay near Floyd Bennett Airport, New York City, as Kurt Bjorkvall, Swedish flier, dumps his fuel after a full-load test rather than land his Bellanca Pacemaker with the heavy, inflammable cargo aboard.

Later he tried an Atlantic hop—see Air Progress, page 7.

MOVIE star—recognize Reginald Denny?—is an ardent model-airplane fan and runs a Hollywood business of his own. He's shown talking with customers.

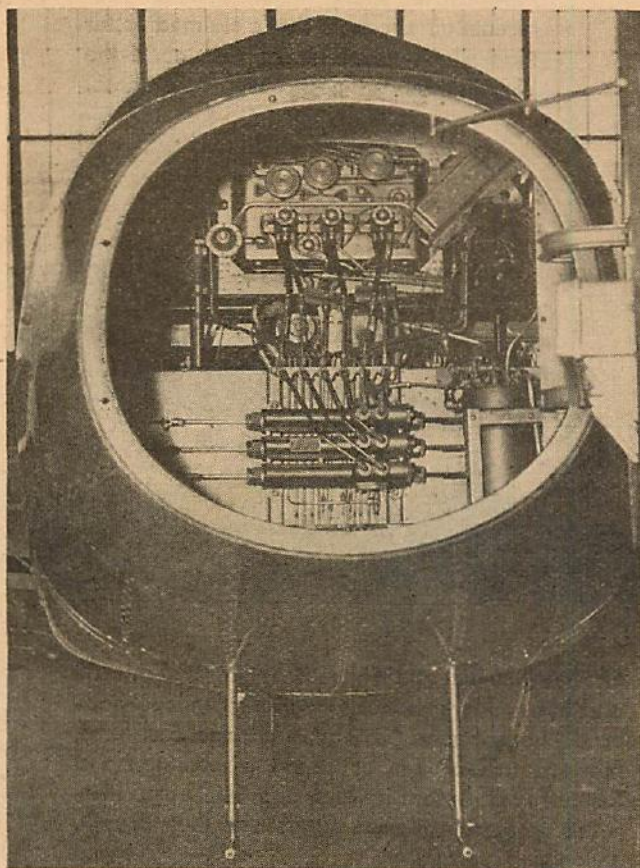


INSIDE looking out is this gunner in the nose of a Martin B-10B army bomber. By opening windows, he can fire in almost any direction.

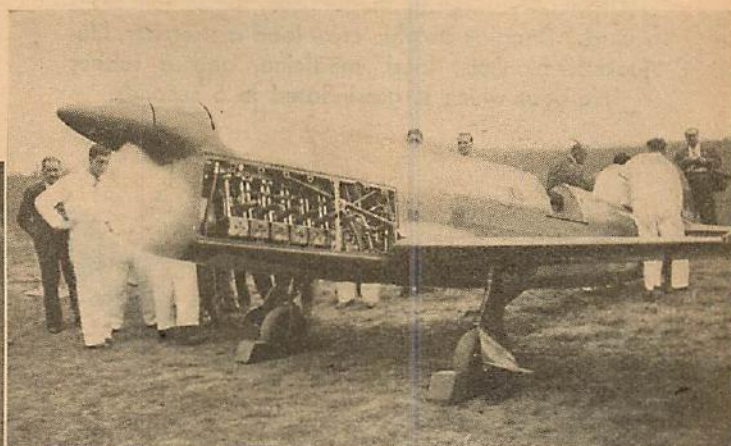


GROUND-FLYING in Robert Kronfeld's machine enables the beginner to learn handling of the controls without endangering life and limb of himself and an instructor. Driven by a pusher prop at 40 m.p.h., it provides safely many of the sensations, as well as the movements of flying.

RECORD BREAKING is the specialty of the Caudron C-460 type, a new development of which is shown below. Detroyat brought one to America and set new times at our national air races. Others have established several speed records in recent years, notably the 314 m.p.h. land-plane mark finally broken by Howard Hughes. Cowlings removed from the plane shown, competing in the annual French classic, Coupe Deutsch de la Meurthe, displays a powerful-looking Renault 12-cylinder inverted V engine.



MAZE of wires and connections in the nose demonstrates that Amelia Earhart's new special Electra fully deserves its name of "Flying Laboratory." Every instrument and gadget known to aviation is said to be included in the equipment, intended to test and develop flying safeguards.

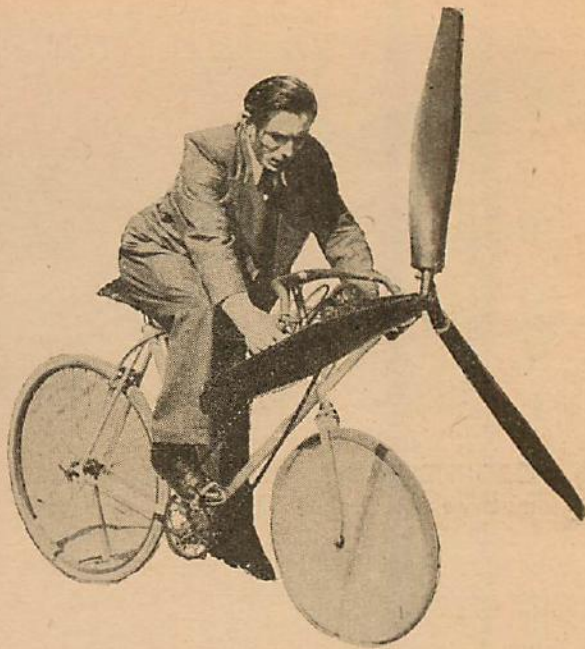


GLIDER take-offs from the top of a moving automobile are being tried by Don Stevens, soaring ace and holder of the record for consecutive glider loops. But what have bathing beauties to do with serious aeronautics?

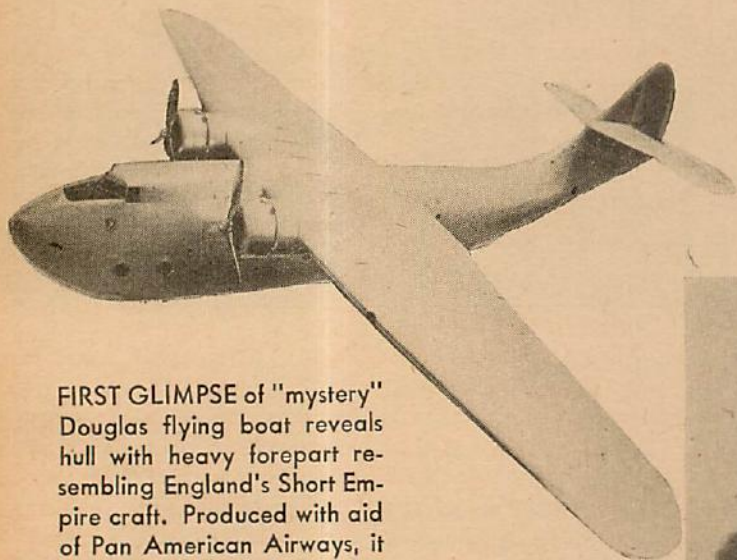




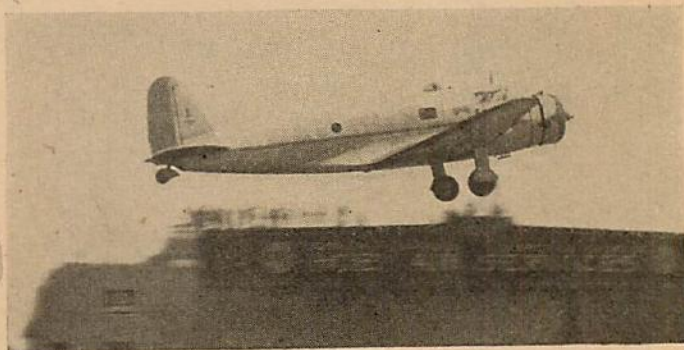
HURRICANE season meant busy times for coast guard. Douglas Dolphin crew load a stretcher, life-jackets, blankets, food, medicine, and a rubber life-boat which is gas-inflated in 5 seconds.



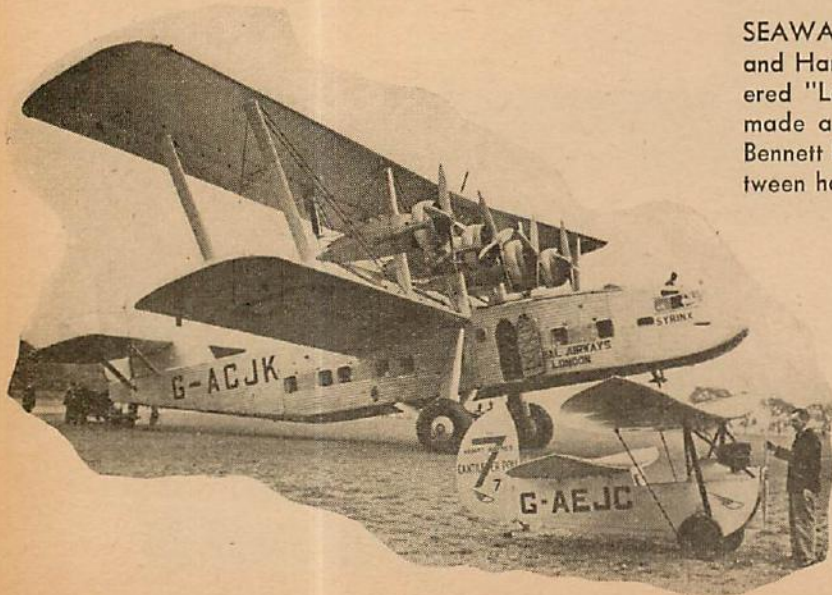
AIR-BIKE of young French inventor represents air progress that's claimed faster than wheel progress. It also cools the bicyclist with a nice breeze, we suppose.



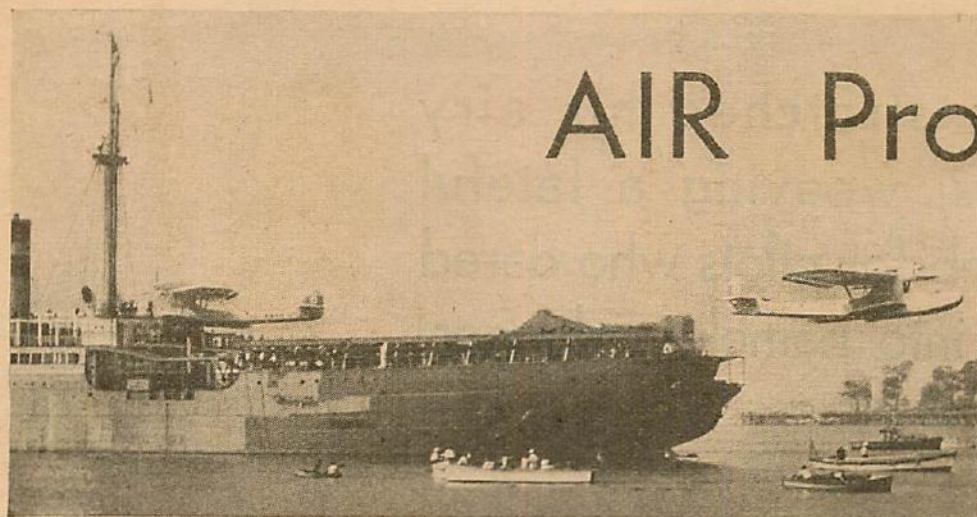
FIRST GLIMPSE of "mystery" Douglas flying boat reveals hull with heavy forepart resembling England's Short Empire craft. Produced with aid of Pan American Airways, it will probably enter that line's ocean service.



SEAWARD flies the Vultee V-1A of Dick Merrill and Harry Richman. The Wright Cyclone powered "Lady Peace," carrying a huge fuel load, made a take-off run of almost a mile at Floyd Bennett Field before it lifted, and then passed between hangars while spectators held their breath.



MITE and might side by side on a London airport! The Flea is a much cleaned-up and improved edition. Rear wing is cantilever and front wing is moved by a strong, rigid strut. The liner is a 39-passenger Short Scylla type.



AIR Progress

A summary of
aviation news

A test catapult launching of the "Zephir" at New York.

Transatlantic

While other nations pushed ocean plans and individual British, American, and Swedish pilots made single hops, Germany chalked up the first heavier-than-air North Atlantic flights of an intended commercial nature with two Dornier Do. 18 mail-type boats, *Aeolus* and *Zephir*. They were carried on board the catapult ship *Schwabenland* to the Azores, where the *Aeolus*, after being forced back once, was launched to Bermuda and thence took off for New York—hops of 2,063 and 700 miles in 24h 19m—and the *Zephir* launched to fly 2,390 miles to New York direct in 22h 10m of heavy weather. When the mother ship caught up with them in New York, she launched the *Aeolus* toward Bermuda once more and sailed after, leaving the *Zephir* to follow. They held a reunion in Bermuda and kept another rendezvous at the Azores, and then called it a successful test. The German Lufthansa line hopes to start scheduled Berlin-New York mail trips next year.

As for passengers, the dirigible *Hindenburg* booked her 1,000th ocean traveler on her eighth trip here, in which she braved a hurricane, and on her ninth trip dropped Dr. Eckener off to seek financial backing to establish the airship line permanently next year before he returned on the tenth and last trip, due Oct. 9th.

Britain tested the *Caledonia*, second Short Empire passenger boat produced, for experimental Atlantic service next summer. The first, *Canopus*, will go on the England-Australia run.

Flights and Performance

Three Atlantic hops were made during September, or maybe we should say 2 and 99/100. Mrs. Beryl Markham, British mother, flew her Percival Vega Gull *Messenger* from England to a nose-down landing in Nova Scotia mud in 23h 15m. She won the distinction of being the first woman to solo from east to west. Dick Merrill and Harry Richman, after visiting in Paris, completed their 12-day round trip by flying the Vultee V-1A *Lady Peace* from England to some Newfoundland mud in 17h 24m. The plane was pried out and they completed their flight to New York a few days later. Stories of a quarrel over the Atlantic and unnecessary dumping of gas were denied by both. Kurt Bjorkvall hopped off from New York in a Bellanca Pacemaker to fly to Sweden, but was forced down near the Irish coast;

pilot and plane were rescued by a French fishing boat.

A new world airplane altitude record of 49,967 feet, or almost 9½ miles, has been offered for official F. A. I. approval by Squadron Leader F. R. D. Swain, Royal Air Force test pilot. Using an experimental all-wood low-wing Bristol powered by a special Pegasus, he set his record in a 3h 20m flight over London during which insufficient oxygen supply in his air-tight suit almost brought suffocation until he managed to slash open his helmet and breathe the cockpit air. The previous unofficial record was 48,677 feet by Lt. Detra of the French army, and the official mark 47,352 by Donati of Italy.

Meets

For National Air Races results, see page 17.

The heralded England-South Africa air race for \$50,000, intended to show that "England and South Africa are not 6,000 miles, but merely 36 hours apart," strewn a scattered trail of cracked-up planes en route, brought death to two contestants, and a \$20,000 first prize to the team of C. W. A. Scott and Giles Guthrie. Scott was co-winner of the famous 1934 England-Australia race with T. Campbell-Black, in which American ships placed second and third. The present race was limited to British planes and pilots.

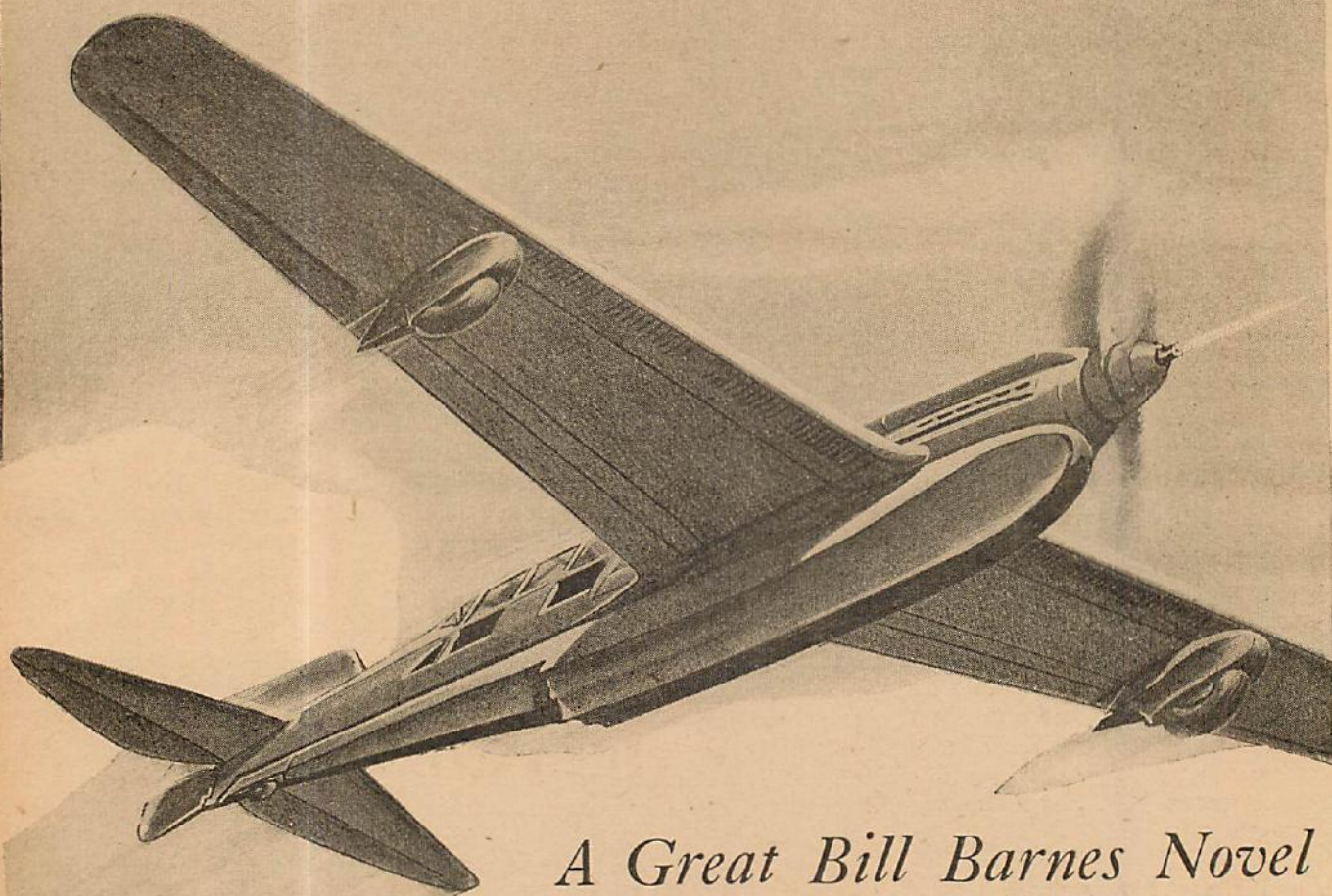
The Scott-Guthrie team's time was 52h 56m; as this is written, they seemed likely to be the only ones to finish out of a starting line-up of nine planes. The remaining \$30,000 in prizes was to be given by the donor, I. W. Schlesinger, to the dependents of Max Findlay and A. H. Morgan, killed in a take-off crash near Lake Tanganyika.

Transport

Three reporters representing New York newspapers were circling the earth from west to east in an attempt to set a new globe-girdling record for travelers by using regular air lines. Their race was made possible by the *Hindenburg's* flights and the opening of passenger traffic on Pan American's transpacific line, which was scheduled to start from Alameda, Calif., Oct. 7, and to make the first return trip from Manila Oct. 13. It was announced that when Pan American eventually completes its last link from Manila, the terminal will be Hongkong.

TWA announced drastic winter fare cuts, to become effective Nov. 1, that will make air travel about as inexpensive as railroad travel.

Death stretched his airy
fingers, weaving a fateful
sky web for pilots who dared
to fly into nameless danger!



A Great Bill Barnes Novel

by George L. Eaton

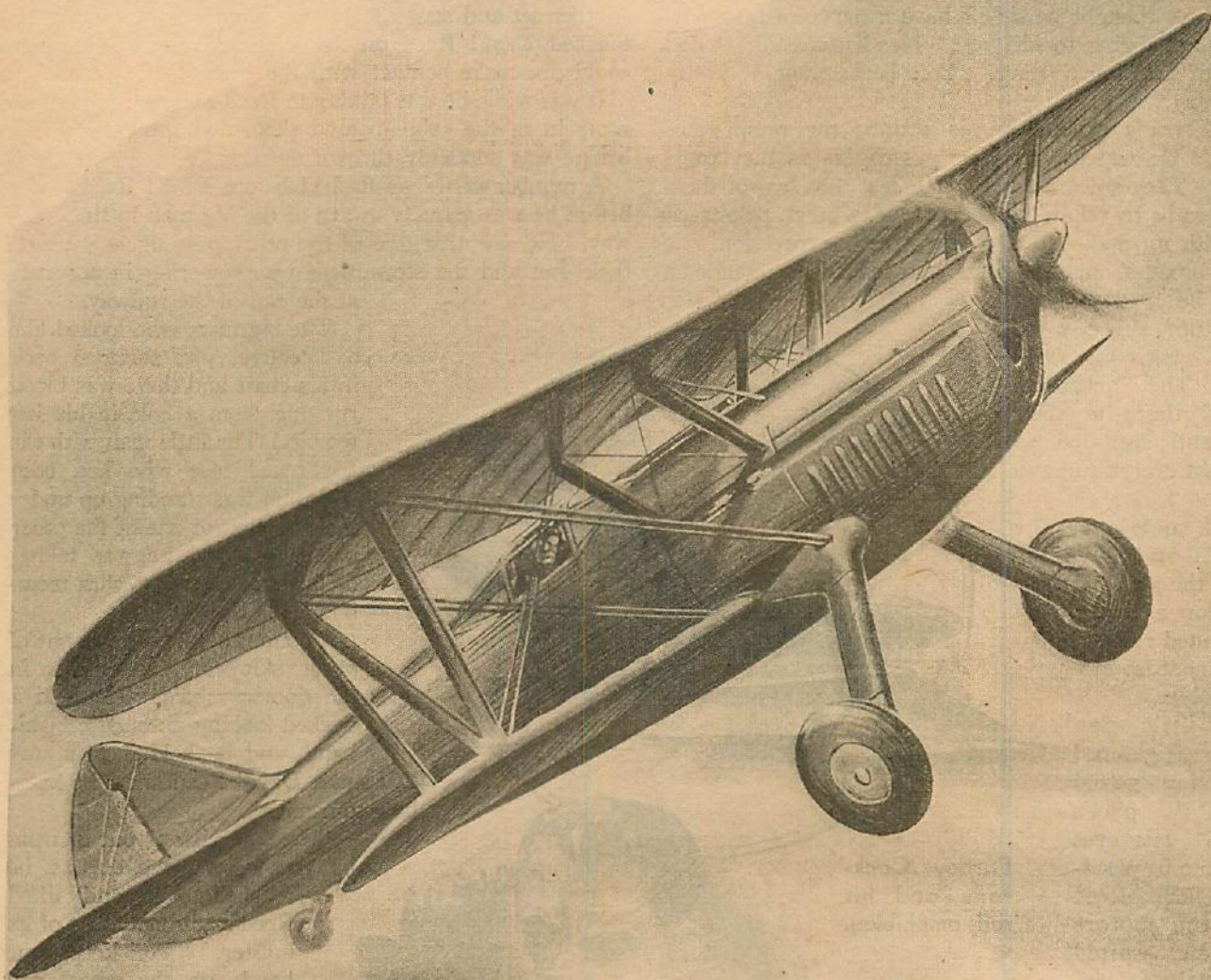
A TRACTOR had just drawn the big twin-motored passenger plane out on the apron when David Reed, the skipper, came down the ramp with his registered-mail pouch and climbed into the port seat in the pilot's compartment.

Young Pat Hendricks, the co-pilot, had already warmed up the engines. They were turning over idly when Reed slumped into his seat. The flight engineer and radio operator came into the big cockpit and slid

into their seats behind Reed and Hendricks.

Hendricks noticed that Reed's face was strained and not a little white as he ran his eyes over the hundred-and-one dials and instruments before him. When Reed spread out his weather reports on his map shelf, Hendricks saw that his hands were trembling. He studied the skipper's tense face for a moment with narrowed eyes. Then he said:

"Whatsa matter, boy? Tell little Patsy."



The PIGSKIN BAG

Reed glanced at him quickly. Obviously he was reluctant to talk. But his habitual friendliness won out. "I'm worried and I don't know why. I have a hunch that something is going wrong. I can feel it. Have you ever had a premonition that something was going to crack wide open? That's the way I feel. I've had these hunches ever since I was a kid. The bottom of my stomach feels as though it had fallen out. I can't explain it, but——"

"Listen, guy," Hendricks interrupted. "Cut it out. Nothing's going to happen. What you need is a rest. You ought to put in for a couple of weeks' vacation from this galley. You sit nice and quiet and take it easy to-day, and I'll take us from here to there. The trouble with you is you take life too seriously. You ought to go ride on a roller coaster once in a while."

"Don't try to kid me, Pat," Reed said sharply.

Pat Hendricks didn't like the way Reed's voice rose

and cracked. He knew that Reed didn't drink, and he had always thought he didn't have a nerve in his body.

"I'm not trying to kid you," Hendricks said. "You ought to ask for a leave. You been pluggin' pretty hard lately."

Reed swung around in his seat as the ramp gates opened. He watched the five passengers as they came aboard. They were all men. He saw that two of them seemed to be traveling together. One, a quiet, pale-faced man with an apologetic, or frightened, expression was with a broad-shouldered man who looked as though he might be a detective. The other three were evidently traveling separately. The stewardess showed them to their seats and signaled to Reed that everything was clear.

Reed took over the controls and gave his motors the gun. He listened for a moment to their muted roar through the almost sound-proof cabin.

The little man with the frightened expression gazed toward the pilot's cockpit. His eyes seemed to be pleading for help. Reed idled the motors down and waited for his take-off signal from the dispatch tower. A moment later he taxied out on the runway and took the big ship into the air in a long, low climb.

A few minutes later he read a dispatch the radio operator handed him, then he said, "Take her, Pat. Newark is sending us a storm ahead."

"That'd be something new," Pat answered as he took over the controls and followed Reed's instructions as he motioned upward with his thumb.

Thirty minutes later fog came rolling in toward them, fog that immersed the ship completely. Pat Hendricks checked his instruments while Reed took their bearings. A wrench and a twist dropped the big ship with a shudder. In a moment fog licked at the coated windows while rain began to spatter against them. Pat Hendricks grinned and made a noise with his lips at the weather. He was feeling his way cautiously. A pocket slapped them down five hundred feet while he fought to regain an even keel.

The door to the bridge opened and the stewardess stuck her head in. "The little man in No. 6 is pretty sick," she said.

"Tell him to hold everything," Pat answered. "He'll be sicker in a few minutes."

Hail beat on the windows as the fog and rain increased. The radio operator was repeating over and over, "Trip No. 8 calling station WEDD. . . . WEDD. . . . Trip No. 8 calling station WEDD. . . . WEDD."

. . . "Receiving no acknowledgment, he switched to another set and began his chant again. In a moment he touched David Reed on the shoulder and told him he could not make contact with the ground.

It was while he was talking to Reed that two explosions sounded in the cabin behind them and the door to the bridge was suddenly thrown open.

A number of things flashed before David Reed's eyes before he was actually aware of the big man in the doorway. He saw that two of the other passengers were on their feet and the stewardess was cowering in a corner at the end of the runway.

The big man, who looked like a detective, was slumped back in his chair and there was blood running from a hole in his left temple. The little man with the frightened face who had been with him was standing up under the direction of one of the other passengers and he was taking off his upper clothes with trembling fingers.

"Your radiophones are out of order, skipper," the big man in the doorway said. He held a wicked-looking automatic in his hand, and he held it in a way that made David Reed know he knew how to use it.

"Get your hands out in front of you," he went on, as he reached over and lifted Reed's automatic out of its holster. "You keep your hands on the wheel and your eyes on your instruments," he said to Pat Hendricks. He stuck Reed's gun in his pocket and reached for Pat's.

"What good will it do you to stick us up?" Pat asked him. "Do you think transport pilots have any money?"

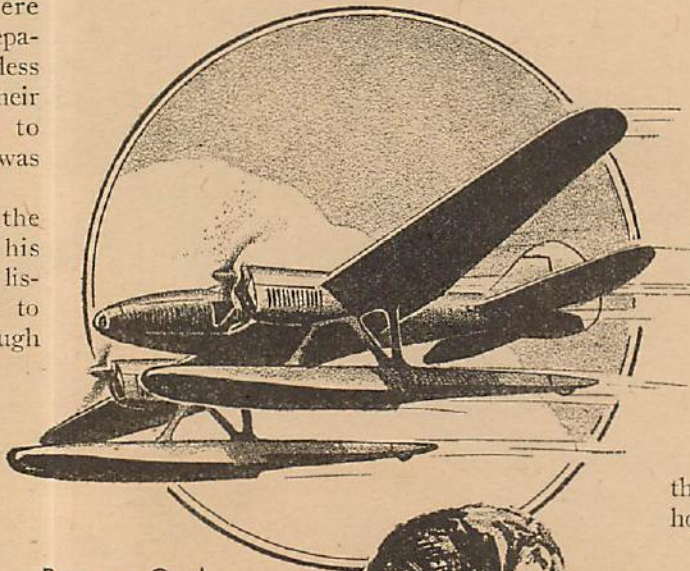
"Keep your lip buttoned," the big man said, "and you won't get hurt. All you have to do is follow instructions. The little punk yonder is carrying what we want."

David Reed let his eyes wander down the aisle again and saw that two of the passengers had forced the little man to strip to the waist. When Reed saw the wide belt with the chamois pouch fastened around the little man's bare skin, he knew what was happening. He knew the little man was carrying something in that pouch that was worth killing a man to get.

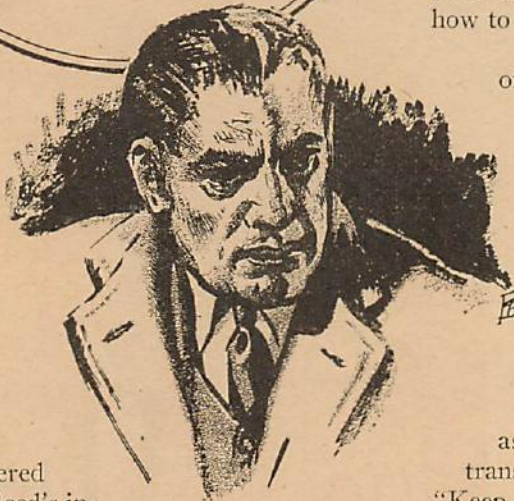
"This," he said to himself, "is the thing that was worrying me. They're committing murder and robbery on my ship. And there's nothing we can do about it."

Red rage suddenly overcame his common sense. It was his ship, he screamed to himself, his responsibility. They had taken command like a gang of Chinese pirates.

He was scarcely aware that he lurched out of his bucket seat and started a swing for the jaw of the big man towering above him. The gun in the big man's hand meant nothing to him. Pat Hendricks' startled



Barney Cockrane and his red amphibian.



face was a white blur as Reed swung his fist, all his weight behind it. It curled around the big man's neck as he ducked his head forward.

There were two detonations that sounded like the roar of a small cannon in the soundproof cockpit. One of the bullets tore through Reed's stomach, the other through his heart. He pitched into a corner underneath the controls and lay still.

The big man swung the automatic in a semicircle as the flight engineer started to climb out of his seat. The radio operator didn't try to move. He couldn't have moved if he had wanted to. He was glued to his seat with fright.

Pat Hendricks felt the cold hand of fear creeping up his spine as he brought the big ship level. He fought to keep control of himself as he saw the automatic leveled at his heart. The drone of the two powerful motors filtered through the soundproof construction of the cockpit. Fog licked at the windowpanes. Pat shook his head and tried to convince himself that this thing was not happening.

The sound that came from the lips of the big man convinced him that it was all true. It was a sound that made Pat shiver. He forced his eyes away from the automatic and looked at the man's face. It was livid and his lips were twisted into a snarl that bared his teeth.

"If you take orders," he snarled, "maybe you'll get out of this alive." He moved over beside Pat and pushed the gun into his side. With his other hand he traced a course on Pat's map.

"Right there," he said, when his finger came to a stop, "is where you sit this baby down. That's where you and the rest of the crew start walkin'. It'll take you a day to get out of there on foot."

"Maybe we won't get out," Pat said. "That's wild country."

"Maybe you won't." The big man sneered. "But you can try."

"You're taking the ship?" Pat said.

"We're takin' the ship. We're giving you a chance for your life."

"Suppose," Pat said, and he was scared when he said it, "I stick the nose down right now. They'll shovel you and your gorillas out in little pieces."

That was when Pat noticed the curious little birthmark on the big man's neck. He stuck his purple face within three inches of Pat's and the little mark on his neck turned red. Pat's eyes fastened on it and stayed there as he felt the gun jam hard into his ribs. He wondered if it would hurt when it went off.

"Listen, smart guy," the big man snarled, "I can fly this crate as well as you can. If you shove that wheel forward I'll blow your insides out. I'm giving you a chance to live. You can take it or leave it."

"I'll take it," Pat said, in a moment. He saw that the storm had abated. The fog was beginning to drift away from them. He looked down at the map and altered his course.

The newspapers didn't get the real story for over forty-eight hours. They first reported that a passenger liner of Transcontinental Airways had disappeared as though some giant hand had plucked it out of the air, ground it to pulp and thrown the dust to the four winds.

Then flashes came through from a little town deep in the interior of the Cumberland Mountains. The public read and gasped with amazement. It was the first time such a thing had happened in the air. The papers compared it to the old days of stage-coach robbers and railway-express holdups.

"Murder and Robbery in the Modern Manner" flew in large letters on the first page of a New York paper. It went on to report that a messenger carrying a quarter of a million dollars' worth of precious stones had been robbed in the air. His guard and the pilot of the plane had been killed when they resisted the robbers.

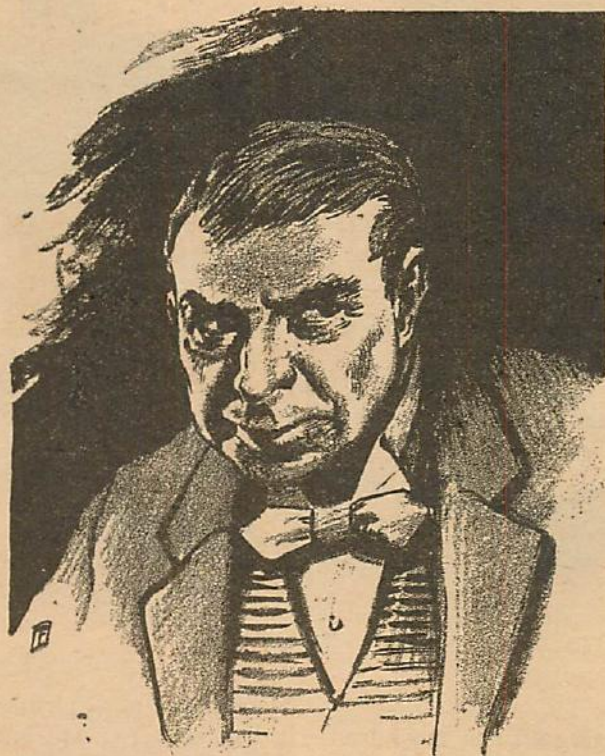
A confusing description of the robbers was given by the surviving members of the crew of the airplane and the messenger. Only one thing stood out in their descriptions: That was the report of Pat Hendricks, copilot of the plane. He reported in some detail that the

man who led the robbers had a curious crescent-shaped birthmark on the side of his neck below the collar line.

The papers played that up, and the police searched their files. But they had no record of a man with such a mark on his neck.

The third day after Pat Hendricks and the rest of the crew arrived back in Newark, the newspapers shunted their accounts of the robbery back to the inside pages. In a week the thing was forgotten by the public.

That is, it was forgotten by every one except the police and one man. That man began to comb the country with a fine-tooth comb to find the man with the curious, crescent-shaped birthmark on the side of his neck.



Leeds

II—BARNEY COCKRANE

BILL BARNES stretched his powerful arms high above his lean, bronzed face and glared at the two men and the boy who were making it impossible for him to read the half dozen letters lying on his desk.

"Listen, you maggies," he growled, "I'm trying to get a little work done."

"That's all right, Bill," young "Sandy" Sanders, the youngest member of his little squadron answered. "You're not bothering us. If you get too noisy we'll go some place else."

"Take him out of here and tape his mouth," Bill said to "Shorty" Hassfurter, his chief of staff.

Shorty's blue eyes twinkled and his broad, Pennsylvania-Dutch face cracked into a wide grin. He winked at the carrot-topped "Red" Gleason.

"That wouldn't stop him from talking," Shorty said. "If you taped his mouth, he'd begin to talk through his ears. The only thing that would stop him would be a good old-fashioned burial."

"Burial!" Sandy said, scornfully. "Why, you poor old gray-haired cripple, I'll be——"

"Shut up!" Bill shouted, as one of the telephones on his desk rang. "Private office! It's about as private as the subway."

"Bill?" Tony Lamport's voice came over the wire. "Barney Cockrane just phoned from the seaplane landing

Unless something cracks before long, we'll all be standing in line asking for a cup of coffee."

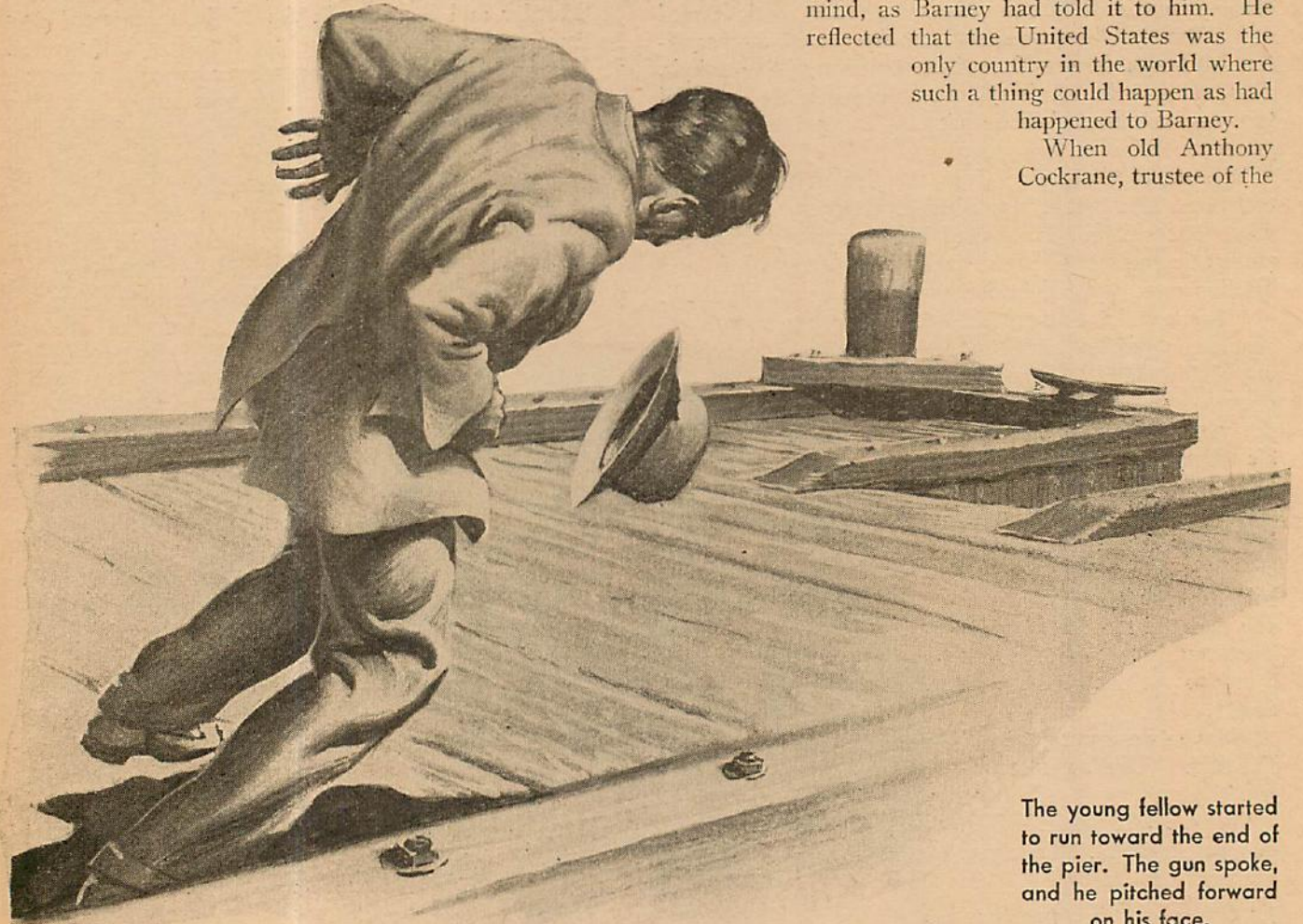
"I'll take tea," Sandy said. "Tea with a little lemon."

The drone of a powerful motor drifted down from high overhead. Bill listened for a moment, his head cocked to one side. Then he glared at young Sandy and started toward the door.

Bill stood on the apron beside old "Scotty" MacCloskey, major-domo and special technician at Barnes Field, and watched his friend, Barney Cockrane, bring the big, low-winged, cantilever monoplane in with a workmanlike landing.

And while Bill watched him bring in a ship that must have cost him a cool fifty thousand dollars, a kaleidoscopic picture of Barney Cockrane's life flashed through his mind, as Barney had told it to him. He reflected that the United States was the only country in the world where such a thing could happen as had happened to Barney.

When old Anthony Cockrane, trustee of the



The young fellow started to run toward the end of the pier. The gun spoke, and he pitched forward on his face.

on Thirty-first Street. He's bringing his new amphibian over and wants you to run out to the Island with him and give it a try."

"How soon is he leaving?" Bill asked, an expression of annoyance on his face.

"Right away," Tony, the chief radio operator on Barnes Field, answered.

"O. K., Tony," Bill said. "Let me know when he comes in."

Bill eased his big frame out of the swivel chair and paced the length of the room and back. Suddenly, he whirled and pointed a finger at the three lounging pilots.

"Listen, you birds," he said. "Somebody around here had better dig us up a job. The bank roll is getting smaller and smaller, and we don't have a thing in sight.

State Board of Orphanages, first found Barney, Barney had no name, except one given him by the orphanage.

Old Anthony Cockrane was a hard-boiled, crusty individual who had fought his way up from the bottom, without any aid, to become the president and then the chairman of the board of directors of one of the largest steel companies in the country. He had never married. He had no relatives. Like young Barney, he had been a foundling and public charge until he had run away from an orphanage to shift for himself.

It had been pretty tough going for young Barney for those first few years after old Anthony Cockrane had legally adopted him. But it had been worth it.

After a thorough education that ended at one of the ivy-decorated universities, old Anthony ordered Barney to begin at the beginning in one of his steel mills.

When Anthony Cockrane passed on to his great reward, Barney, at the age of thirty-six, was already a power in the steel industry. He was a big man with a shock of brown hair and soft, brown eyes that could, on provocation, become as hard as a bar of the special steel he produced.

With Anthony Cockrane's millions at his command, Barney became known as the Robin Hood of the steel industry. That is, he bought in all of the outstanding stock of his various companies until he was the sole owner. He then raised the wages of all of his workers until the least of them was earning a comfortable living. In that way he believed his workers would have the money to buy the things they produced. After being sure he had plenty of cash in reserve, he distributed a large share of his profits to charities. That is why the newspapers and the people in general loved him.

And on top of that Barney Cockrane was a very dashing young man. He was a fearless sportsman; his enthusiasm for and interest in aviation were the things that first brought him in

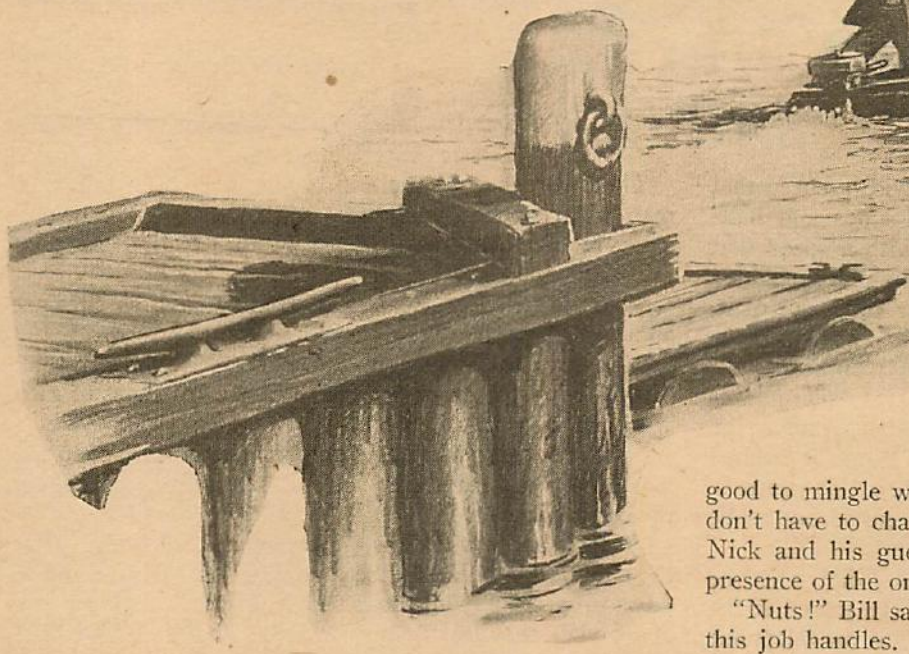
Bill Barnes didn't answer for the moment. Instead, he circled the ship, gazing at it like an artist inspecting the work of an old master. He inspected the streamlined monocoque fuselage and the tandem cockpits. He studied the inverted engines inclosed in their streamlined nacelles and the two controllable-pitch propellers.

"How is she for speed?" Bill asked in a moment.

"That's what I want you to find out for me," Barney Cockrane grinned. "I've pushed her up to two twenty-eight. But I think she'll do better."

Bill pursed his lips and ran his eyes over the ship again.

"Now don't begin to tell me you're busy," Barney Cockrane said. "I want you to run out to the end of the Island with me and try her out. And on the way back I want to stop in at Nick Stewart's place for a moment. He's throwing a big garden party and it will do you



touch with Bill Barnes and his famous squadron of pilots.

Bill, or Shorty Hassfurth, or Red Gleason had tested a dozen or more planes for Barney Cockrane. They had also handled some of Cockrane's bizarre gifts to charity.

Bill and Barney Cockrane spoke the same language. They were friends.

"Boy," old Scotty MacCloskey said, as Barney brought the ship to a halt, "she is a beauty. She is one of the most beautiful jobs I have ever seen."

"She's a honey," Bill said. Finished in gleaming red lacquer, with snow-white trim, her lines seemed to melt one into the other with an illusion of speed and grace that made the ship seem, even on the ground, to be traveling along at tremendous speed.

Barney Cockrane's helmeted head appeared above the coaming of the forward cockpit as he slid back the transparent overhead hatch. There was a grin on his face that spread from ear to ear.

"What do you think of my baby?" he shouted as he killed the two special 250-horse-power Menasco motors.

good to mingle with the common people for a bit. You don't have to change your clothes or anything like that. Nick and his guests will be overwhelmed by the mere presence of the one and only Bill Barnes."

"Nuts!" Bill said. "I'll go because I want to see how this job handles. She's built like a greyhound. I wonder if she can take it."

"I think she can," Barney said. "Haul your carcass into the after cockpit and we'll shove."

"I'll be gone for a couple of hours," Bill said to Scotty. "Tony can pick me up if you need me."

Bill climbed into the after cockpit and plugged in the inter-cockpit telephone. He smiled when he saw that it was the same type he used in his own Snorters and the Lancer.

"You take her, Bill," Barney Cockrane said in his ear.

Bill gunned the engines a moment later and kicked the speedy ship around into the wind. At eighty miles an hour the tail lifted and Bill took it off the ground with the skill and precision for which he was famous.

At five thousand feet, he leveled off and stuck the nose of the plane to the west. A few moments later the Statue of Liberty waved her torch at them. The waters of the East and Hudson rivers emptied themselves into the harbor below them. Barges and battleships, tugs and tramps, steamers and ferries made their way through the heavy harbor traffic, their whistles shrieking.

Black smoke curled above the industrial towns of New Jersey as they hurtled above them. The Atlantic Ocean shimmered under the late afternoon sun.

A solid mass of clouds came racing toward them as Bill brought the trim ship around in a steep bank and stuck the nose toward the end of Long Island. He coaxed the throttles open as he climbed to eight thousand feet. The blue-green waters of the Sound flashed beneath their wings. The steady drone of the twin engines increased in volume as he continued to open the throttles. The airspeed indicator climbed to two hundred and twenty-five, two hundred and thirty, two hundred and thirty-five.

"You want me to shoot the works?" Bill said into the telephone.

"Make her take it and like it." Barney chuckled.

Bill pulled the stick back into his stomach and brought the ship up in a terrific zoom. When the engines began to whine he spun the ship three times in a corkscrew turn, until the tail started to slide off. Then he fought the controls until he could bring the nose down to streak away on an even keel.

He came down and up in a series of outside loops; he chandelled around with a speed that was dazzling. He came up in normal loops and half-rolled the sturdy ship level at the top with a speed that was breath-taking. He barrel-rolled, side-slipped, skidded the plane until it seemed it would never come out of it, did wing-overs and split S's until he had Barney Cockrane hanging onto the cowling with frozen fingers.

To top it, he went through a series of flat and inverted spins and then into a tail spin that brought the hair up at the base of his own scalp. When it seemed he could never pull out of it, he neutralized his controls, gave his motor all she would take and pulled out as he reversed the controls.

He was out over the end of Montauk Point when he leveled off again and cut his throttles. He smiled at the rigid figure in front of him and spoke into the telephone again.

"She can take it," he said.

"Yes," Barney Cockrane said. "She can take it, but I can't. Let's get back to Nick Stewart's place. I need something to fix my stomach. Do you think you can find it? I mean, do you know where it is?"

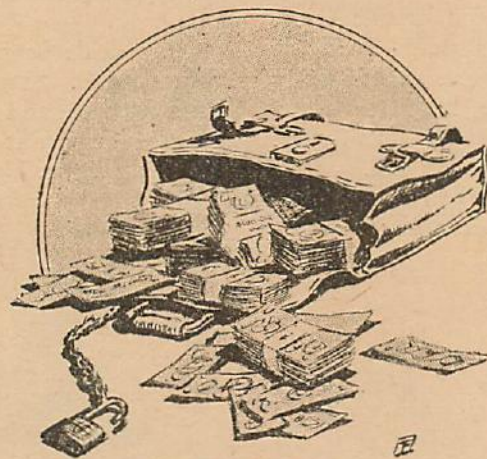
"I know where it is," Bill said. "But I can't stay there long, Barney. I'm expecting a couple of important phone calls. I've got to get back to my field."

"We won't stay long, Bill," Barney answered. "I just want Nick to see this buggo. He's been boasting about a two-place job he bought recently. Besides, you may get a laugh out of the antics of these nitwits at a Long Island party."

III—A CRESCENT-SHAPED MARK

IT WAS just dusk as Bill set the twin-motored amphibian down on the cove and taxied toward a mooring. As he killed the motors the sound of singing came to his ears. He gazed toward the wide sweep of lawn between the large Colonial mansion and the shore line.

People were moving about the lawn under a thousand Chinese lanterns. Servants scurried about with little wagons loaded with food and drink. But down near the pier was the strangest sight of all. A man dressed in white linens was leading a chorus of perhaps thirty people in song. They were singing as though their lives depended upon it, and most of them had glasses in their hands. Barney Cockrane began to laugh as they climbed into the dinghy that had been sent out from shore to pick them up.



The pigskin bag.

"Don't be surprised at anything you see around here," he said to Bill. "The man leading the chorus is Nick Stewart. When he has had a certain amount to drink he likes to sing. His grandfather must have been a barber. He'll sing with any one. If he can't get people to sing with him he goes off in a corner to sulk."

"He sounds a little half-witted to me," Bill said. "Listen, Barney! I don't want to get mixed up in a party. I don't have the time to—"

"Forget it!" Barney said. "It'll do you good. Nick will want to know if you can sing bass as soon as you meet him."

They were met at the end of the dock by a tall, thin man with practically no hair on his head. He held a glass in his hand and raised it in greeting as they joined him.

"This is Bill Barnes, Nick," Barney said, as Stewart approached them. "He sings tenor."

"I'm glad to know you, Barnes," Nick Stewart said. "But I wish you were a bass. I'm always short of men who can sing bass."

"There's a big shortage of bass singers all over the world," Barney said, gravely. "It's because people shoot them out of season."

"I don't know what it is," Stewart said solemnly. "But the situation is becoming serious, Barnes. I want you to come up and meet all these people and let them tear you apart when they learn who you are. They've all heard of you, of course."

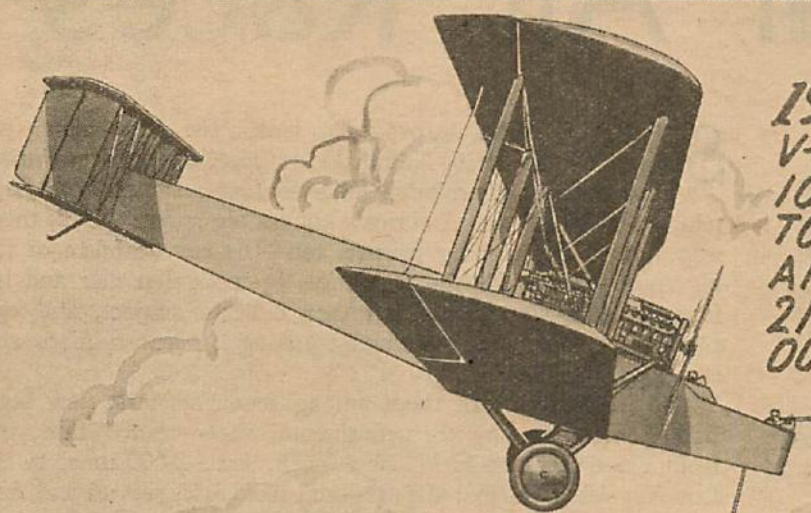
"Listen, Barney," Bill said, casting a yearning glance toward the amphibian riding the cove. "I think we'd better go along."

After twenty minutes of having people claw at him and ask him foolish questions, Bill managed to escape from the crowd that surrounded him. When he got away he cursed Barney Cockrane with a vehemence that would have surprised Barney had he heard it. He moved back into the shadows and watched.

And the longer he watched them the happier he was that he was not one of them. He hadn't talked to a man or a woman who seemed to have a vestige of common sense. He wondered, vaguely, what Barney Cockrane could see in a crowd of people like this. He knew that Barney was not one of them. He didn't think like them nor act like them. The more Bill thought about it, the more it puzzled him.

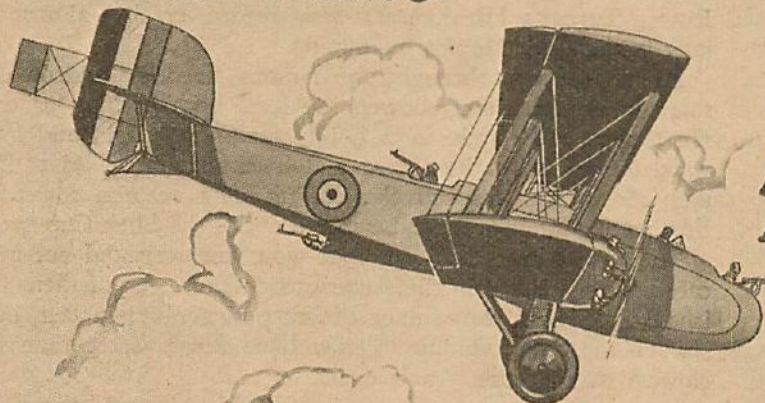
He began to laugh aloud as he saw Nick Stewart assembling another twenty-five or thirty people in a semicircle. Stewart had a glass and a short (Turn to page 64)

Bomber Development



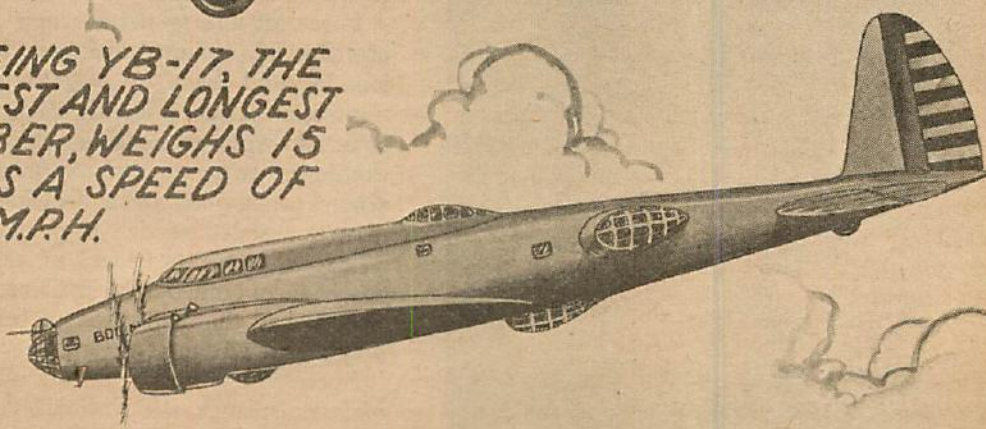
1919 THE HANDLEY-PAGE V-1500 WITH A SPEED OF 103 M.P.H. COULD CARRY A TON OF BOMBS 1,300 MILES AND CLIMB TO 10,000 FT. IN 21 MINUTES. THIS WAS THE OUTSTANDING WAR BOMBER

1925 THE NEXT BIG STEP IN DESIGN WAS THE CURTISS "CONDOR," CARRYING 3,600 LBS. OF BOMBS AT 105 M.P.H. AND HAVING A 13,400 FOOT CEILING



1930 NOW APPEAR SUCH DAY BOMBERS AS THE BOULTON & PAUL "SIDESTRAND II" WITH A SPEED OF OVER 130 M.P.H., A CEILING OF 21,500 FT., AND A CAPACITY OF 1,000 LBS. OF BOMBS.

1936 THE BOEING YB-17, THE WORLD'S FASTEST AND LONGEST RANGED BOMBER, WEIGHS 15 TONS AND HAS A SPEED OF NEARLY 250 M.P.H.

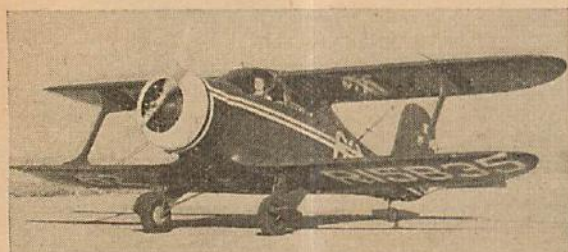


*Speed aces and stunt champs
put on a thrilling show at the—*

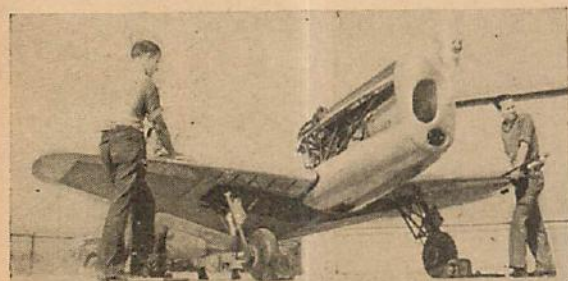
National Air Races



Capt. Papana stunts his Bucker Jungmeister.



Mrs. Thaden's Bendix-winning Beechcraft.



Grooming Harry Crosby's 15-foot Special.



A spectator's view; pylon in background.

SPEED and the ladies proved to be the two outstanding features of the 1936 National Air Races that drew many thousands of air-minded folks to Los Angeles from September 4th to 7th for America's annual air spree. Well, there was a third outstanding feature, too—the easy capture of the big speed events, for the first time, by a foreign flier and his foreign plane—but that's a rather delicate subject, and one that's best mentioned cautiously among American fliers still smarting from defeat.

The ladies, three of them among seven starters, flew their first Bendix Trophy transcontinental race—routed this year from Floyd Bennett Field, New York, some 2,600 miles to the Los Angeles municipal airport—and took first, second and fifth prizes. Louise Thaden won in a little less than 15 hours in a stock-model C17R Beechcraft powered with a 450 h.p. Wright Whirlwind. Laura Ingalls, in her Wasp-powered Lockheed Orion, nosed out William Gulick, piloting a Vultee V-1A, by such a slim margin for second place that her male rival entered a protest, claiming that confusion on the field resulting from a parachute accident had caused the timers to err.

Despite the valiant race of Mrs. Thaden, the Bendix results might have been different had not Benny Howard and Mrs. Howard, far in the lead and piloting *Mr. Mulligan* ahead of Roscoe Turner's 11h 30m east-west record, crashed almost fatally in the New Mexico mountains.

Michel Detroyat brought the famous French Caudron 460 racer to America and showed the local boys a thing or two. He topped 273 m.p.h. in a 5-mile qualifying dash, and later walked away with the Greve and Thompson trophies at 247 and 264 m.p.h. respectively, setting new records for both. Fortunately for the others, he stayed out of the Shell Cup event.

The ease with which Detroyat won, however, did not indicate lack of quality in the American entries. All of them finished faster than the winner of last year's race; in fact, only six Thompson racers up to now have flown faster than the slowest man in this year's event.

Foremost among notable new ships this year was the Folkerts Special, designed and built by Clayton Folkerts of Waterloo, Ia., and flown by Harold Neumann. It took two firsts, two seconds, and a fourth place, earning a total of \$8,800. It is a mid-wing monoplane with somewhat long fuselage, full cantilever surfaces and retractable wheels. Relatively low power is supplied by a 4-cylinder 185 h.p. Menasco Pirate, driving a short wooden prop of high pitch.

Two new Keith Riders of closely similar design appeared, one of them built by David Elmendorf. The diminutive Crosby Special had the distinction of being the smallest plane and the only all-metal one at the races.

Successful this year, on the whole, in "improving the breed" of fast airplanes, the National Air Races next year should see even greater advances. Detroyat promises to return with a speedier ship, and American designers and builders are already at work in an attempt to go him one better.

SUMMARIES

Bendix Trophy

(Transcontinental race, New York-Los Angeles, 2,600 mi., open to all)

Louise Thaden	Beechcraft C17R	Wright Whirlwind	14:55:01	\$7,000
Laura Ingalls	Lockheed Orion	P&W Wasp	15:39:38	2,500
William Gulick	Vultee V-1A	Wright Cyclone	15:45:52	1,500
George Pomeryo	Douglas DC-2	Wright Cyclones	16:16:51	1,000
Amelia Earhart	Lockheed Electra	Twin Wasp Jrs.	16:34:53	500
Ben Howard	Howard "Mulligan"	P&W Wasp	(crashed in New Mex.)	
Joe Jacobson	Northrop Gamma	Wright	(bailed out over Kans.)	

(Former women's east-west record: Laura Ingalls, 18:30)

Ruth Chatterton Trophy

(Cleveland-San Diego cross-country tour, 2,460 mi., 6 days, ATC planes)

Frank Spreckels	Luscombe Phantom	Warner	—	—
Jeannette Lempke	Davis	Warner	—	—
Jerry Fairbanks	Stinson	P&W Wasp Jr.	—	—
George Armistead	Stinson	Lycoming	—	—
George Arents	Fairchild	Warner	—	—

Amelia Earhart Trophy

(Women pilots only, ATC planes 175 m.p.h. limit; 25 mi., 5 laps; handicap)

Betty Browning	Cessna C-34	Warner	15:58.62	675
Gladys O'Donnell	Ryan ST	Menasco	16:10.01	375
Genevieve Savage	Ryan ST	Menasco	16:27.25	225
Jeannette Lempke	Davis	Warner	16:30.94	150
Nancy Love	Beechcraft	Jacobs	16:44.06	75

Shell Trophy, 375 cu. in.

(100 mi., 20 laps)

Harold Neumann	Folkerts Spec.	Menasco	223.201	3,000
Art Chester	Chester Spec.	Menasco	222.235	1,250
Lee Miles	Miles & Atwood	Menasco	202.848	700
Joe Jacobson	Howard "Pete"	Wright Gipsy	147.424	450

Shell Award, 375 cu. in.

(50 mi., 10 laps)

Harold Neumann	Folkerts Spec.	Menasco	231.344	1,350
Art Chester	Chester Spec.	Menasco	230.479	750
Joe Jacobson	Howard "Pete"	Wright Gipsy	147.565	450
Lee Miles	Miles & Atwood	Menasco	(out in 3rd lap)	

Greve Trophy, 550 cu. in.

(100 mi., 20 laps)

Michel Detroyat	Caudron C-460	Renault	247.300	4,900
Harold Neumann	Folkerts Spec.	Menasco	225.858	2,125
Art Chester	Chester Spec.	Menasco	224.682	1,190
R. A. Kling	Kling-Rider	Menasco	215.331	765
Joe Jacobson	Howard "Mike"	Menasco	214.426	595
Roger Don Rae	Rider	Menasco	212.325	425

Shell Cup, 550 cu. in.

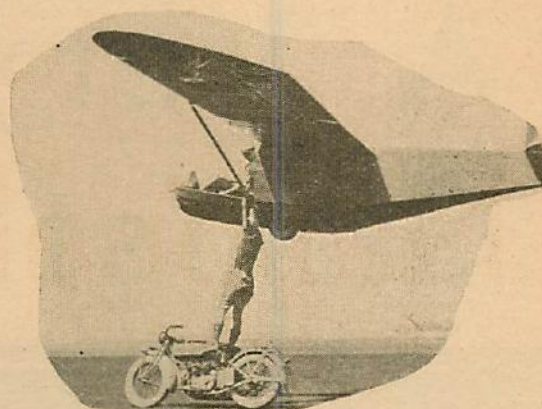
(50 mi., 10 laps)

Roger Don Rae	Rider	Menasco	225.544	1,350
S. J. Wittman	Folkerts Spec.	Menasco	223.561	750
Marion McKeen	Brown B2	Menasco	218.808	450
Lee Miles	Miles & Atwood	Menasco	206.188	300
David Elmendorf	Elmendorf-Rider	Menasco	—	150
Art Chester	Chester Spec.	Menasco	(out in 2nd lap)	

Thompson Trophy, unlimited

(150 mi., 15 laps)

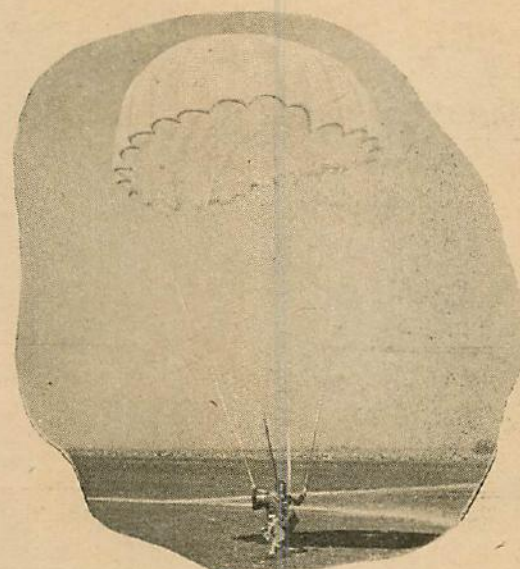
Michel Detroyat	Caudron C-460	Renault	264.261	9,500
Earl Ortman	Rider	P&W Wasp Jr.	248.042	4,375
Roger Don Rae	Rider	Menasco	236.559	2,450
Harold Neumann	Folkerts Spec.	Menasco	233.074	1,575
Marion McKeen	Brown B2	Menasco	230.465	1,225
Harry Crosby	Crosby Spec.	Menasco	226.075	875
David Elmendorf	Elmendorf-Rider	Menasco	(out in 14th lap)	
Lee Miles	Gee Bee "Q.E.D."	—	(out in 11th lap)	
Art Chester	Chester Spec.	Menasco	(out in 5th lap)	
S. J. Wittman	Miles & Atwood	Menasco	(failed in take-off)	



Don Stevens picks up a passenger.



Art Chester poses with his "Jeep."



Roger Don Rae hits the bull's-eye.

These shining faces being tanned by the California sun represent as all-star a cast as you're likely to find in any flying show anywhere. In the back row, left to right: Franklin Wolcott, Bill Ong, Harold Neumann, Milo Burcham, Leon Atwood, Dick Ranier, J. H. Cordner, Alex Papana, Michel Detroyat, Earl Ortman. Front row: Rudy Kling, S. J. Wittman, Harry Crosby, Art Chester, Marion McKeen, David Elmendorf, Don Stevens.



A Very Merry Christmas



Flying had robbed Dean of all happiness—could it give him manhood again?

THERE WASN'T any doubt that Dean Braid was in bad shape when he stepped up to the little bar of the Hotel Paz. His hands were shaking; his eyes sparkled too brilliantly; his face was flushed. He threw a half crown on the bar and asked for a whisky with water.

The white-haired man with the jabbering parrot on his shoulder, behind the bar, took his pipe from his mouth and lifted the parrot to a perch on the edge of a shelf.

"What you need is some quinine, lad," he said.

"I asked for whisky," Braid snarled. His eyes dropped in a moment, as he tried to meet the steady, fearless blue eyes behind the bar.

"Why don't you come out of it, Braid?" old Howell, the barkeep, asked. "You still have something to live for if you'll brace up. You're still a young man."

Dean Braid wet his dry lips and pointed at a bottle of whisky. What was the use in arguing with this old fool?



He yanked back on the stick and threw some packages overboard.

by
Harold Montanye

Howell put the bottle, a glass and a glass of water before him. He mixed a little water with each of the two drinks he threw down his throat, and went out into the street.

The blazing tropical sun half blinded him as he turned down a cobblestoned street toward the water front. Barefooted, half-naked blacks scurried out of his way as he plodded along, head down, looking neither to right nor left. Beggars sitting in the shade of doorways chanted their litany at him. He pushed his pith helmet back off his perspiring forehead and cursed at them.

At the old stone customs house on the water front he turned left and made his way past the rugged buildings that had withstood a score of hurricanes.

In the windows of those dusty old shops were signs and decorations that sent waves of nostalgia through his numbed brain. One or two of the windows had artificial Christmas trees with gay little baubles and yards of glistening tinsel, and perhaps a star at the top.

All of the windows had posters decorated with holly in green and red. They spoke of sales in plum puddings, cheeses, and other things that go with Christmas.

Through his mind ran a mad procession of thoughts and pictures. He remembered the gay Christmas parties at home before the War. He could see candy canes and oranges and a tree agleam with lights and decorations. He could see the ruddy face of his father, toasting the world. He could see the quiet, gentle face of his mother. He could even feel the touch of her hand when she tucked him in bed on those Christmas eves when he was only a child. He could see his two older brothers, both later killed at Mons, turning the place into a madhouse.

Then his thoughts flashed to those two terrible years in France. He had been only sixteen years old when he managed to get by the examinations and was sent to a ground school of the Royal Flying Corps.

Christmas of 1916 he remembered only too well. There was no camaraderie on that Christmas day. He had shot down his first German plane. And he had been very sick after it happened. He saw the pilot jump out of his flaming ship before it crashed into the ground.

He remembered the Christmas of 1918 only faintly. He was a captain then, but he had already lived all of his life. He had gone back to civilian life to find that everything was an empty shell. For five long years he studied to become a barrister. Five long years of mental and physical hell.

When his mother died, and then his father, he had a little money, a small income. Something broke inside him when his father went. The horrible strain of war on the mind of a boy of sixteen and seventeen and eighteen took its toll. He could not adjust himself.

For eight years he wandered from one place to another, while he slowly disintegrated physically and mentally. He had tried his hand at a dozen things. No one of them offered him any solace from his thoughts.

Two years before he had landed on the little island of Torrigua, one of a series of outposts of the British Empire in the Caribbean Sea. There he rented an abandoned lime and orange estate high up in the *mornes*.

The administrator of the island and a half dozen other white men told him he would go crazy stuck back in the jungle with only a couple of apelike natives to keep him company. He laughed at them and told them that was what he wanted. Not to go mad, but to be alone.

At first he seldom left the place. He basked in the warm sun, fished the hundreds of roaring streams, rode the narrow trails until his body ached.

Then the first rains came in the winter. He could see the distant *mornes* covering themselves with a mantle of white. Then a far-away wind sighed down the valley, followed by columns of rain. Rain that came harder and harder until it pounded on the roof of his little red house like the patter of machine-gun bullets.

Those columns of rain became like the columns of men he had seen marching endlessly toward destruction during the War. He tried to hide from them by going back to the little town on the coast. He took a room at the Hotel Paz and spent most of his time in the café, drinking whisky and soda. He was still invited to the homes of the planters on the island.

And then he fell in love. The whole world became a place worth while. She was the daughter of the official port doctor. She had red hair and blue eyes and freckles on her nose. For a year Dean Braid lived in heaven.

He managed to get a position in the chain bank that had a small branch on the island. He managed that through friends back in England. It looked as though he had at last found his salvation.

Then he began to slip again. He could not explain it to Gwen Huntley, nor could he explain it to himself. The world became a place of torture.

Gwen begged him to leave the place, to take her back to England with him. But he stayed on, drinking a bit more each day, falling deeper and deeper into despondency. He was afraid of himself. He was afraid to risk her happiness when she told him she would marry him if he took her back to England. He was afraid that going back to England wouldn't make any difference, that he would only make her life a thing of terror and regret.

Dean Braid cursed the intangible fear that possessed him as he plodded along the water front. He walked to the end of the jetty and gazed back at the red-tiled roofs of the houses set on the sides of the towering *mornes*. He wished that he could dive to eternity in the soft, fleecy clouds that caressed their peaks. His eyes drank in the glorious blue-green shore, tinted with emerald and aquamarine. He saw great groves of cocoanut palms, sheer cliffs that rose hundreds of feet straight up from the Caribbean, little native villages constructed of bamboo and plantain leaves.

He knew there was beauty there, but he couldn't see it. He could see only his trembling hand and the thing he had become. He watched native fishermen unloading fish that were every color of the rainbow. But he could not see their beauty.

He cupped his hands and shouted at the man who was working in the cabin of the little black amphibian riding its sea anchor in the roads. His voice sounded hoarse and raspy to his own ears. He saw the figure in white overalls lean out to acknowledge his call.

"Be with you in a bit," the man in the cabin bellowed at him.

He waited there in the broiling sun, whisky oozing out of his soft body. He decided while he waited there that he would tell Pete Manders when he came in what he was going to do. He knew that Manders was the only real friend he had left in the world. Manders and Gwen Huntley.

Gwen would be heartbroken, he knew. But time would heal that. After the first shock had gone she would probably marry old Manders. That would be best for both of them. He told himself that he had no right to jeopardize the happiness of either of them. Manders would help Gwen stand the shock. He was true blue. He would straighten out his, Braid's, affairs. And that would be the end of it.

He knew exactly how he was going to do it. He smiled as he glanced toward the sheer, high cliffs up along the shore. He thought of the legends telling how the warlike Caribs had driven their enemies off those same cliffs to their deaths. Something was about to drive him off them to his death. Something that was as deadly as the savage Caribs.

"What ho! What ho!" Pete Manders called, his voice cheery, as he rowed his little dinghy alongside the jetty.

Braid started, violently, then scowled down at the bronzed, blue-eyed man beneath him.

"Want to try out the old baby? Give her a spin?" Manders asked, throwing a hand toward the floating amphibian whose black fuselage gleamed brightly in the glare of the sun.

"Not now, or any other time," Braid said. "Let's get out of this heat. Let's have a spot of something over at the Three Widows." He wished Manders would stop ragging him about flying his ship. He knew that Manders knew he hadn't taken any kind of a plane into the air since the day he was released from active duty in the Royal Flying Corps. He never wanted to see another plane at that time and he still felt the same way about it.

"You look," Manders said, as he joined him, "as though you'd been trying to drink the Widows out of wet goods. It's a foolish ambition. You'll never succeed. Just as soon as you get one barrel empty they'll have another one ready for you." Manders' keen eyes were going over Braid the way an officer's eyes go over a recruit's rifle at inspection.

"In fact," he went on, "I once knew a fellow who even stopped eating so he would have more room for his liquor. What do you think happened to him about the time he got used to it?"

"All right," Braid growled, "what happened to him?" "He died," Manders said. "Ho! Ho! The blighter died!"

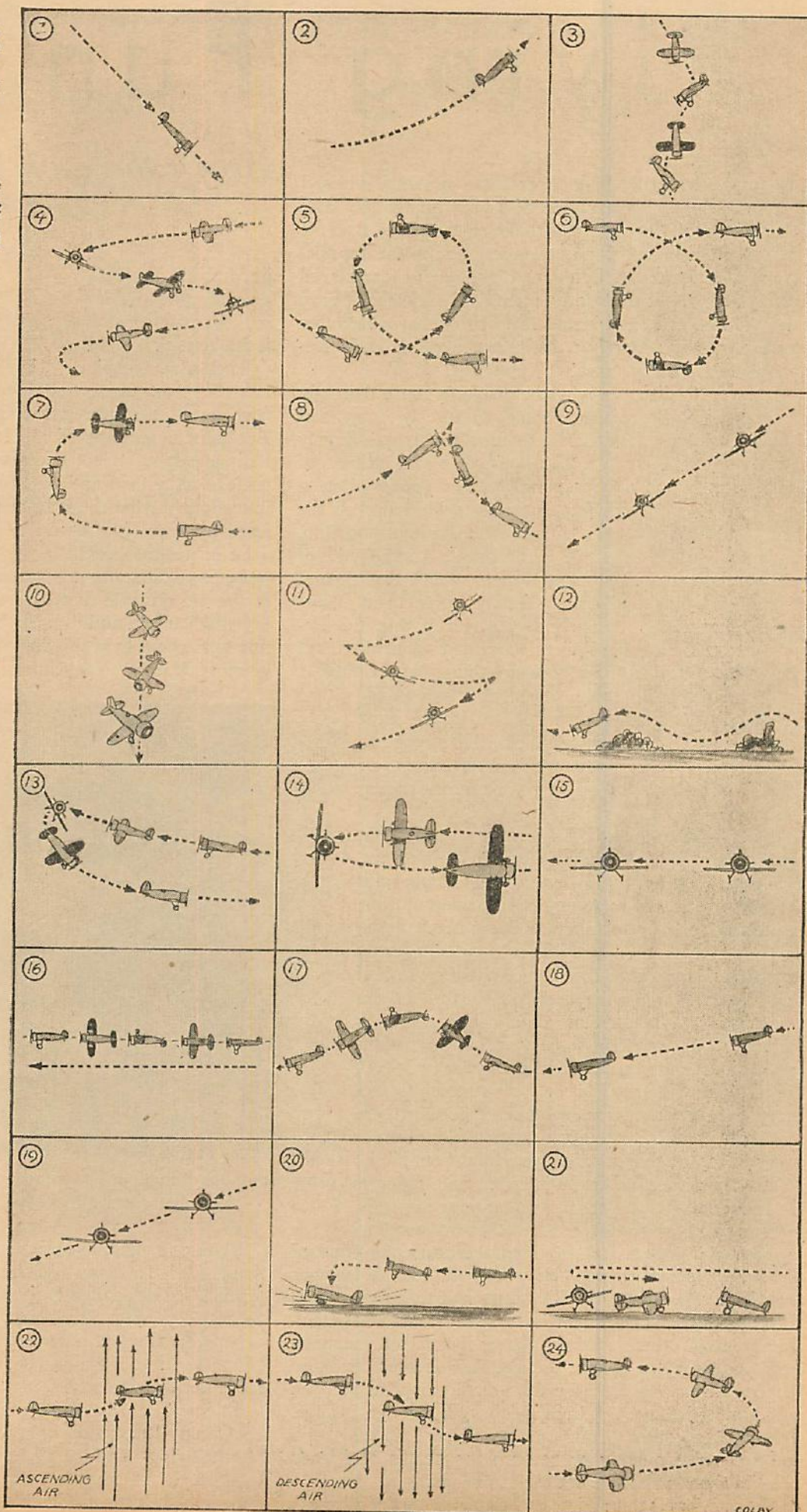
"Funny!" Braid half snarled. "That's what I want to talk to you about. About death. I'm fed up, Pete. I can't make a go of it any longer." (Turn to page 89)

THE FLIER'S DICTIONARY

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

MANEUVERS

- 1 DIVE
- 2 ZOOM
- 3 SPIN
- 4 SPIRAL
- 5 INSIDE LOOP
- 6 OUTSIDE LOOP
- 7 IMMELMANN TURN
- 8 STALL
- 9 SLIP
- 10 FISH-TAILING
- 11 FALLING LEAF
- 12 HEDGE-HOPPING
- 13 WING-OVER
- 14 VERTICAL BANK TURN
- 15 SKID
- 16 BARREL ROLL
- 17 SNAP ROLL
- 18 GLIDE
- 19 CRAB
- 20 PANCAKE LANDING
- 21 GROUND LOOP
- 22 BUMP
- 23 AIR POCKET
- 24 CLIMBING TURN



Flying Fun for

*Aren't there any thrills left for
and they're the fin-*

IN an article in the September issue of AIR TRAILS, I pointed out that the causes of a great many avoidable accidents originate in the mind of the pilot, that the "dare-devil complex" is a natural reaction to the extraordinary stimulation of flying and one to be forewarned against and fought constantly, upon pain of death. I gave a few figures and cited instances to show that what often seems to a pilot merely a little exciting fun leads frequently to a ghastly crash.

In trying to discover why the airplane, more than any other fast vehicle, makes people do utterly crazy and dangerous things, I stated the opinion that it was largely because flying, even in a fast plane, at a safe altitude of 2,000 feet or more is, especially to a young pilot, a monotonous, slow-seeming business, with none of the thrills that hedge-hopping gives. The resultant boredom, combined with a sense of great power (and hence of invulnerability), makes many a man, with a throttle and stick in his hands, deliberately seek the excitement of forbidden maneuvers. Largely as a result of this, the Department of Commerce figures show that about three out of every four accidents in "pleasure flying" are avoidable.

Now I suspect that the idea that it is possible for an airplane to be what I called it, the most boring of all vehicles, sounded a bit strange to a good many people who are sure flying is—or would be, if they could only fly—the most exciting of activities.

"Do you mean to say," they might ask me, "that these 'grown-up' safe pilots just sit in their planes, thousands of feet up, and yawn with boredom until they get where they're going or until a certain time is up? If so, why are they as crazy about flying as they ever were? Why is it they can hardly bear to stay out of a plane three days at a time if they expect nothing but boredom? And do you mean to say that the thousands of people who look forward to flying in the future can hope for nothing within the limits of safety but monotony? Will the airplane, flown safely, be for us merely something to be endured for the sake of getting there quickly? And is it necessary to flirt with death in order to escape this boredom you talk about?"

The answer emphatically is NO. Safe flying is the best of all—if you are dry under your ear-pads.

When I spoke of the boredom that makes pilots do foolish things, I had in mind the particular kind of pilot the article was about—the young pilot in the "danger period" between 200 and 500 hours and the rare experienced pilot who hasn't grown up, yet miraculously survives to lead others to their deaths by his bad example. Few young pilots escape the peculiar mental condition that lays them open to the dare-devil complex. In the past hundreds have not been able to get through it alive. Others have gotten through, because they had mild cases and recovered quickly or because the deaths of friends came in time to shock them back to normal.

The problem is this: How can young pilots (of all ages)

be helped quickly through this malady or kept from having it altogether?

by Lieutenant

The answer, obviously, is education. Forewarn them; help them to realize that their feeling of safety is often false; teach them to resist temptations to seek excitement. But most important of all, help them to learn quickly that safe flying is not necessarily boring. Help them to achieve a "grown-up" outlook that will reveal to them immediately what the mature pilot of the past has had to learn by himself, after wasting much time and enduring a lot of mental stress.

Before examining this "grown-up" outlook, let's glance at the old attitude that has caused so many pilots to be bored when safe and to miss the best joys of flying. Getting to the bottom of this warped mental condition involves going back into the psychological history of aviation.



The grown-up attitude must be spread by education. An army pilot chats with Kelly Field students.

Flying, for many years, was considered by most people (and still is by many) as something extraordinary, spectacular, sensational and, above all, dangerous. Before the War, pilots were brave but foolish—like the man who went over Niagara in a barrel. The War changed all that. Pilots became brave and heroic, knights of the air who faced peril with a smile.

During the past few years that viewpoint has been changing. The engineers have been taking the danger out of sane flying—and the pilots miss it! The less danger, the less glory. The greatest danger, it has turned out, is the danger of being considered just an ordinary mortal with

Grown-Up Pilots

*the safe, sensible flier? Plenty—
est thrills of all!*

W. M. Wood

an interesting (but not heroic) job, or sport, or way of getting around.

Now it seems that the trouble with most of our rashly daring youngsters among the pilots is that they are sadly behind the times. They have been unable to change mentally as fast as aviation has been changing. They still think they have to be heroes, and that flying must be exciting and sensational and, at least to the groundlings or to the friend in the passenger seat, dangerous. Even when they don't have passengers or spectators whom they feel obliged to thrill, they feel the necessity of dramatizing themselves to themselves as daring aviators. Their attitude is so cluttered with childish notions and feelings that they are blind to the best joys of flying, and so get bored at 2,000 feet. They realize vaguely that they are missing fun and, not having the right mental habits, not knowing where to look, they go diving down for a cheap roller-coaster thrill—and break their necks.

The whole attitude of such behind-the-times people must be changed. The time has really come for private and pleasure fliers to take off those knickerbockers and boots and to put on long pants. The time almost came in 1928 and '29. The air (if it wasn't exactly full of ships) was full of talk about "airplanes for everybody." The depression put it off a few years, but now the business index says 100 again and Mr. Vidal of the Bureau of Air Commerce says the "airplane for everybody" is just about here. Looking at Mr. Vidal's recent exhibit in Washington of the Hammond Y, the Curtiss-Wright Coupé, the Arrow F (with auto engine), the Weick W-1 (with its amazing glide-steepening device), the Water-

man Arrowplane, and the "go everywhere" roadable autogiro—who could doubt that everybody's airplane is here?

If these small airplanes really go into mass production soon, as we all hope they will, it is certain that people everywhere before long will be considering pilots as mere humans. The trouble will be in getting the hundreds and thousands of new pilots themselves to remember that they are merely ordinary people in 1937 or '38 or '39, and not daring, devilish fellows of a dead romantic day.

This difference in the way other people look at pilots and the way they look at themselves has been causing serious trouble, and the matter has been gone into thoroughly by Captain Harry G. Armstrong, a flight surgeon of Wright Field. He discovered that in a group of 163 pilots 11.04 per cent suffered from a nervous disorder which he calls "aeroneurosis." Writing recently in the *Journal of the American Medical Association*, and referring to aviation's change in the public eye from romantic adventure to an everyday business, Captain Armstrong says:

"This slow but definite change has deflated the pilot's ego and thereby created further emotional stress. There is a constant attempt to regain face, to reclaim and hold a fading dream."

He lists other things that help cause "aeroneurosis" and defines it as "a chronic functional nervous disorder characterized by gastric distress, nervous irritability, fatigue of the higher voluntary mental centers, insomnia, emotional instability and increased motor activity." Obviously a pilot so afflicted is in pretty bad shape, and Captain Armstrong says that victims should be grounded because it is dangerous for them to fly.

Although I am not a specialist in psychiatry, it does not take a trained observer to see that the dare-devil complex, even where the more pronounced symptoms are not apparent, is really a mild case of aeroneurosis.

Treatment of pronounced cases of aeroneurosis must obviously be left to the medical specialist, but the real solution of the problem for young pilots of the present and for the thousands of pilots of the future must be prevention of the ailment by a change in the general mental attitude, a change in the reasons why new recruits to the ranks of the air-minded want to fly, a change in their expectations from flying, and a change in what they look for after they start flying. It's an old saying that you can't make but one mistake in parachute jumping. It's almost as true of flying in general. Pilots, in order to be safe, must be born without knickerbockers. Or the swanky riding pants must be yanked off quickly and plain, unromantic trousers substituted. I believe it's possible.

The Private Fliers Association, under the direction of its president, William W.



Thrill-seekers seldom realize that you can see more fascinating views at 2,000 feet than you can at 20!

Brinckerhoff, has recently inaugurated a national campaign for making private flying safer. Shocked by fatalities resulting from pure carelessness and foolhardiness in violation of regulations, this organization has formed a "Death Holiday Committee," which seeks to have stricter State laws passed where needed and stricter enforcement of regulations carried out by State and local officials and agencies. The Private Fliers Association also wants more Bureau of Air Commerce inspectors to enforce Federal regulations, and it urges the permanent grounding of all planes with obsolete engines and all planes not Federally licensed.

These aims are admirable and if carried out should do a great deal of good. But enforcement efforts alone will be inadequate in the face of wrong conditions in the minds of the people who fly and of those who look on. There is a certain thrill in violating a regulation, and the stricter the enforcement the greater the thrill. The idea that it is smart to "get by" with something, which grew so strong during prohibition, is unfortunately still with us. But get it into the heads of youngsters (of all ages) that it is definitely not smart to be reckless; let them understand once and for all that they will not be admired for their trumped-up daring; feed them contempt instead of awe and pleadings and threats, and it will make a vast difference.

The first factor, then, in the grown-up attitude toward flying, which must be spread as a preventive of the daredevil complex, is the idea that everyday pilots are not heroes any longer, do not need to be daring, and merely make themselves ridiculous when they try to make artificial heroes of themselves, when they try to reclaim and hold their "fading dream." They must let all these foolish self-delusions go, and welcome flying as an exhilarating, thoroughly enjoyable, commonplace function of the modern man or woman, no more nor less heroic (and actually less dangerous if done right) than driving an automobile.

And right there is the clue to the secret of not being bored at 2,000 feet. You don't go driving on a sunny afternoon in order to see how near you can come to running off a cliff without actually doing it, nor to drive at 70 along a mountain road just to get a sensation of violent movement and perilous speed. At least, it is hoped you don't. Unfortunately there are fools among motorists (as there will always be a few among pilots). No. You go driving generally to see the mountains, to enjoy the sunshine, to feel the fresh air on your face.

We can't carry the comparison too far, for the airplane, used safely, is vastly superior to the automobile as a means of enjoying civilized pleasures—for those who have gotten over the need for roller-coaster thrills and mock heroics.

First of all, you have the third dimension. You are free, almost completely free in space, superior to the confining pull of gravity. The fundamental joy of flying is, of course, the actuality of the miracle of flight. That sounds very obvious, but that's the trouble with it. It's so obvious the average flier misses the quiet wonder of actually flying. Too often he feels only the intoxicating "sense-of-power" element, gets himself dog-drunk on that and goes for a wild spree of dangerous pranking.

Next time you go flying, sit very calmly in your plane, and look far down at the earth. Observe that there is actually nothing visible holding you up, and think how many thousands of years people dreamed vainly of flying,

of how the ability to fly, through all of ancient myth and legend, was a miraculous power which identified its possessors as gods, angels, and the sons of gods.

Sure, think of yourself as a "winged god," but do it right. Marvel and be grateful because you live in an age when millions of men can be just that; don't go trying to show off and draw attention to yourself like a child of two with a new rattle.

Ask an old pilot what is to him the finest thing, after all, about flying, the one thing that possesses in the highest degree its distinctive pleasurable quality. The chances are he'll say he doesn't know, he just likes to fly. Pin him down, and you're likely to find that the greatest joy of all is that indescribable feeling of freedom, of exaltation that comes when the wheels lift, with a final light touch, from the earth—the moment the miracle of flying becomes real. Is it strange to you that there should be more fun in a normal take-off than in a loop off the ground? If so, you need reeducation in the joys of flying.

Pin your veteran pilot down further in an effort to discover why he is still crazy about flying, even though he hasn't done a "thrilling" thing in years, and it is entirely probable that you will find out little. The gentle joys of flying often have a personal nature and it's hard for the typical old pilot to put such things into words. Sometimes he hardly knows himself just why he remains devoted to flying. And if he knows he might not tell you. After all, it's not in the flying tradition for a wind-burned veteran to go around the hangars talking about his private relations with clouds. Yet, if you watch him take off on a pleasure hop, alone, on a morning when the thunderheads are piled white and splendid on the horizon, the chances are you may see a speck of a plane a few minutes later spiralling upward around a towering castle of spotless foam. Did you ever stop and think how marvelous it is to be able to stand on the earth and to look up at a vast cloud formation, and then actually to go to it, and to explore its other side, its hidden crevasses, its canyons and lofty battlements? Try thinking about that sometime. Try doing it. There will be surprises.

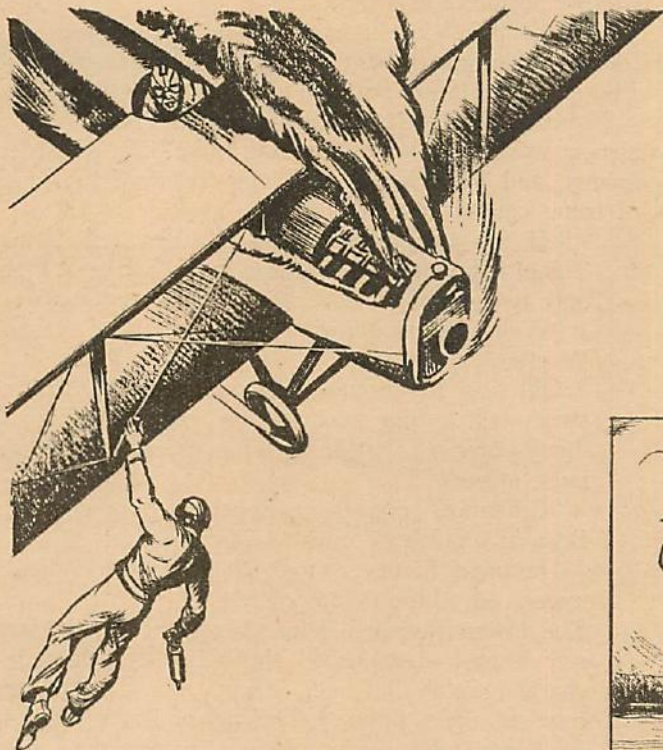
But that is only one phase of the genuine and gentlemanly joys of flying. Did you ever stop to consider that the airplane is one of the finest instruments in the world for the expression of skill in graceful movement? Perhaps you know the joy of dancing rhythmically and well, or of getting over a forehand drive just right in tennis, or of driving a golf ball 200 yards, or of being able to do a perfect swan dive. Nothing dangerously thrilling about those pleasures, is there? And they are genuine pleasures, fine ones. Well, as the source of essentially the same kind of pleasure, the airplane, in my opinion, is supreme.

The secret of success and of a large part of the pleasure in dancing, playing tennis, and so on, is balance. The more perfect the balance and the truer the rhythm, the better the performance and the more fun it is. At the very heart of good flying is development of the sense of balance. You have to have it to a certain extent even before you solo. You must be able not to skid or slip too much. As time goes on the sense of balance is developed to a very fine point, so that a good pilot constantly works his controls keeping the ship in trim, correcting minute slips and skids when they are so little that the legend arose that a pilot stops them before they actually start at all.

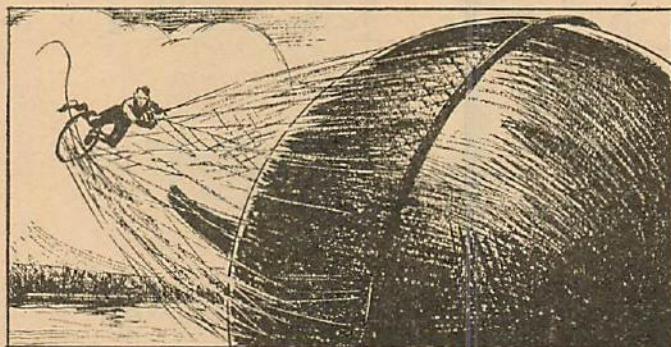
There is no more pleasant sport than what might be called "sky dancing." I mean by that (Turn to page 91)

SPLIT-SECOND ACTION

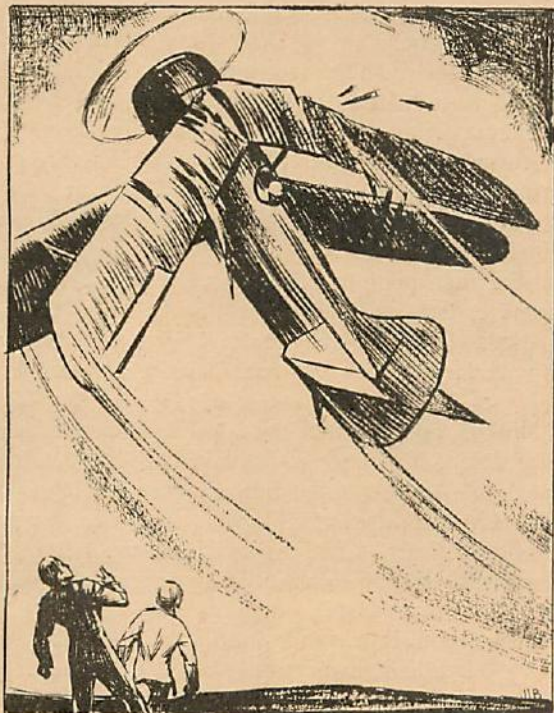
Hair-breadth escapes, hair-trigger decisions, dangerous moments that come once in a lifetime.



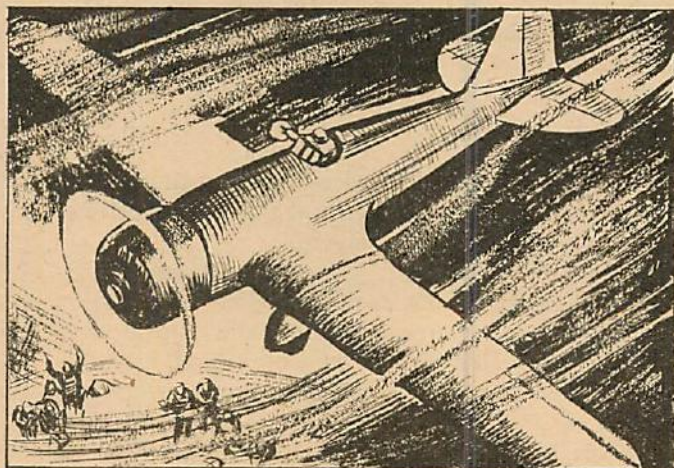
FIRE SWEEPED BACK FROM THE ENGINE. THE CANADIAN ROCKIES WERE NO PLACE TO LAND. CAPTAIN STREETT TURNED THE CONTROLS OVER TO HIS MECHANIC AND CLIMBED ONTO THE WING WITH A FIRE EXTINGUISHER. AS HE WAS ABOUT TO PULL HIMSELF ONTO THE HOOD, THE MECHANIC SIDE-SLIPPED THE PLANE (TO PROTECT STREETT FROM THE FLAMES). STREETT FELL. CAUGHT A WIRE BRACE. SWUNG BY HIS FINGERS. PUT THE EXTINGUISHER IN HIS JACKET. CLIMBED BACK. STRADDLED THE HOOD AND PUT OUT THE FIRE.



A BALLOON, BREAKING AWAY FROM THE GROUND - CREW, SHOT SKYWARD, CARRYING ON THE LOAD RING, SHADE, THE CREW CHIEF. HE PULLED THE RIP CORD. DOWN DROPPED THE BAG SPINNING OVER AND OVER. IT BORE OUT OVER THE WATER. SHADE COULD NOT SWIM. WHEN THE BAG HIT, SHADE WAS ON TOP AND STEPPED INTO THE RESCUE LAUNCH, WITHOUT GETTING, EVEN HIS FEET, WET.



SCREECHING ALONG. 100 FEET UP. 235 MILES PER HOUR. THE WINGS BEGIN TO TEAR OFF. THE SHIP NOSES UP. AT 300 FEET THE PILOT "BAILS OUT". THE WINGS GO - IT'S A CLOSE CALL FOR JIMMY DOOLITTLE!



SIX OTHERS HAD TRIED WITHOUT SUCCESS. E. HAMILTON LEE FLEW THROUGH THE WORST SORT OF WEATHER AND DROPPED FOOD FROM A MAIL PLANE TO ICE-BOUND LUMBERJACKS ON A LAKE MICHIGAN ISLAND.

UPSTAIRS, the gleaming Colborn "mystery" test plane bucked, flipped, rolled, looped in dizzy gyrations. For half an hour red-headed "Ace" Tighe had tried to boot her, had throttled and stalled and slipped and gone into spins that would have wrecked another ship.

He zoomed around on an outside loop, panted into the seventh arc. Throttling down, he felt the ship stagger, hang suspended a brief instant, then sit back and shriek off in a fast spin.

Releasing controls, he waited. In three hundred feet the ship pulled out, stabilized, in control.

On the apron beneath, Colonel Colborn puffed proudly at binocularized aeronautical engineers and flagged the ship down.

The Kiwi Clipper

It was the dizziest flying contraption ever flown, and Pine Notch folks echoed, "Only Ace Tighe could do it!"

by Thomas Calvert McClary

"She's foolproof with those gyroscopes!" he boomed. "A child could land her on a pocket handkerchief at thirty."

"If Ace Tighe can't boot her," said "Tex" Kane of Tal Oil, "she'd fly bottom up in a hurricane! We'll take twenty—one for each of Ace's crack-ups."

Colonel Colborn expansively drew out a contract form as the ship leveled off and came in at thirty-five. "Note that safe landing speed," he boasted.

But Colonel Colborn had not counted on Ace Tighe. Ace came in with tail high and wiggling his flippers wildly. There was no response from the ship at that speed. The gyros held the tail on a dead level.

With almost practiced ease, Ace nosed over and crashed.

"Only Ace Tighe could do it," said local papers. What the colonel said was unprintable.

Ace pocketed the headlines with a sublime lack of conscience, eight dollars, and hopped his red Boeing over the roofs of terrified villages toward Pine Notch.

It was time, he considered, to give the home folks a hand. Also, he must eat.

Home folks were in happy ignorance of Ace Tighe's

nearby presence. Some even murmured that Ace should be there to help. Nobody meant that seriously, but Ace was safely not there, and it made pretty "Lassie" Foote happy to hear them.

There was a serious problem at hand. Old man Foote fixed the town meeting with that intent expression immemorably reserved for presidential debates and the hallowed subject of trout.

"Pine Notch," he declared gravely through a quid of tobacco, "has got to have that airport! If them danged Elkton varmints get it, they get the county seat."

Not all Pine Notch citizens were quite sure what an airport was, but it was something to be built on Federal money, and Pine Notch had long lived off the profits of being county seat.

"If my son were here——" declared General Tighe, forgetting he had bought his son a new ship only two months before to stay away.

"Well, how we going to get it?" snapped pessimist Wortles.

Old man Foote conceived one of the brilliant answers which had kept him in political power for thirty years. "That, fellow citizens, is a question we must answer!"

"Guidance," rasped the Reverend "Spigget" MacBean in sepulchral tones, "will come from above."

He fixed his eyes upon the bottom of the bell tower. A whine answered him from that direction. The tower vanished before his gaze. A red monster roared and pushed through the opening. It charged into the hall, stuck, spit, snorted, and coughed up a figure. The figure hurtled through space and came down spinning on a snapped rafter.

The Reverend MacBean prayed intently. It was not the devil. But it might as well have been. It was Ace Tighe.

Worse, he was alive and kicking. At least a good funeral would have distracted public suspicion of witchcraft from the Reverend Mr. MacBean.

General Tighe poked martial whiskers through a heap of plaster and gasped stoutly that you couldn't kill a Tighe. Heads nodded sad agreement. It was, unfortunately, true.

Then the disrupted meeting became very frightened. Incoherent orders and shrieks rang through clouds of plaster dust. The general was trying to forestall lawsuits by declaring his son's arrival an act of Providence.

Ace blinked open pained eyes to find himself on the village common, his head pillowed in Lassie Foote's lap. He noted the concern in her long-lashed eyes and grinned. She stiffened and looked suddenly resentful.

"I think I'm hurt," Ace groaned quickly.

"You aren't, but the town is dying of shock," she said crisply.

"This common is a punk landing field," Ace complained. "That bell tower was smack in the sun."

Lassie regarded him accusingly. "The wind's out of the east and the sun setting," she snapped. "Ace, you're just a— a kiwi with a prop on your beak! Showing off isn't good flying!"

She threw his head off her lap and arose abruptly. Ace sat up slowly. Hangar talk! She must be running with Tom Deval from Elkton.

There was a drone over the mountain. A Corsair slipped into sight, dropped and came in on a perfect

three-point landing. Lassie colored and watched Tom Deval alight.

"Well," Tom said cheerfully, regarding the wrecked Boeing and building, "only Ace could have done it!"

Ace darkened beneath his tan and glared at the smug satisfaction on Deval's face. But Deval could talk. He was a really good flier. Not daring, but winning the respect of any field he squatted on.

"Are you the world's best-known flier?" Ace gritted.

"No, that can be your honor—when you're a legend."

Deval smirked. "I want to be its oldest pilot, myself."

"I'll leave you in the clouds at the Elkton army test races!" Ace snapped.

"Like to make a bet?" Deval asked. His eyes went meaningfully to the quick-breathing figure of Lassie stand-

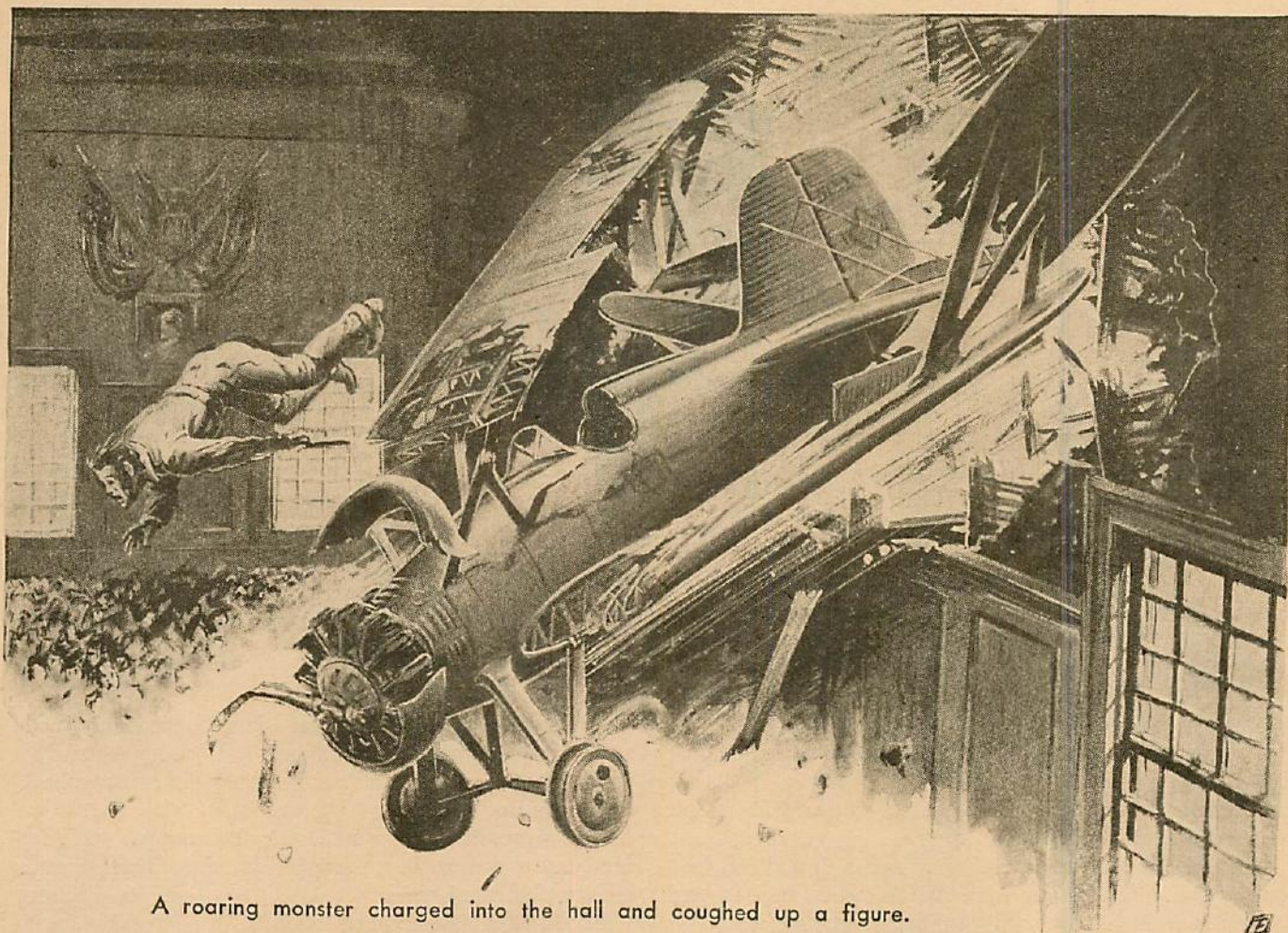
ing. It had just cost him a pretty penny to settle with the town council.

Ace gulped. There wasn't a clodhopper in the country who would loan him a ship. He had just eight dollars in the world toward a new one. And with a nod of his head he had bet his rights to the girl he loved with his rival.

"Happy landings!" Deval chuckled. "Maybe you can rig up an electric fan on a chicken crate."

"I reckon I better take you home before you get in more trouble," old man Foote drawled in Ace's ear.

Ace wedged himself into the springless seat of the springless 1916 Foote motor chariot with thoughts dark and distant. General Tighe was hotly arguing with Seth Cressing over the disappearance of some Cressing false



A roaring monster charged into the hall and coughed up a figure.

ing between them. Ace Tighe's eyes followed, swerved back to Deval's. His face was sober and much older as he nodded sharply.

For a second Ace thought of his own reputation. He kept the best motors at any field. He could make two horse power do whirlwind tricks. But when it came to good flying, the careful flying of the modern commercial times, he was just Kiwi No. 1, the wild redhead who had lived on borrowed time so long his luck was bankrupt.

A brittle chuckle from Deval brought the swagger back to Ace. "Well, folks, put your nickels on the local eagle at the races!" he sang out. "I'll be doing loops through Deval's prop!"

"Not on my money you won't!" roared General Tighe. He shook a trembling finger at the wreckage of the Boe-

teeth. Seth had lost his teeth while fishing six years before, but he swore he had just lost them in the shambles of the meeting house.

"Reminds me," old man Foote said, "you owe me five dollars for a new stovepipe. Piece of plaster near scalped me."

"Uh-uh. Two dollars," Ace corrected distantly.

Foote gave him a look of freshening respect. "Guess you ain't forgot all you used to know."

"Guess I'm in a tailspin with Lassie," Ace mourned.

"Pretty bad, coming home like that right now, Ace. Some folks around here kind of got the notion your reputation might help get the airport for Pine Notch. But it looks like the most help you could be now was to say you're from Elkton."

Ace groaned.

"Yep. Trouble is, you're plumb reckless," Foote said. He hit down the pike at thirty, which speed he knew by the particularly annoying knock of the engine. Going around a curve he snapped his wheel in two complete circles. "Straightens out that old kink in the steering gear," he explained.

Ace watched them avoid plunging over a cliff by the sheer force of some secret power shared only by old man Foote and his chariot.

"You got to be safe, careful, reliable for a woman," Foote was saying. "Take Lassie's ma and me—" He paused while he suspended one side of the car over the brink of a chasm.

"Yep. Nice and safe like you," Ace said, and wiped cold sweat from his brow.

"Well, you got just two months to think on it," Foote went on.

"On what?"

"What do you think I been talking about? On getting back Lassie's and the town's respect. I calculate you got to find a plane and win that race and think out a way to get the airport over here to do those things."

"Just how would you think out a way?" Ace asked tartly.

"Me?" Foote nudged aside a tree which had managed to get in their road. "Why, I'd go fishing." He left Ace without further comment.

GENERAL TIGHE glowered at breakfast. He might have to buy Seth Cressing a new set of false teeth. Seth had gotten public opinion behind him.

It was not the false teeth which worried the general. It was Seth's popularity, which was directly traceable to hooking the season's largest trout. The general secretly believed Seth had netted it, anyway.

"Don't think you'll be getting a dime of my money!" the general snapped.

"I wouldn't take it!" Ace snapped back without much conviction. "I'm going fishing."

"Fishing?" repeated the general, touched in a soft spot. "Maybe I'll go with you."

"You'd scare off the fish," Ace accused, and left in a gray mood. So distant were his thoughts, he basked an eighteen-inch trout without even noticing it.

But as he pushed up Deep Gorge toward Bald Mountain, Ace lost his gloom. Looking up the narrow sides of the gorge, he saw the place where he had once ferried young, white-faced desperadoes across in his box kite. He recalled the irritation of his parents, who had nearly hid him for life.

"Golly, I sure knew the wind currents in these mountains!" he told himself largely. He thought about those currents and their peculiar violence. Then Deval's remark about a chicken crate and an electric fan occurred to him.

For a second the strong muscles of his jaw quivered. Then a twinkle of amusement came into his gray eyes, and his wild laughter, which matched the wild toss of his red mane, rang up the gorge.

The general awaited his son's return with elaborate disinterest. He had been fishing himself, but his best catch just topped nine inches.

While Ace was washing up, the general peeked cautiously into his son's basket. He gulped and gasped. Eighteen inches of beautiful speckled body lay before him. And Seth Cressing's had just made fourteen and a quarter—a bare minnow by comparison!

"Uh—pretty good," the general gulped weakly.

"Not so bad. Couple must measure nine or ten," Ace shouted back.

"What?" the general bellowed.

Ace repeated. There could be no mistake. Ace didn't know what luck he had had.

The general hesitated. All his life he had been an honest man. But he was a fisherman. And he thought darkly of Cressing's false teeth. Furthermore, this was practically his own fish. He knew the very deep pool from which it had come.

With a stealthy air, the general flashed the fish from one basket to the other. In spite of it being a family fish, so to speak, he had a sense of guilt. Ace came out looking dreamily distant.

"Ahem, Junior," the general said gruffly, "I have been thinking. I've decided to give you nine hundred toward a new ship."

The general left the check in the hands of his stunned son and hurried villageward with his purloined trout. By the time he reached the turn of the road he was sure he had caught it himself.

All that night Ace figured frantically with pencil and paper. Nine hundred was not enough for a new ship to compete with Deval's Cor-

sair. But it was enough for a lot of material, and he had salvaged his Boeing motor.

At sunup he rang up old man Foote.

"I'm going to beat Deval!" he shouted at the cantankerous early-morning voice.

"Blast my britches!" Foote gasped, suddenly wide awake. "How about the airport? What happened?"

"Hang the airport. I went fishing," Ace sang back, and hung up.

"He went fishing," Foote repeated slowly. "He figured out a way to beat Deval. But that don't save my county chairmanship if we lose the airport to Elkton."

Foote sat a long time at breakfast that morning, wondering if he had been giving occult, instead of political advice all these years. Then he grabbed his fish pole and headed toward Twin Forks.

OLD MAN FOOTE had two great qualities of political leadership. He was a good fisherman, and he knew how to get blood from a stone. If he could not think of a way to steal the airport from Elkton himself, he thought of what to do about it while fishing.

Young men in love, he concluded, could rise to heights of sheer genius if properly inspired. The matter of inspiration he undertook by making up some stories about Ace to tell his daughter.

There was a meeting between those two, the outcome of which was a very pleased Lassie Foote and a dark-browed Ace. Lassie, womanlike, believed nothing impossible to those in love. If Ace

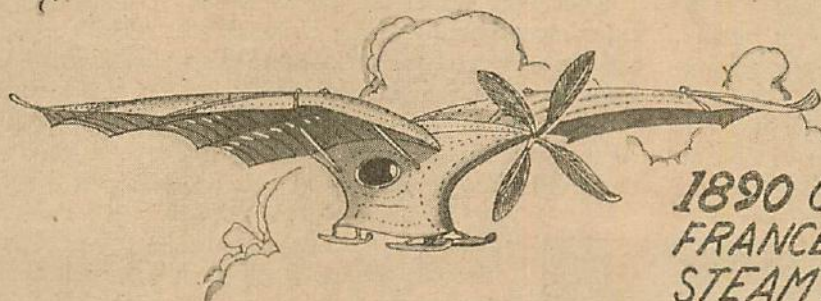
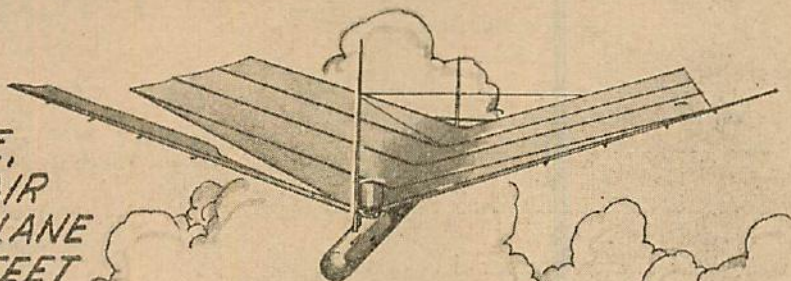
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Ace Tighe

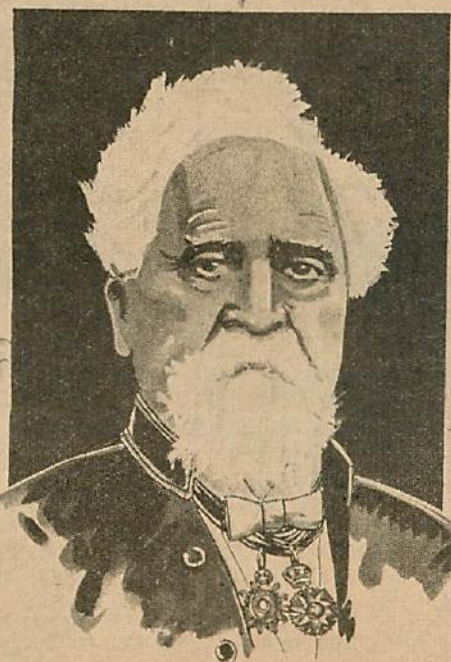
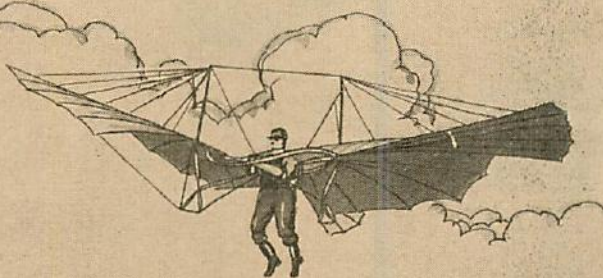
Pictorial History of Man in the Air

1890 AN AUSTRALIAN, LAWRENCE HARGRAVE, BUILDS A COMPRESSED AIR FLAPPING-WING-MONOPLANE MODEL THAT FLIES 368 FEET AT A HIGH RATE OF SPEED.

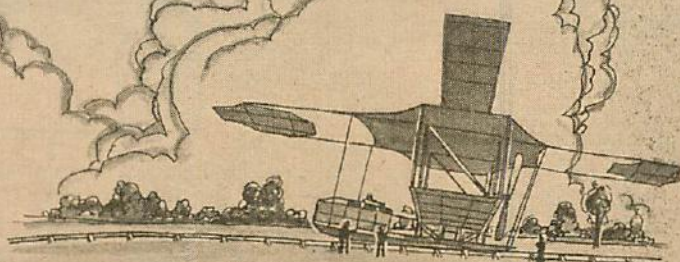


1890 CLEMENT F. ADER, OF FRANCE, BUILDS THE EOLE, A STEAM DRIVEN, BIRD WINGED MONOPLANE.

1891 OTTO LILIENTHAL FLIES HIS FIRST GLIDER. THIS WAS THE FIRST OF OVER 2000 FLIGHTS BEFORE HIS DEATH.



1893 HIRAM MAXIM, AMERICAN BORN ENGLISH INVENTOR, BUILDS A GIANT AIRPLANE THAT LIFTS AND CARRIES HIM ABOVE THE TRACK TO WHICH IT IS TETHERED.



Russia Spreads Her Wings

*The story of the long-distance
A. N. T. 25—the plane on the cover.*

by Frank Tinsley

ONE of the curious features of man's conquests of the air lies in the fact that certain of the earth's peoples seem to take to wings more easily and naturally than others. A good instance of this is the statement, made many times by people in a position to know, that the Japanese make poor pilots. They are said to be mechanical in their handling of the controls; they never really become "part of the plane." How true this is I am unable to say. If it is so, the young men of Nippon bear but little aerial resemblance to their Slavic neighbors across the Japan Sea, for the youth of Russia certainly seems to take to flight as readily as the birds of the air.

Russia's airplane and motor development was inconsiderable before the War. Most of the machines were built under foreign licenses, largely from French designs. At the outbreak of the War only two of the 16 different types of army planes were of Russian origin, and only one of the 9 types of motors. During the War, transport difficulties and home requirements completely stopped French deliveries. The Czarist air industry, thrown upon its own resources, was forced to develop native technicians and types of aircraft.

Among the Russian engineers thus brought to the fore was a young designer of bombing planes who was a fanatic on the subject of large, multi-engined ships. He built a number of highly successful machines with two or more motors, some of which rated as the largest airplanes of their time. The young man's name was Igor Sikorsky.

Following the overthrow of the Czarist government, all aerial activity ceased and a general exodus of aeronautical talent took place. Many gifted designers and pilots, among them Sikorsky and Alexander Seversky, arrived in the United States and, being unsympathetic toward the Soviet regime, never returned to their native land. This great loss of engineering talent seriously hindered the development of Russian aviation during the years immediately following the revolution.

By a legislative act on June 28, 1918, air activities were taken over by the State. The head of the State Industries displayed little interest in flying, however, and even advocated that airplane factories be done away with on the ground that they were non-proletarian luxuries. In the end, Lenin, who was then engaged in the formidable task of creating a new military set-up, took the re-organization of aeronautics into his

own hands and laid the foundations upon which the great Russian air force of to-day has been built.

Under the leadership of Professor Schukowsky, an experimental and research establishment called the Central Aero-Hydrodynamic Institute known as "Z. A. G. I." from the initials of its Russian name, was founded for the development of all-Russian airplanes and motors. At the same time, 3,000,000 rubles were appropriated for the acquisition of foreign aircraft and engines. Thoroughly alive to the handicap imposed on its

infant air industry by the shortage of raw materials and trained workmen, the Soviet government took advantage of the Allied ban on German aerial armament and permitted the erection of Teutonic aircraft factories on Russian soil. Hundreds of ex-flying officers of the former imperial German army were employed as military instructors, and more hundreds of skilled technicians were brought in to help staff the new factories.

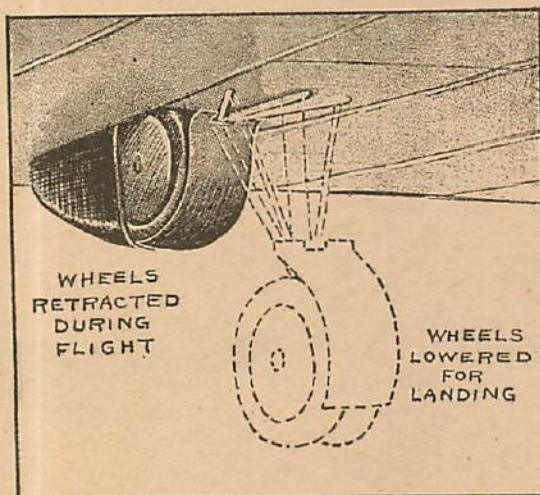
During the ensuing years, the Soviet army air force has continually expanded and improved until it now rates as one of the most

formidable in the world. The technical ranks of the Russian air industry, sadly depleted by the revolution, have been gradually filled up with recruits drawn from the newly established Soviet engineering schools. To-day, the design and production of native aircraft and engines in the U. S. S. R. is

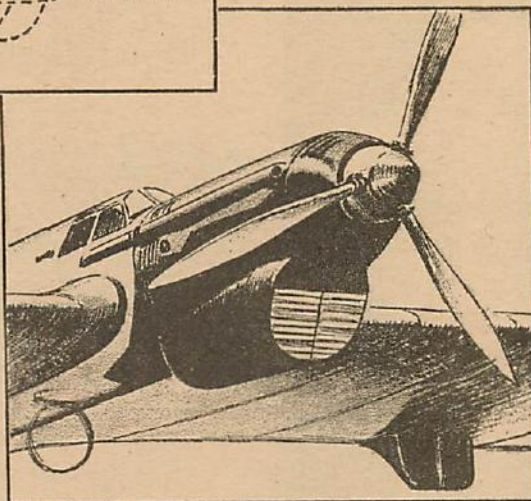
equal to that of any other nation in the world.

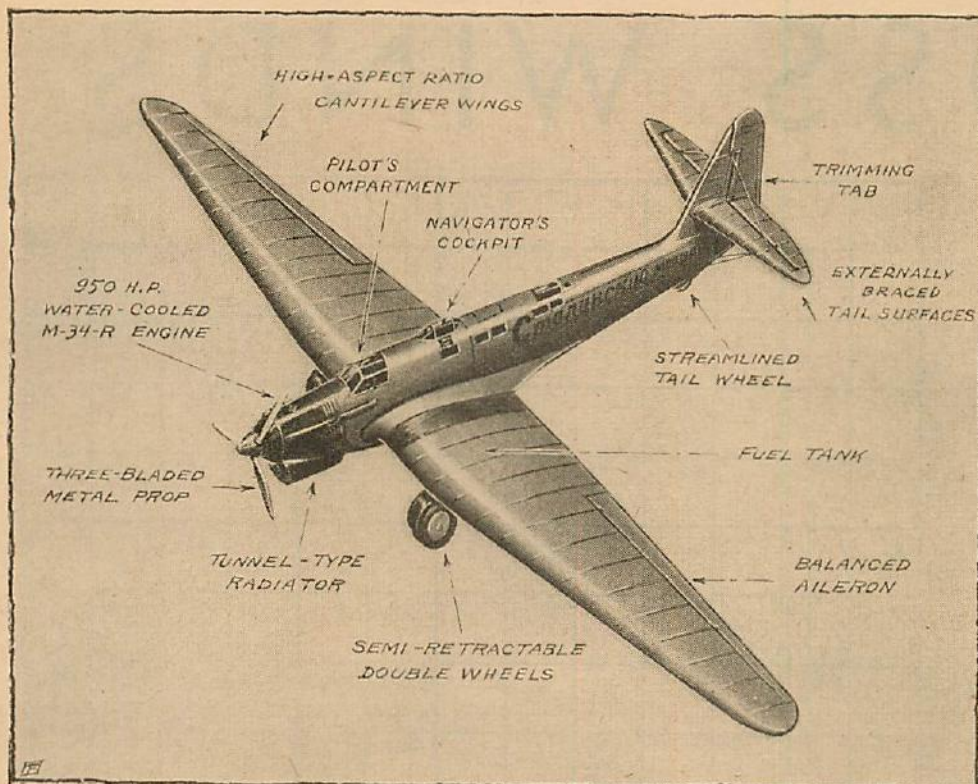
The international marking for Russian aircraft, assigned by the Fédération Aéronautique Internationale, is URSS, which are the initials for the French form of the country's full name, the Union of Soviet Socialist Republics.

Shortly after Lenin's re-organization of aviation, the



Operation of semi-retractable twin wheels and view of tunnel radiator.





Russian government instituted a movement to popularize flying with the general public. Clubs were started everywhere and lectures and pre-flight instruction of qualified young Communists became the order of the day. Recognizing the need of coordinating these far-flung activities, and of providing the Soviet army with a reservoir of semi-trained fliers, Moscow soon announced the foundation of a huge all-Russian military organization which would absorb all flying clubs and correlate all financial, propaganda and training activities in the Soviet republics. This immense movement, which now numbers its members in millions, is probably the greatest mass effort to advance aviation that the world has seen. It is known as Osoaviachim and has already produced thousands of technicians, mechanics, pilots and parachutists.

Shortly after its foundation, the great Z. A. G. I. experimental institute at Moscow commenced working on the problem of designing suitable aircraft for both military and civil use. Under the direction of its chief engineer, A. N. Tupolev, the A. N. T. series of large all-metal airplanes was produced.

Among them was the A. N. T. 4, which, bearing the name "The Land of the Soviets," became well known in this country after a successful flight from Moscow to New York in 1929. The A. N. T. 4 is now being manufactured in large quantities for military use as a twin-engined bomber-reconnaissance land plane or sea plane. A larger four-engined version, the A. N. T. 6, is also being turned out. The A. N. T. 9 is a nine-passenger trimotored commercial monoplane of the old Ford type powered with 365 h.p. Wright or 230 h.p. Gnome-Rhône Titan air-cooled radial engines. It is largely used on the Moscow-Irkutsk air line, the largest commercial air

route in Russia. The A. N. T. 14, another transport monoplane, boasts five engines and has given very satisfactory results under test.

In 1934 the A. N. T. 20 was produced. This was the largest land plane in the world, a huge, eight-engined monoplane named after the Russian writer, Maxim Gorky. It was capable of carrying a crew of 23, plus 40 passengers. Fitted out as a propaganda plane, the ship was flown all over Russia and did much to popularize aviation with the masses of the people.

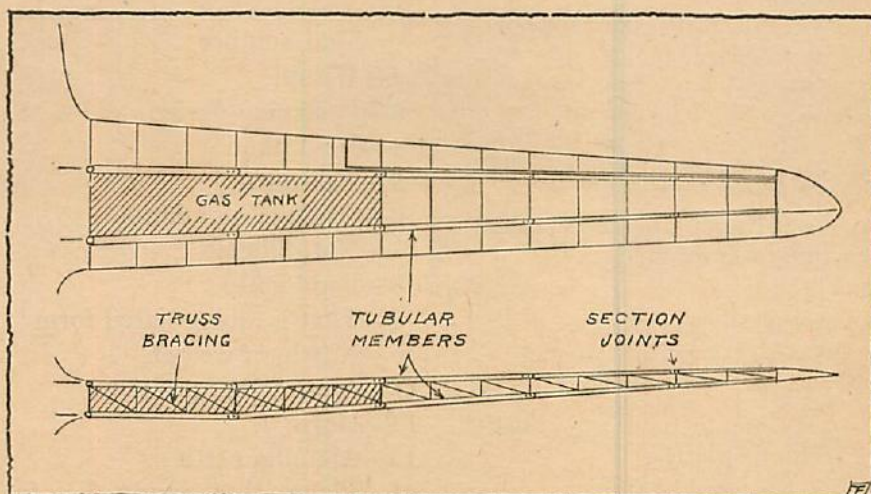
During this service, the plane's equipment included a photographic laboratory and printing press for the preparation of leaflets and news sheets, a wireless transmitting plant with loud-speakers for broadcasting from the air, moving-picture apparatus for

the projection of propaganda films, and a complete electrical installation for the display of lighted slogans on the underside of the huge wings. Each of the passenger cabins contained four bunks. There was also a passenger lounge, a telephone switchboard connecting 16 separate stations, and long, medium and short-wave two-way radio sets. To generate the current necessary for this extensive electrical equipment, a dynamo driven by a 30 h.p. auxiliary motor was provided.

In May, 1935, a young pursuit pilot, while engaging in aerial acrobatics, flew too close to the big ship, and a collision occurred in mid-air. The "Maxim Gorky" crashed and was destroyed, its 49 occupants being killed.

Undismayed by this catastrophe, the Russian government is now building three more of the giant monoplanes, and still others are being financed by popular subscription. The new version of the A. N. T. 20 will be fitted with six, instead of eight, engines, as experience with the "Gorky" showed that the tandem engines above the fuselage were not very

(Turn to page 92)



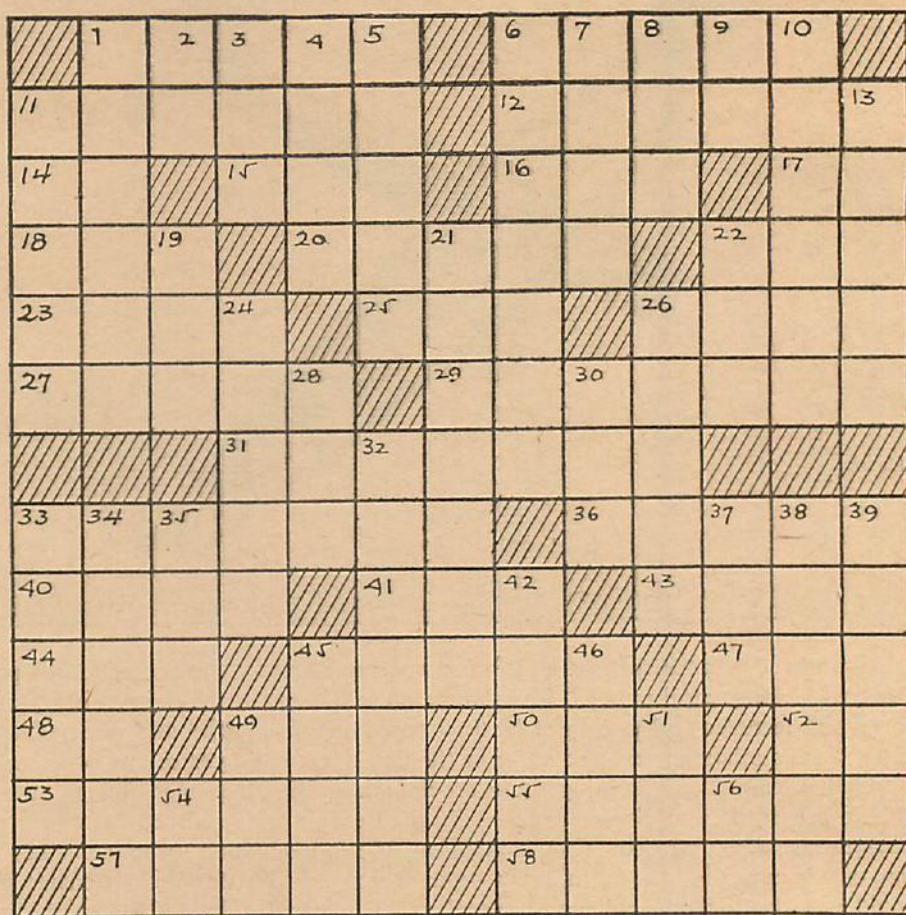
Light, strong wing construction of A. N. T. 25 and location of gas tanks.

CROSS WINDS

*Can you answer
the aeronautical
definitions in
this puzzle?*

Across

- 1—Single-seat, wood-construction light plane
6—High nest of birds of prey
11—Present western end of transpacific Clipper route
12—Strata
14—Half of printer's em
15—Neither
16—Employ
17—Mountain, abbreviated
18—Leading manufacturer of aircraft floats
20—Military foe
22—Strive for superiority
23—Sea bird
25—Make of Italian plane
26—Airship mooring fixture on mast
27—Grease stain
29—Knotty
31—Aircraft with two supporting surfaces
33—Dignify
36—Rips
40—Make of plane in Austrian air force
41—Government plane certification, abbreviated
43—To fall
44—Attachment fixture
45—Avro bi-motored service plane
47—Last name of Wiley Post's famous plane
48—In the same manner
49—To perch



- 50—Human beings
52—Regarding
53—Withdraw
55—Traveled in a circuit
57—Change
58—Go in

Down

- 1—Arrangement of wing behind another
2—Within
3—Fastening device
4—Wild plum
5—Tall tales
6—Oxide of aluminum
7—Not difficult
8—Food grain
9—That is, abbreviated form
10—Northern weasel
11—Aircraft competitions
13—Horse
19—Metallic earth
21—Planes that Sandy flies for Bill Barnes

- 22—Flight, in French
24—Wealthy man
26—Air Adventurers' guide
28—Wing member that shapes surface
30—Series designation of Russian plane on cover
32—Plantation owner
33—German make of light planes, in plural
34—Air-sickness
35—To scold
37—Furnish with weapons
38—One who bellows
39—Airplanes' outstanding quality
42—Make of Swiss planes
45—Military assistant
46—Element in air
49—Put in place
51—Thing screwed on bolt
54—Abbreviation for longitudinal division of fuselage or other aircraft member
56—Concerning



Electra, Junior

*The new Lockheed 12
is smaller and faster*

by Albert J. Carlson

IF you live near one of the large airports and are in the habit of spending your spare time there (and what aviation fan doesn't?) perhaps you saw a glistening, all-metal, twin-motored job that you'd never seen before come gliding in for a landing recently. It looked very much like an Electra, you thought, but it was smaller. Later, or perhaps after an over-night stay, it took off for the next airport, leaving a lot of pilots and mechanics talking about the swell job Lockheed had turned out.

For the twin-engine plane's tour was the Lockheed company's way of introducing its new model 12. It was the first public appearance of what is claimed to be the nation's fastest twin-engine commercial airplane.

The Lockheed 12 may be considered a trimmed down version of the famous 10-passenger Electra. It is intended as an "executive" type of ship for industrial companies and business men, and as a "feeder" transport for small air lines, tapping passenger traffic in areas where the bigger, heavier sky-liners might not succeed in filling all their seats.

There will be four models of the new plane: the 12A, powered by 450 h.p. Pratt & Whitney Wasp Junior SBs; 12B, Wright R-975-E3 Whirlwinds of 440 h.p.; 12F, Wright Whirlwinds of less power; and 12M, 6-cylinder in-line 290 h.p. Menascos.

Although smaller than the Electra—5½ feet less in span, 2 feet 3 inches in length—the Lockheed 12 has a fuselage of about the

same cross section, maximum inside cabin width and height being 5 feet. Including the pilots' section, the soundproofed cabin is 14 feet 8 inches long. In air-line service, the plane will carry six passengers in adjustable seats, a crew of two, and about 450 pounds of cargo in the nose and a rear baggage compartment.

Construction is principally of Alclad 24ST (aluminum alloy, aluminum coated), with monocoque fuselage and semi-stressed-skin wing. The twin fin and rudder arrangement, which made for stability and controllability in the Electra, has been further refined in the 12.

The wing is built on a single shear beam. The load-sharing skin, carefully smoothed to present the lowest possible resistance, is reinforced underneath by heavy

corrugations which provide such strength that it is possible to walk down the center portion of the wing without damaging the skin. Electrically operated split-type trailing-edge flaps increase the gliding angle and reduce landing run. The ailerons are statically and dynamically balanced.

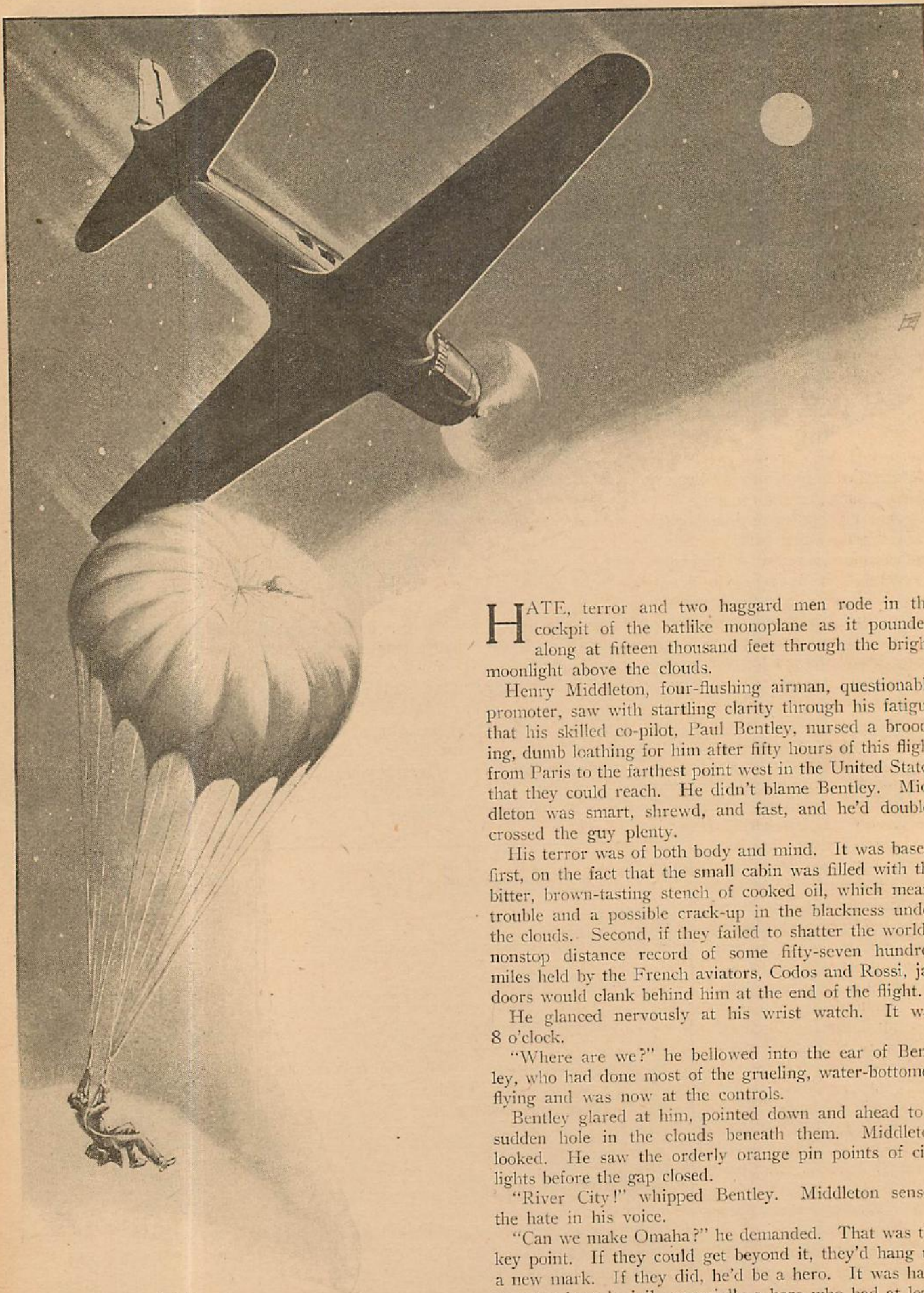
As with the Electra, the Lockheed 12 wing center section is cut away at the fuselage, permitting the fuselage to be placed partly within the wing. This reduces the plane's frontal area, helping to eliminate excessive drag and making possible high-performance figures. The smooth nose design and sloping, streamline construction of the fuselage also provide maximum visi- (Turn to page 47)

Lockheed 12A

Length	36 ft. 4 in.
Wing span	49 ft. 6 in.
Height over-all (tail on ground)	9 ft. 9 in.
Wing area (incl. ailerons and fuselage)	352 sq. ft.
Landing-gear tread	13 ft. 6 in.
Engines: 2 P&W Wasp Junior SB	
H.P. at r.p.m. for cruising	300 @ 2,000
H.P. at r.p.m. for take-off	450 @ 2,200

Take-off run (sea level), 2-position prop.	780 ft.
Take-off run (sea level), constant-speed prop.	600 ft.
Maximum rate of climb (sea level), wheels up, 1,400 ft./min.	
Landing speed (sea level), flaps down,	65 m.p.h.
Fuel consumption, max. rated cruising power, 52 gal./hr.	
Cruising range, (140 gal.)	530 mi.
Fuel consumption, approx. 60% power,	39 gal./hr.
Cruising range (140 gal.)	650 mi.
Service ceiling, both engines	24,800 ft.
Absolute ceiling, both engines	27,000 ft.
Absolute ceiling, full load, one engine	10,200 ft.
Absolute ceiling, half fuel dumped, one engine	11,000 ft.
Maximum speed, sea level, 100% power	219 m.p.h.
Maximum, 5,000 ft.	231 m.p.h.
Cruising, rated power, sea level	192 m.p.h.
Cruising, rated power, 5,000 ft.	201 m.p.h.
Cruising, rated power, 10,000 ft.	209 m.p.h.

Gross weight	7,925 lbs.
Empty weight (incl. std. equip., W.E. radio)	5,355 lbs.
Useful load	2,570 lbs.
Passengers (6) and pilots (2)	1,360 lbs.
Cargo (mail, baggage, express, etc.)	445 lbs.
Maximum oil capacity (14 gal.)	105 lbs.
Normal fuel capacity (110 gal.)	660 lbs.
Maximum fuel capacity (140 gal.)	840 lbs.
Wing loading	22.5 lbs./sq. ft.
Power loading	8.81 lbs./h.p.



Silk swished and billowed out above him, tightening as air ballooned into it.

HATE, terror and two haggard men rode in the cockpit of the batlike monoplane as it pounded along at fifteen thousand feet through the bright moonlight above the clouds.

Henry Middleton, four-flushing airman, questionable promoter, saw with startling clarity through his fatigue that his skilled co-pilot, Paul Bentley, nursed a brooding, dumb loathing for him after fifty hours of this flight from Paris to the farthest point west in the United States that they could reach. He didn't blame Bentley. Middleton was smart, shrewd, and fast, and he'd double-crossed the guy plenty.

His terror was of both body and mind. It was based, first, on the fact that the small cabin was filled with the bitter, brown-tasting stench of cooked oil, which meant trouble and a possible crack-up in the blackness under the clouds. Second, if they failed to shatter the world's nonstop distance record of some fifty-seven hundred miles held by the French aviators, Codos and Rossi, jail doors would clank behind him at the end of the flight.

He glanced nervously at his wrist watch. It was 8 o'clock.

"Where are we?" he bellowed into the ear of Bentley, who had done most of the grueling, water-bottomed flying and was now at the controls.

Bentley glared at him, pointed down and ahead to a sudden hole in the clouds beneath them. Middleton looked. He saw the orderly orange pin points of city lights before the gap closed.

"River City!" whipped Bentley. Middleton sensed the hate in his voice.

"Can we make Omaha?" he demanded. That was the key point. If they could get beyond it, they'd hang up a new mark. If they did, he'd be a hero. It was hard to put a hero in jail—especially a hero who had at least fifty thousand dollars in his pocket collected from manufacturers whose products he had used; his endorsements;

the stamped and cancelled postal covers he carried for philatelists; and a newspaper syndicate running an exclusive story about his flight. That much would get him out of the jam he was heading into with the State Securities Commission for selling stock in an aircraft corporation which had no assets or promise of them, in order to finance the trip.

Rage and disappointment stung him as Bentley answered:

"Not a chance. Pistons have been seizing. Fire is blowing by them into the sump, carbonizing the oil. The carbon's clogging the oil-filter screen. When the flow's blocked the motor'll fry."

"When?"

"An hour. Maybe two. We've got nine hundred miles to go—eight hours—to beat the Frenchmen."

Middleton stroked his whiskered, grimy face to cover the trembling spasm which shook him. He believed what Bentley said, for Bentley knew planes and motors, even if he was a sucker for a man with brains in any other line. He tried to bolster up his flagging spirits, shake off his terror, by remembering the clever way in which he'd bilked the pilot by getting him to sign a trick contract just before they had taken off from Paris. The contract paid Bentley a mere five hundred dollars for flying the ship and robbed him of the fifty-fifty share of the proceeds which Middleton had promised verbally.

"When the motor quits—will there be any great danger?" the promoter asked, rubbing his hands together. "I mean from the plane. Will she get out of control going down through the clouds now that the instruments have all gone haywire? Your invention—the correctional what-chamacallit—it'll pull us out of anything, won't it? Keep us stable? That's why I let you put it on the ship."

Middleton shuddered at the oblique, detesting look he got.

"The correctional gyroscope's no 'good!'" Bentley snapped. "It won't save your rotten neck. I tested it in Paris. When you ease the motor back to about twelve hundred revs, kick the right rudder and pull the stick into your stomach, the ship'll go into a spin and the gyro'll never bring her out. That makes it worth absolutely nothing."

Bentley went into a fierce silence, stared up at the stars and down at the clouds, which looked like a mussed fleecy blanket. Middleton studied him, pored over his statement, stiffened suddenly at the audacity of his thought. He controlled his agitation enough to say, smoothly, as he unsnapped his parachute harness and pulled up in his metal seat:

"Tough. Well, I'm going to hit the hay until the big moment. Call me when we're licked."

He turned, stepped on the parachute pack, pulled himself onto a built-up platform over the tanks at the rear of the cabin and worried his big body around until he was facing forward on the dirty kapok mattress.

He was amazed at the rapidity with which his mind clicked under the stimulus of what Bentley had told him.

He knew that Bentley would join with the mulcted stockholders to slap him behind bars. Bentley should be put out of the way. His correctional gyroscope was ineffective in a right spin. Middleton had talked the insurance company into slapping a fifty-thousand-dollar policy on the crate, which was a fair estimate of its actual cost, although it would bring less than five thousand on the open market because it had been designed only for long-distance flights, and had no commercial value. Answer: Bentley out of the way via the crash route. The insurance company ponying up the fifty grand. Middleton paying off the stockholders to keep them quiet. His part in the act would be risky—but he was desperate at the thought of gray walls and iron bars.

His hand closed over the crank which lay beside the mattress. He lifted it, swung it in a tight arc down onto Bentley's head. The pilot slumped forward over the stick. Middleton screwed himself forward, braced himself on the seat beside Bentley. He panted. His brow was mottled with sweat. He struggled, pushed and heaved until he'd gotten the man away from the controls. Bentley was moaning, unconscious. Middleton hadn't cracked down too hard. Accidents were freakish. A crushed skull might give Middleton away during the investigation.

He snapped on his parachute harness. For a moment

he was sick, and he swayed dizzily with fear. He steadied himself, slipped into the seat behind the controls, throttled the rough, laboring motor to twelve hundred. Then he drew the stick to him and kicked full right rudder. The ship mushed forward, nose up, like a sick fish gulping air at the surface of water, then sloughed off onto the right wing. The circle tightened. Nose slapped down, tail up, the crate began winding down at the clouds and death beneath them. Middleton figured that they'd be just beyond River City, which was what he

wanted. He had planned his deviltry carefully.

He hugged the stick, pressured the rudder until his stomach felt empty and his head swam. The tailspin stuck—the ship didn't fight to come out, but tightened up. Sure at last that there was no chance of it coming out, he reached up, unhitched the window latch in the roof, opened it, juggled himself out of it and kicked off into blackness. He counted a short five, pulled the rip cord. Silk swished and billowed out above him, cracked and tightened as air ballooned into it.

He sighed with the fervor of a condemned man receiving the news of a stay of execution. Cold air weaved through his garments, cooling his perspiration, chilling him.

"Perfect!" he gasped.

The parachute drifted in the light wind. He strained for a sound from the big monoplane which was corkscrewing through the clouds, heard the distant popping of the motor for a minute, heard it fade out. He knew that with both descending through fifteen thousand feet of air, he and the doomed plane might (Turn to page 85)

Tail Spin

*The record-seeking
hop was going to fail.
There was only one
way out—*

by Edward Churchill

What's Your Question?

By CLYDE PANGBORN

Wing Commander



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

Question: What kind of airplane was used in producing the motion picture "Devil's Squadron," and what are its specifications and performance? R. A. M., Utica, N. Y.

Answer: The plane you refer to was a Northrop Gamma. The same type was used in the filming of "Ceiling Zero." The former well-known "Sky Chief" of Frank Hawks—destroyed in the last Bendix race—was a Gamma, too.

The Gamma is a single-engined freight and mail plane. It is all metal, and has stressed-skin wing and fuselage construction. Its length is 31 feet 2 inches, and span 47 feet 9½ inches. Weight empty is 4,119 lbs., and it carries a pay load of 1,173 lbs. It has usually one of two engines: a Wright Cyclone SR-1820-F3 developing 710 h.p., or a Pratt & Whitney Hornet of about the same power. Maximum speed is around 220 m.p.h., absolute ceiling 22,500 feet, landing speed 60 m.p.h. (with flaps). If you want further details, I suggest that you write to the Northrop Corp., Inglewood, Calif.

Question: R. T. of Atlanta, Ga., asks an opinion on the pursuit-versus-bomber question, quoting claims that the modern bombers can outspeed and outshoot many pursuits, but that, also, the pursuits are developing cannons that can stop the bombers.

Answer: If I could give a final answer as to whether the day of the pursuit planes is ending, I'd automatically become the world's foremost authority on military aviation and governments would come running for advice. The answer is that there is no final answer—at least, not at this stage of the game. In my opinion, no decision will be possible until man stops inventing new weapons that are deadlier than the old, and I see no sign of his stopping. The factors that must be considered in air warfare—speed, maneuverability, armament, numbers—are constantly shifting unevenly, so that the probable outcome changes practically from month to month. At present there's no solution.

Question: What is the endurance flight record (refueling in air) official and unofficial? What type ship and motor was used? Who were the fliers? E. G. J., Selma, Calif.

Answer: Both the previous official record of 553 hours of the Hunter brothers and the unofficial time of 647 hours 38 minutes, set by Jackson and O'Brine, were

broken July 1, 1935, when Al and Fred Key came down at Meridian, Miss., after the remarkable time of 653 hours 34 minutes, or a little over 27 days spent in the air within sight of the airport.

Their plane, named "Ole Miss," was a Curtiss Robin, powered by a 175 h.p. Wright Whirlwind.

Question: I have heard that when a plane makes a turn without banking, it immediately starts to skid. What happens then? Would it turn completely around, or would it merely make a wide skidding turn? K. B., Canova, S. D.

Answer: Neither of the above-mentioned movements would happen. With practically all planes an attempted flat turn, furthermore, would result not in a skid, but in a sideslip. That is, the wing on the outer side of the turn would begin to point downward, and the plane would fall off in that direction. At the same time, losing forward speed, the nose would drop and almost certainly you'd find yourself heading into a spin. In other words, don't figure to try a flat turn—at least, at low altitude—any more than you'd try going around a curve on a bicycle without leaning inward.

Question: Why are air-cooled engines considered better than water-cooled engines? B. L., New Orleans, La.

Answer: There are a good many reasons why; in fact, it would be difficult to find anything to say in favor of liquid cooling. About the only advantage that liquid-cooled engines still have is that it is possible to line up a lot of cylinders along a crankshaft and so pile up considerable horse power without large frontal area, liquid circulation being a more or less efficient way of cooling such an arrangement. But even in such engines, the science of air cooling is developing rapidly.

The superiority of air cooling lies in its own virtues and in its freedom from the drawbacks of water cooling. The somewhat higher temperatures of air-cooled cylinders make for greater fuel economy, since the fuel is burned more thoroughly, or for greater power on the same fuel quantity. The air-cooled engine is simpler in construction, lacking water jackets, radiator and pump, and hence requires less attention and repair by pilot and mechanics. For the same reason, it is lighter. It is easier to start in cold weather, yet does not risk overheating at any time, since there is no liquid to escape or boil over.

AMAZING results were recorded in recent experimental instrument landing tests made in a twin-motored Boeing 247-D transport by United Air Lines at Oakland Airport. They were made possible by new radio directional and landing beams, picked up by a cross-shaped antenna installed on the nose of the ship.

The directional beam operates on a frequency of 232 kilocycles. It is transmitted from a small auxiliary station located at the far end of the field. At the station the beam is a couple of inches wide; it spreads out to five feet at the landing circle on the field, ten feet at the border of the field, and widens gradually so that a mile away it is 300 feet wide, and wider in proportion at ten miles. The beam is vertical and extends upward to great height. Once on this beam, the pilot knows he is approaching the center of the field to land.

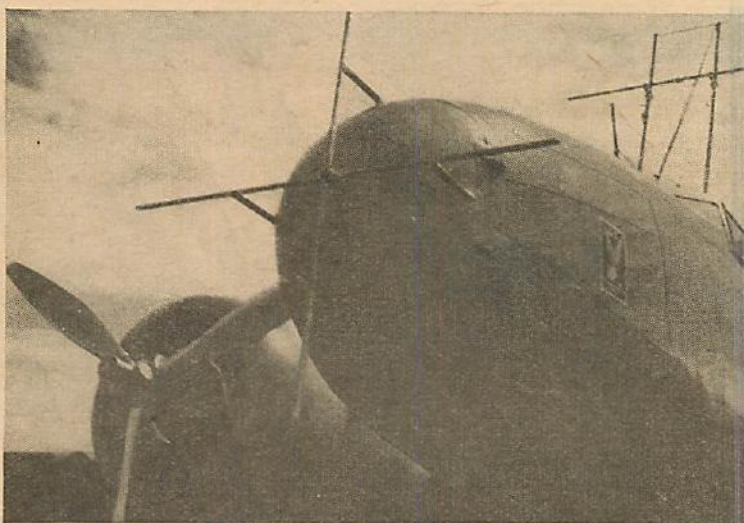
The landing beam operates on a frequency of 93,000 kilocycles. It is transmitted from a small auxiliary station which stands close to the directional beam transmitter. The beam is thin and horizontal. At the landing circle it is fifteen feet above the ground, and 60 feet at the border of the field. One mile away it is 300 feet up. It curves gradually so that at ten miles it shoots up almost vertically.

These airport localizer radio beams register on an instrument in the plane called the cross-pointer or localizer. It contains two floating pointers, one vertical and one horizontal. The only mark on the glass dial is a zero in the center.

A pilot coming in to land in fog so thick that the ground is blotted out—or zero-zero weather—first locates these beams after passing through the cone of silence over the radio range beacon station at the field. The two beams are in conjunction. The pilot must fly so that the horizontal and vertical pointers intersect one another at the center of the localizer.

Now, if the plane loses altitude too fast on approaching the field for a blind landing, it will go below the landing beam and the horizontal pointer will move down below the zero, while if it does not lose altitude fast enough, it will go above the landing beam and the pointer will stand above the zero mark. In this manner the pilot can avoid flying into the ground or overshooting the field.

During all this time the automatic pilot is connected to the controls. It keeps the plane in level flying position and prevents skidding and slipping. It does not hold the plane on the two radio beams, but it relieves the pilot of



Cross-piece antenna on nose picks up the landing beams. In the background is an experimental antenna for better range beacon and message reception.

the task of maintaining horizontal equilibrium manually so that he can give all his attention to the job of holding the craft in the correct direction for the blind landing.

When the altimeter shows 300 feet, the pilot knows he is one mile from the border of the field. He is in a power glide, with motors turning up 1,750 r. p. m., and he is maintaining

a safe landing speed of 85 m. p. h.

When the radio tone coming through the earphones begins to build up, the pilot is warned that he is close to the field. At 60 feet altitude the tone suddenly fades away. The pilot then knows he has passed the border of the field. He holds the plane exactly on the junction of the two beams, and flies right down to the ground. The landing beam is almost flat at this height, so the plane's wheels do not hit hard. However, the plane bounces slightly, and when it touches ground on the rebound the pilot cuts the throttle and applies the brakes.

The automatic pilot holds the plane absolutely straight while rolling on the ground, and eliminates all danger of swerving into a ground loop.

The first blind landing in official tests in the United States was made by Major James H. Doolittle in 1929 at

Mitchel Field with a safety pilot riding in an open cockpit. Doolittle sat under a hood. Three years later Major A. F. Hegenberger actually made the first solo blind landing at Dayton. And of course many airline pilots have landed by instruments in dirty weather.

But their task was harder and carried considerable risk. Their landings were more than 50 per cent luck. All of them found their greatest difficulty to be in over-controlling, in trying to maintain horizontal equilibrium on approaching the ground and in holding the plane straight after the wheels touched. The tendency of the plane is to swerve. They were never entirely sure whether the plane would land on both wheels, or on one wheel and one wingtip. There was also the danger of stalling, since the planes were not brought in with flying speed.

In the successful United Air Lines experiment all the guesswork has been eliminated with the aid of the automatic pilot. The cross-piece antenna acts as greased skids which slide down the invisible directional and landing beams and thus guide the plane to a safe landing with the pilot never once seeing the ground.

Landing Blind

by A. S. Gregory

Invisible sky paths guide a big transport to happy landings in zero-zero weather.



Take That Dare!

I REMEMBER Duke. He lived next door and was older than most of the fellows in our bunch. He called himself "Dare-devil" Duke—and how he lived up to his name. He'd take a dare on anything, and if somebody didn't give him one, he'd suggest a stunt for himself, then carry it out.

His chief hurts were sprains and bruises. No busted ribs. Then, while we were still pedaling bikes, he began driving a car. This was the real thing. Now he would show us kids some first-class daring. Three months later, after he became the talk of the county because of his new recklessness, they found Duke's body in the charred wreckage of his car at the bottom of an abandoned quarry not far from town. And the very last time I'd seen Duke alive he'd mentioned something about planning to drive within an inch along the top edge of the quarry for a certain distance.

Even before Duke's tragic finish a lot of my admiration for his dares had worn thin. I wondered what good his stunts were doing him. Seeing his blackened, mangled body brought me up with a jerk. I realized for the first time that the stunts had been unnecessary.

Duke's story came to mind as a result of reading Lieutenant Wood's splendid article in this issue. I've known flying cadets, some war-time pilots, barnstormers and amateur airmen such as he describes—members of our profession afflicted with "aeroneurosis," who think it cute to skim beneath high-tension power lines, by way of mild example. To give the complete record, I've known some transport and mail pilots with the same attitude toward flying. But these last, in every instance, were quickly grounded or killed. As for the former, the smart-Aleck cadets and amateur playboys of the ether, a few of them are still alive, even after causing the death of other people by their antics. However, put this down in your flight log: They'll all go the way of this world's Dukes, and sooner rather than later.

The "adult" flier Lieutenant Wood mentions, who can have his fun though playing safe, is faced with his share of danger without courting it. *Take that dare*—when it's necessary. Save that urge to experience a

do-or-die thrill—for the moment when Fate challenges you. There will be such moments. You, the fliers of to-morrow, will be called on to choose a course that may spell sudden death or the only means of living. Danger from storm, faulty landing gear, conked motor; risks in connection with wing and motor tests; hazards encountered while pioneering a new air route—these, Air Adventurers, are the real dares of the skyways. They are the only kind considered by the Pangborns, Chamberlins, Balchens and Lindberghs. They are the only kind accepted by them—promptly and with life in the balance.

The Creed of this Club includes daring—when needed. If you are interested in becoming an airman, and can honestly pledge yourself to uphold the seven-point Creed of Self-reliance, Courage, Initiative, Independence, Loyalty, Integrity and Obedience, I cordially invite you to apply for membership. Fill out and mail the coupon below. A membership certificate and a winged badge, our official insignia, will be sent you if your application meets approval here at Headquarters.

Happy landings!

Your Flight Commander,

Albert J. Carlson

(MEMBERSHIP COUPON)

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

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

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

Name..... Age.....

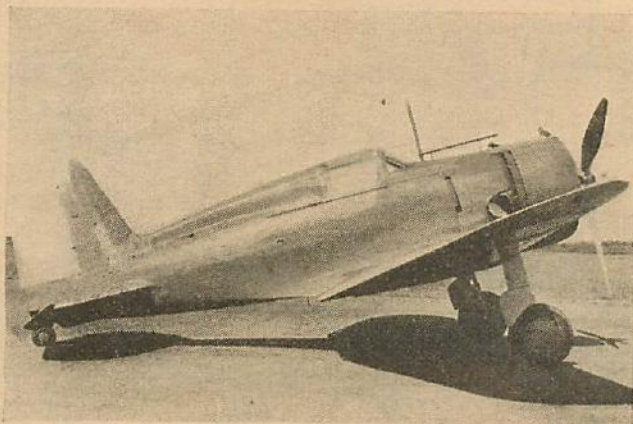
Address

☐ Check here if interested in model building.

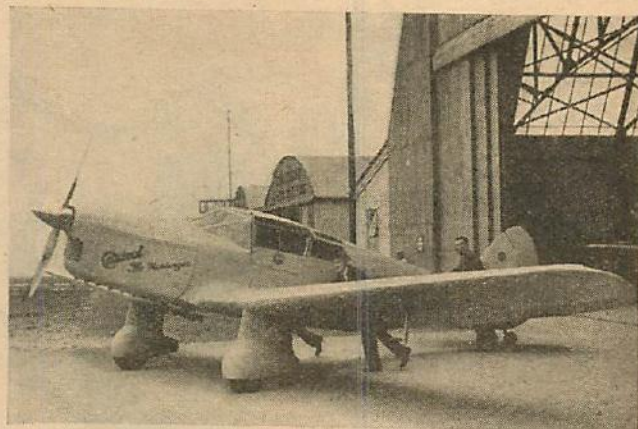
(This coupon may not be used after January 15, 1937.)

AIR TRAILS GALLERY

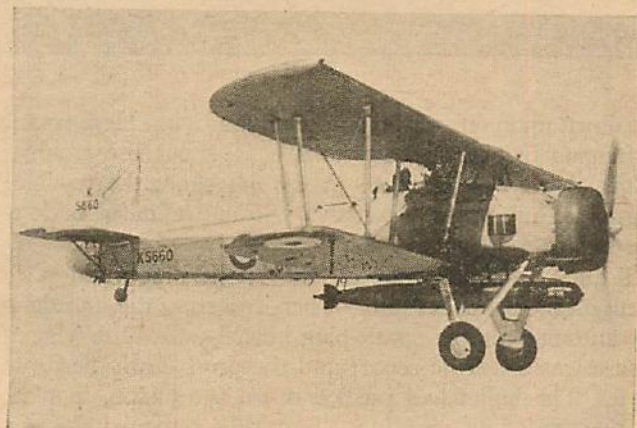
A Picture Page of Modern Planes for the Collector



VOUGHT V-143 fighter, Northrop-designed and Vought-built, has Twin Wasp Jr., 250-m.p.h. top, two guns and 300-lb. bomb capacity.



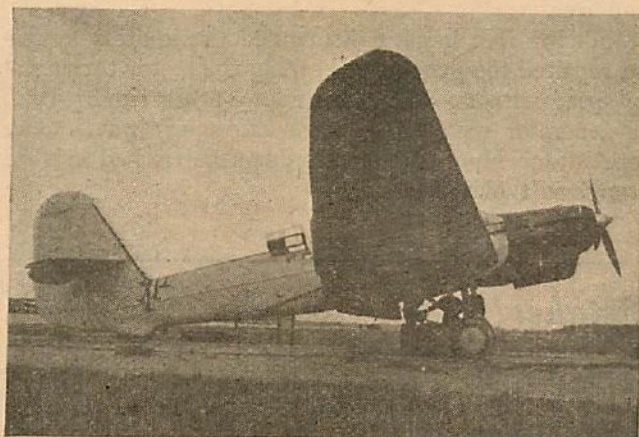
PERCIVAL Vega Gull above is Mrs. Markham's "Messenger," 200 h.p. Gipsy Six, which flew Atlantic from England to Nova Scotia in 23h 15m.



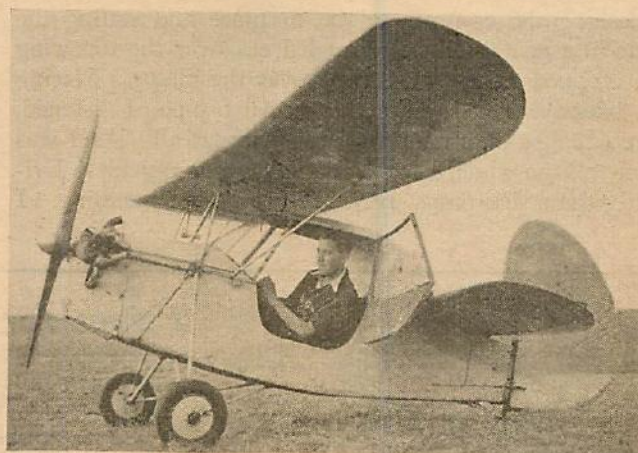
FAIREY Swordfish 2-3 seat land or seaplane, 690 h.p. Bristol Pegasus IIIM, carries fixed and flexible gun, bombs or 1,425-lb. torpedo.



FOCKE-WULF FW-56A Stösser trainer above was Gerd Achgelis' acrobatic plane at national races. Engine is 240 h.p. Argus air-cooled inverted V.

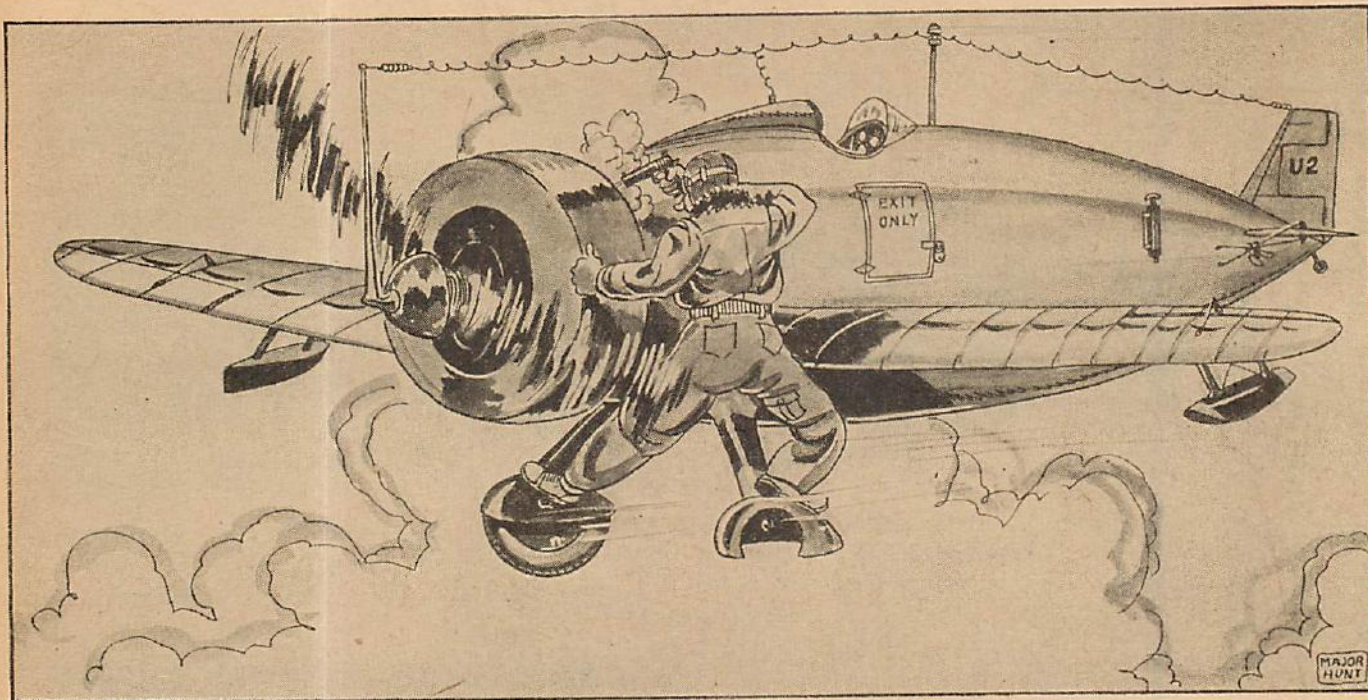


A.N.T. 25 side view shows large rudder area of Russian plane. Description appears on page 30 and flying-model plans on page 42.



MIGNET HM-18, first Flea cabin version, does about 100 m.p.h. on 38 h.p. Like Flea on page 6, strut replaces wire wing control.

GULLIBLE'S TRAVELS—Major Hunt



IT was morning, possibly because it was 9:30³/₁₆ a. m. I was roaring along over the foothills of the White Mountains of Nebraska, idly strumming my bass viol, with my faithful Airedale, Hykkuvn, lying beside me on the hearth.

A brisk fire crackled in the grate below the instrument board, softly lighting the instruments with a yellow glow. As I deftly moved the stick in the soft twilight, my eye chanced to fall upon the steamgauge giving the r. p. m.'s of the motor. It was missing! The motor, that is, not the steam gauge.

With the rapidity of a worried mudworm, I leaped to my feet. I must investigate at once the cause of my engine trouble. Being known as a fearless trouble-shooter, I took along my trusty Colt .45 and a few boxes of shells.

Lashing the controls to the fireplace and setting the plane in a gentle climb, I crawled out over the top wing and dropped on to the cowl over the motor. Placing my sensitive ear against the exhaust pipe, I listened. Sure enough, the motor was not firing at all. As I was falling all the while, I had to do something quickly. Evidently the spark plugs were not firing, or something. I

sat down upon one of the pontoons to think. Here was I, a famous trouble-shooter, unable to shoot the trouble! Wait, there was an idea! Why *not* shoot the trouble? I grasped my rusty—er, trusty .45 and climbed back to the motor.

I quickly twisted out all the spark plugs and piled them on the propeller hub. Then, inserting the muzzle of my automatic into a spark-plug hole, I pulled the trigger. There was a terrific report and the prop slowly began to turn. The bullet had pushed down the piston, in place of the exploding gasoline. I quickly removed the gun and inserted it into the next cylinder and pulled the trigger. The prop spun faster. I did this all the way around the motor and soon the prop was again turning as rapidly as ever. This required some agility, but I became used to it and presently I could do it with one hand free.

With my free hand I dismantled the ignition system and repaired the generator, keeping the motor turning at top speed with my automatic in my other hand. With the generator repaired, I was soon on my way. Once more Major Hunt, master trouble-shooter, had crashed through in typical fashion.

Prizes for Mistakes!

1—Each month Bill Barnes-AIR TRAILS has printed one picture and story to test your knowledge of aviation conditions and aerodynamics.

2—PRIZES are awarded monthly for the entries listing the highest number of errors and contradictions in the picture and the story of Gullible's Travels. The First Prize will be \$5.00. There will be 5 prizes of \$2.00 each; and 5 of \$1.00 each. In the case of ties, duplicate prizes will be awarded.

3—List the errors you find in the picture. Then list the errors of fact contained in the story. Then check the story and picture for contradictions. A

contradiction and an error on the same item may be counted separately.

4—This puzzle will serve as a game. It will be fun, but at the same time it will test the knowledge you have gained by reading Bill Barnes-AIR TRAILS.

5—All entries must be neatly written (or typed) on one side of the paper only, listing only one error on each line. Number your errors in the left-hand margin 1, 2, 3, etc.

6—Address your answer to the:
December Contest Editor
Bill Barnes-AIR TRAILS
79 Seventh Avenue, New York, N. Y.

7—The Editors will be the judges and their judgment will be final.

8—No entries will be returned.

9—All entries must be postmarked not later than midnight, December 15, 1936.

10—Prize checks will be mailed not later than January 15, 1937.

11—Every one is eligible to compete except employees of Street & Smith Publications, Inc., and their families.



The MODEL WORK- SHOP



Conducted by

Gordon S. Light

WHEN model building once takes hold of you, it never releases you from its clutches. With each new model you build the grip gets tighter, and after a few years you're completely beyond saving. This in itself isn't bad. But after a short exposure to the art you contract a disease known as "model madness." Queer actions and strange doings are its symptoms. Usually it affects you to such extremes that neighbors, alarmed by your queer ways, are prone to shake their heads and sadly mutter, "Poor fellow!"

We've done our share of crazy things. Flying models at night by the light of a lantern and flashlight, rushing out of the house immediately after a rainstorm to launch hydros from the pools of water collected in the streets, and getting up at dawn to fly models in the calm air are only a few evidences of how this disease has affected us.

But we've never been as seriously affected as some of the other members of the modeling clan. For example, Art Snyder hitch-hiked across the country from Burbank, California, to attend the 1933 national contest in New York City. An even more famous hitch-hiker is John Dilly of Galt, Ontario. He's been to contests at Akron, St. Louis, and New York via the thumb route. But John is slipping. The last contest at Detroit was near his home, yet he turned "softie" and came by automobile.

But "model madness" takes a variety of other forms. John Romanowski rode his motor cycle from Newark to Akron for the 1934 contest. Near the Pennsylvania-Ohio border he ran into a hard rainstorm. When he emerged from the storm, he had lost his pack of baggage. It might be added that Romanowski was seen in the same shirt throughout the contest, and no questions were asked.

Model Madness

But his famous ride was overshadowed the next year by that of Ben Shereshaw, director of the Kresge Aero Club of Newark, New Jersey. He and Mrs. Shereshaw rode a thousand miles to St. Louis on a motor cycle. Profiting by Romanowski's sad experience, they kept a firm grip on their baggage.

The night before any big contest you can determine exactly how crazy the modelers really are. The relatively sane builder will stay awake until midnight tinkering with his models. The "goofier" ones will work on their ships through the night, finally turning in at about 5 o'clock for a few hours' sleep. But then there are a few builders, too crazy to classify, who work through the night without a wink of sleep.

The most pathetic case I heard of was that of an entrant at a national meet who worked all night finishing his models. About 7 in the morning, on the day of the contest, he had everything ready. So he lay down for a short nap before leaving for the field. He awakened from his "nap" late in the afternoon, and was barely able to turn in an official flight before the contest ended.

A mass demonstration of "model madness" was exhibited recently at a contest we helped to direct. Friday night, before the fateful day, all the Eastern States were soaked with a hard, steady rain. To make things even more dismal, it was still raining hard the morning of the contest. Yet 70 entrants left home in the heavy rain and drove distances of 50 to 150 miles through the rain to the contest. Their faith was rewarded by clearing weather about two hours before the events started. But even if the storm had continued and the contest had been postponed, this same group of builders would have come again a week later. And they would have come even if it had been raining.

The Contest Calendar

INTERSTATE MODEL MEET, Fort Lauderdale, Fla., Nov. 28. Scale, stick fuselage, and gas-model events, in junior and senior classes, to be held at the Municipal Airport. Information and entry blanks from August Burghard or E. R. Heimbürger, Fort Lauderdale, Fla.

The Model Workshop asks the aid of readers and clubs in developing for their benefit a complete, detailed report of all model contests and exhibitions, large or small, everywhere. Listings should be received by The Contest Calendar, AIR TRAILS, 79 7th Ave., New York City, at least two months in advance; news of winners and results as soon as possible.



Arctic Flier

The long-winged Russian plane on the cover comes to America in an unusual flying scale model

by Alan D. Booton

AND now let us see what we can do with a flying model of the A.N.T. 25. The most noticeable feature is the high-aspect-ratio of the wing which, in relationship to the seemingly conventional fuselage, would cause most model builders to think twice before attempting a flying model.

The A.N.T. is of all-metal construction, chrome aluminum and steel, covered with 24ST, so in the model we will try to conform with the all-metal appearance by using all-balsa construction. Since the trend of large planes is toward the all-metal type, why shouldn't we use a medium to reproduce the miniatures to be the envy of the large planes? The

A.N.T. all-balsa construction is really quite simple, if care is taken with the consecutive steps of building. Ready to fly, the model weighs less than 2 ounces.

Read the instructions carefully and study the drawings before starting the model.

FUSELAGE

The first step is to make a $\frac{1}{8}$ " thick sheet of ply balsa 4x6" to provide formers. Weigh it down and let dry at least for an hour.

The cowl is made from a block and extends from the nose block to $\frac{1}{2}$ " back of the center-section spar. Transfer the over-all side-view outline (less windshield) to the side of the block, then cut the outside portion away. Transfer the top view to the top of the block and cut

again. If carving is difficult for you, make cardboard templates to fit the outsides of sections 1—4 on drawing #4 to use as the cowl is carved. Sand the cowl and then hollow it to the approximate sections. Carve a nose block to fit the cowl and insert a bearing tube to have the proper down-thrust.

Mark the former locations on the two side longerons and cement them in slots on the cowl. Arrange them so they will dry parallel and on the center line.

Cut out of the plywood sheet a pair of each of the formers, 4a—8, and cement them together. Former 9 is cut out of $\frac{1}{8}$ " sheet balsa, and is equipped with the rear hook, as shown on drawing #2.

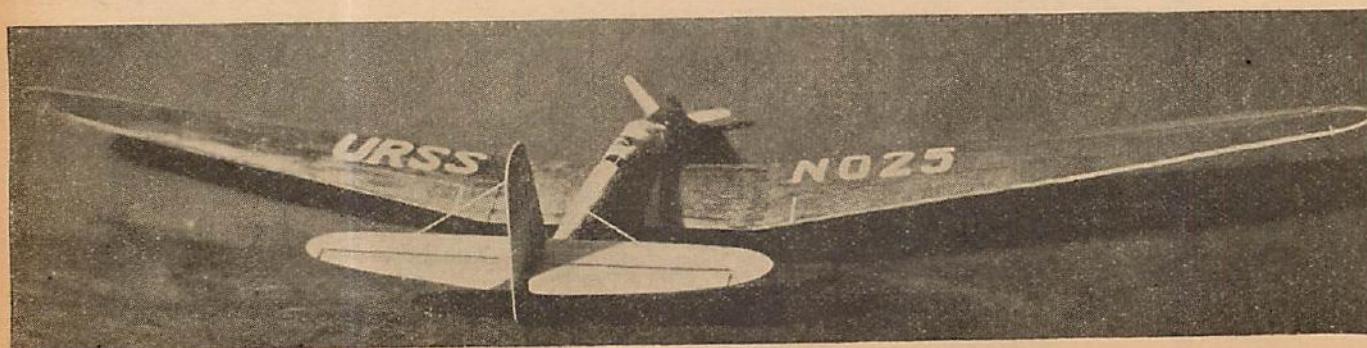
Start with former 9 and cement the formers to the side longerons toward the front. When dry, add the top and bottom longerons.

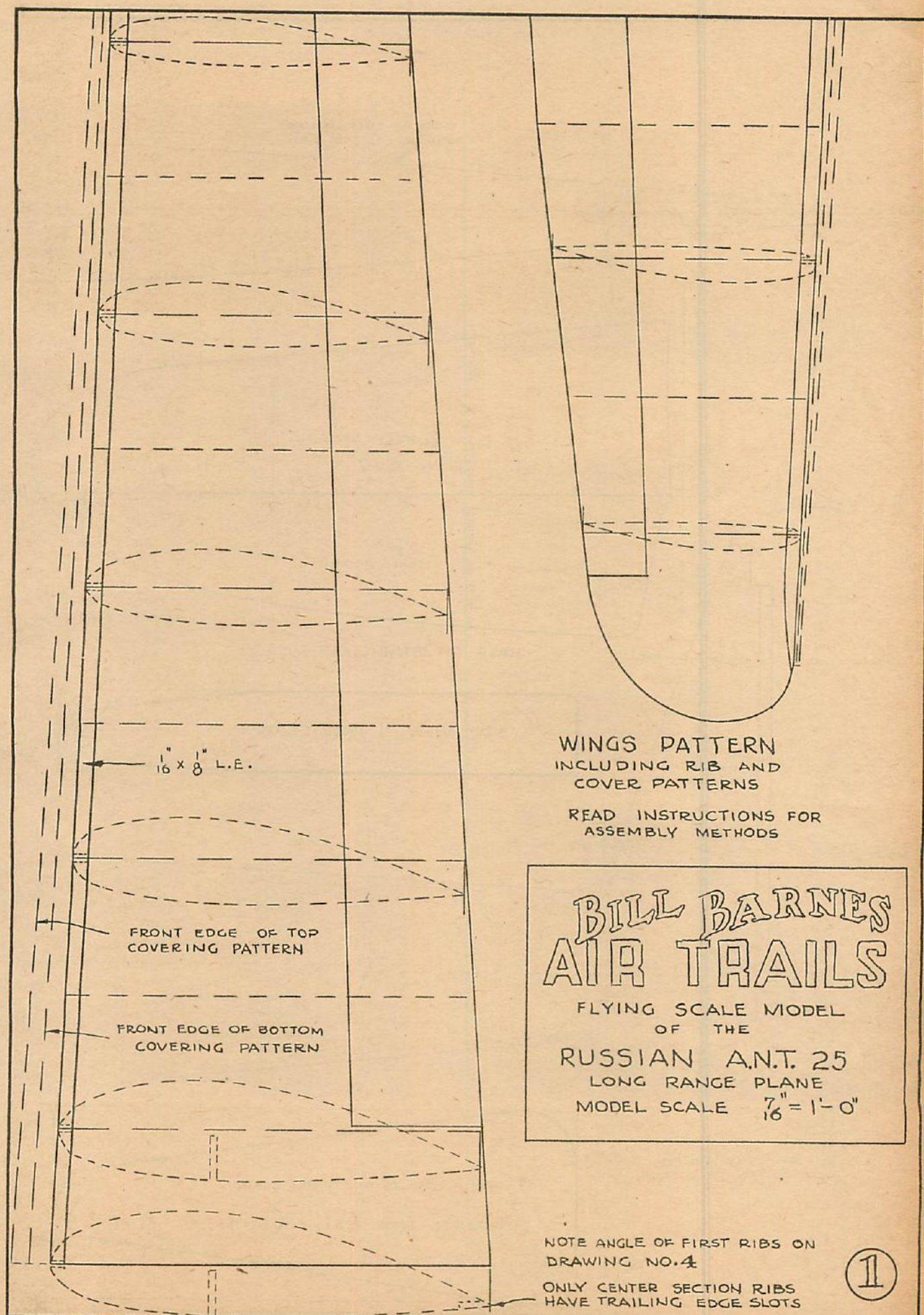
Now comes the job you may think difficult. Instead of using tissue, cover the fuselage with $\frac{1}{64}$ " sheet balsa. Cut a trial pattern for one side out of paper, starting at former 4. The two balsa patterns are then cut and cemented on, working back to 9. Apply cement to each former and longeron as you proceed. Rubber bands and pins are a great aid in holding the balsa patterns in place. Check up at each former to see that the frame has not warped out of line.

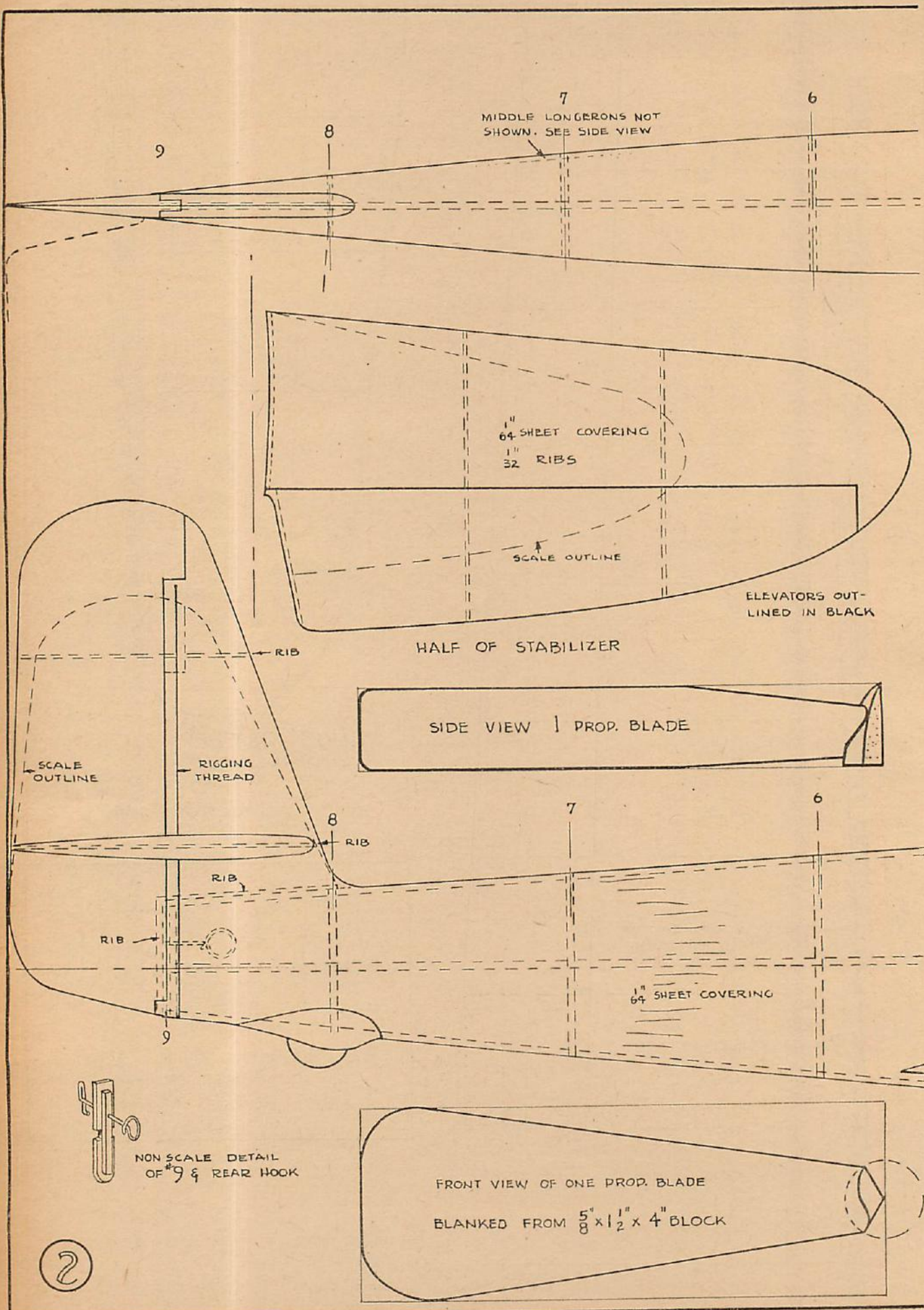
Note: the fuselage side patterns can be pre-curved by rubbing a thin layer of cement on the inside of each.

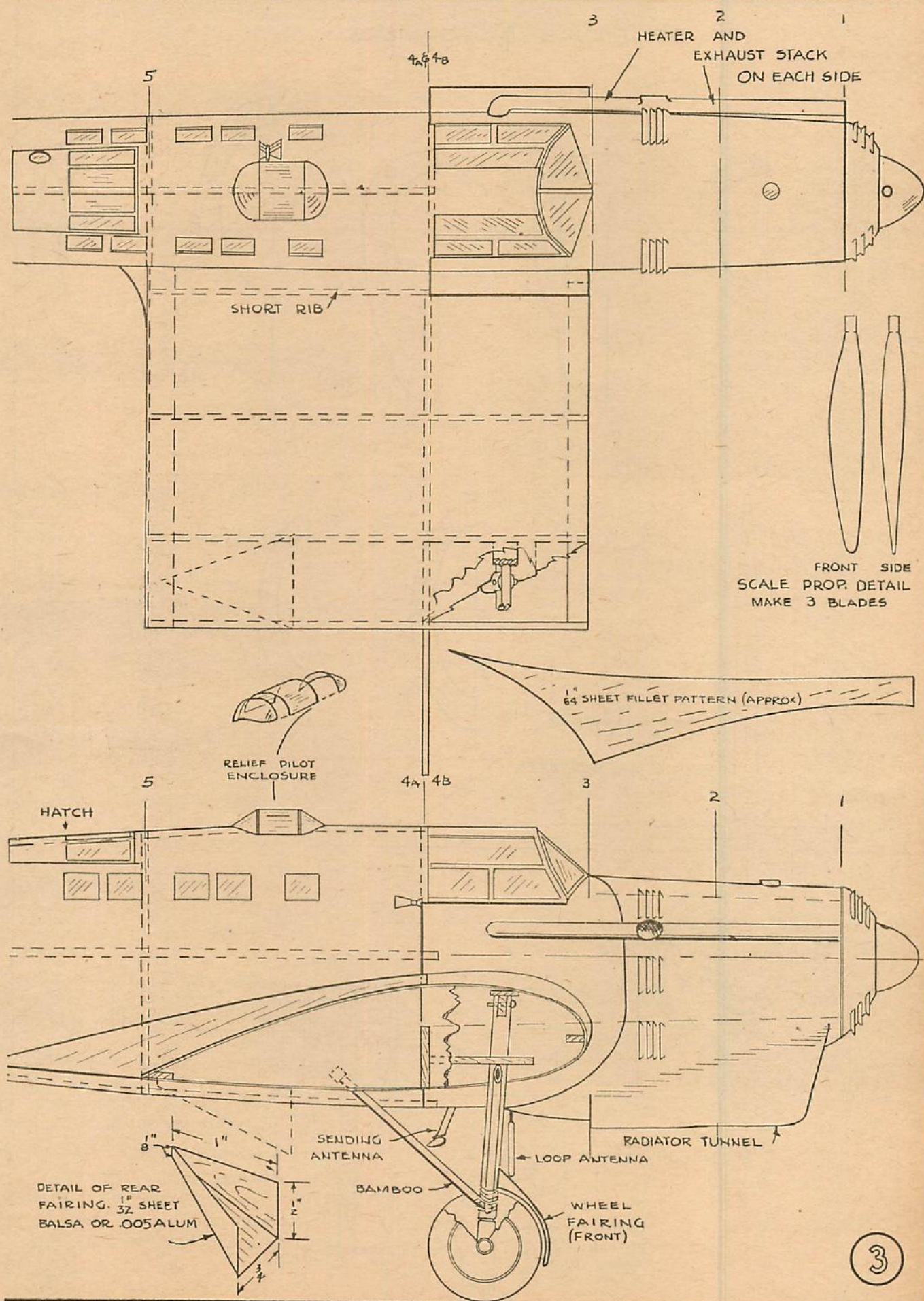
The center section is made integral (Turn to page 96)

A.N.T. 25

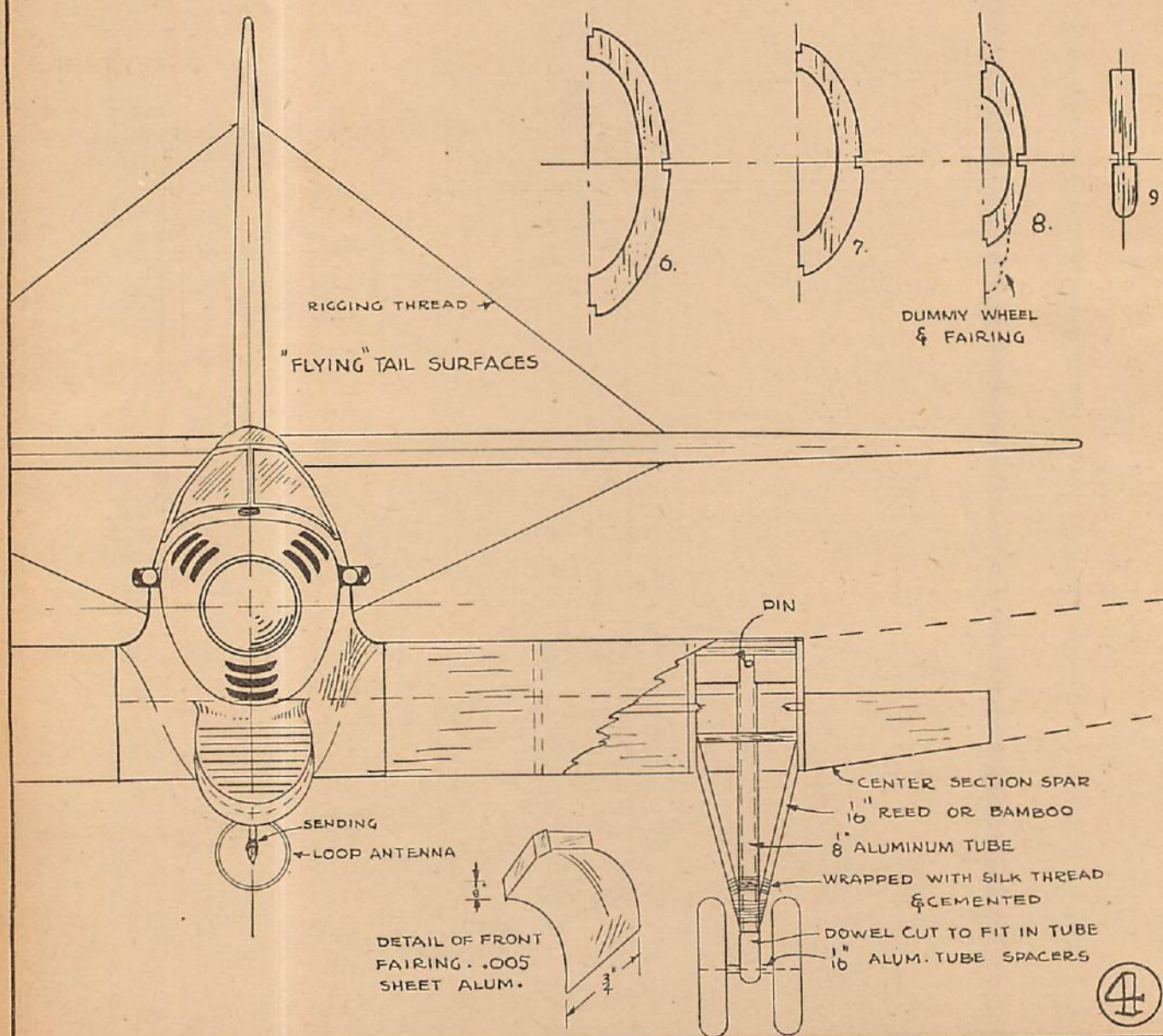
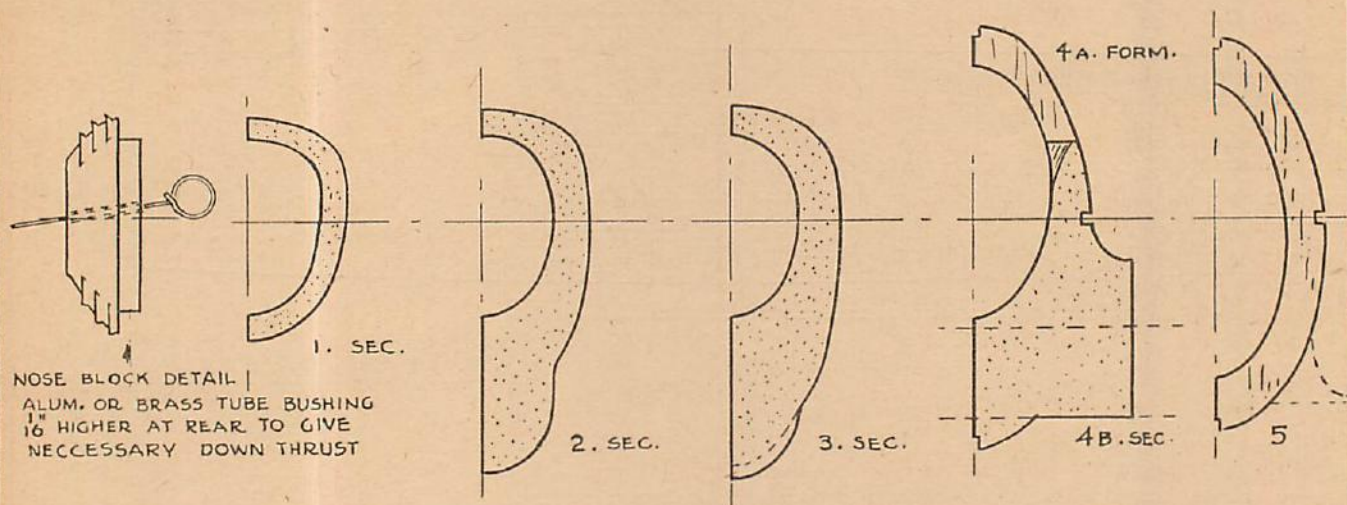








SECTIONS & FORMERS



Electra, Junior

(Continued from page 33)

bility for the pilots. The retractable landing gear operates by hand.

The double-fin tail scheme incorporates fixed fins and stabilizer, and two statically and dynamically balanced elevators and rudders. The elevators carry controllable tabs.

There are four fuel tanks, two being installed in each wing. Also within the wing, toward the tip, are two retractable landing lights which lift into the lower surface when not in use.

Standard equipment on the Wasp Junior engines are two Hamilton Standard two-way controllable-pitch propellers. Constant-speed props, if fitted instead, produce an increase in take-off run and other details of performance.

Lifting well over a ton and flashing high up along the airways at 231 m.p.h., the Lockheed 12 represents another step forward for American air transport. Although a few two-engined ships abroad, notably the Heinkel He III and the Bristol 142, claim a higher top speed, they use considerably more horse power than the Lockheed 12. American transport speeds in general already average much faster than those of other countries, and with the 12 added to the roster of U. S. speedsters that already includes the Vultee V-1A and the Douglas DST, we will move even further into the lead.

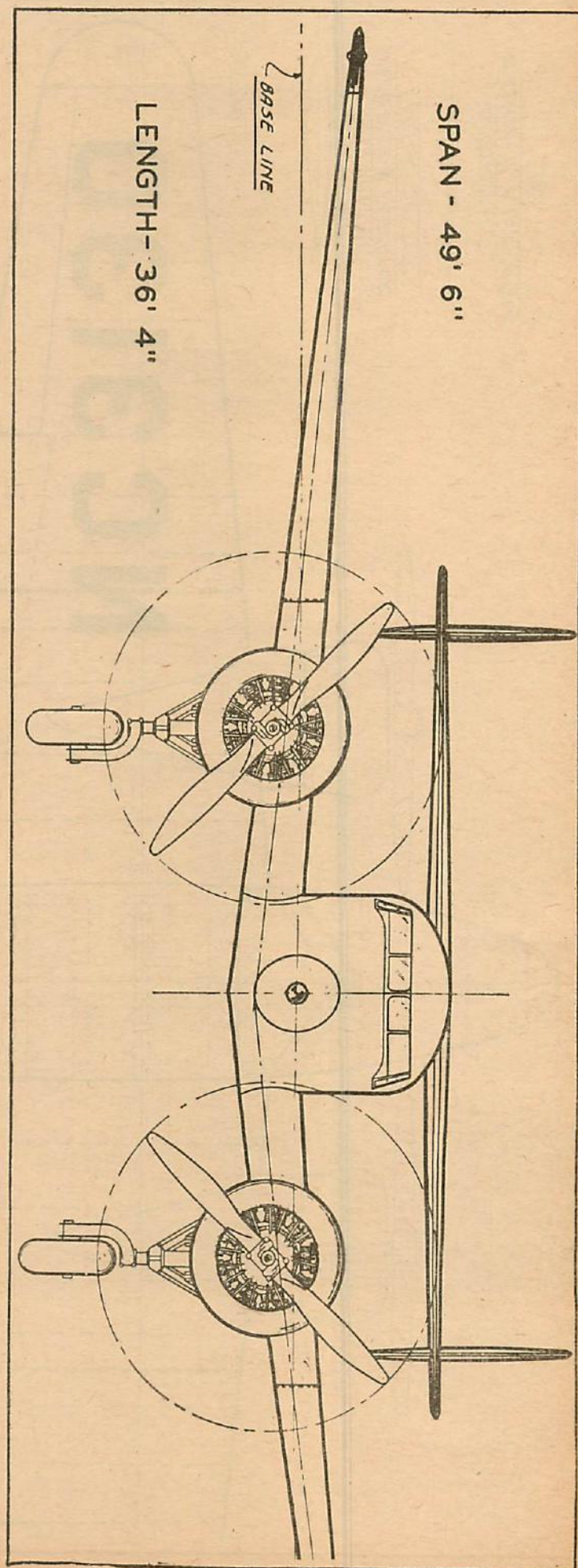
LOCKHEED 12

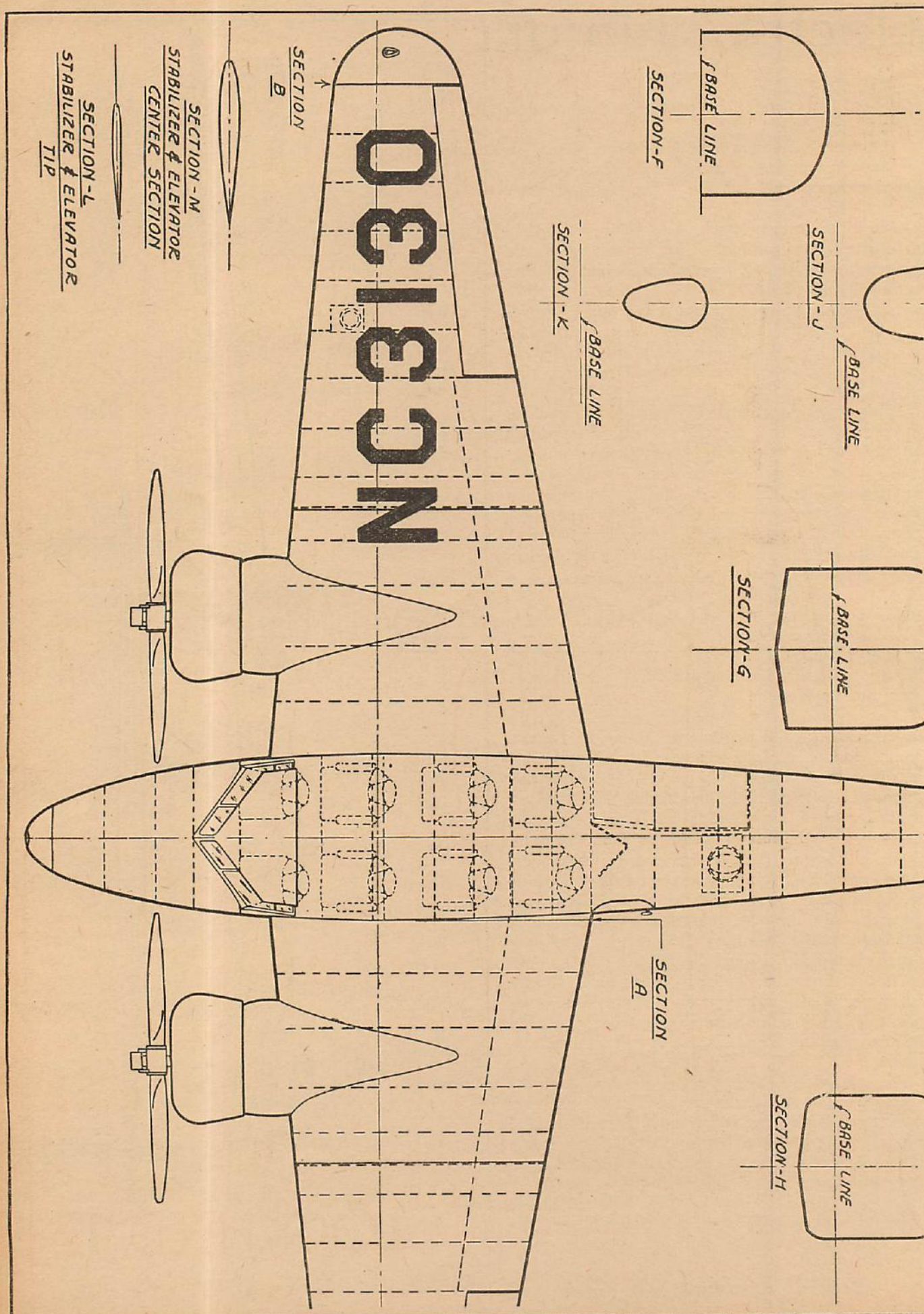
Much of the success of the 12 is due to Lockheed's experience with the well-known 209-m.p.h. Electra. Three years of research, testing and hard day-by-day service with the bigger ship pointed the way to successful development of the new model. Electras have made Lockheed one of the busiest and most rapidly expanding of the aircraft plants on the west coast. Some 70 Electras are in service for private fliers and American and foreign air lines, and a total of eleven more were on order at the Burbank, Calif., factory on June 1st of this year. Amelia Earhart's special \$65,000 "flying laboratory" model got newspaper headlines when it emerged this fall.

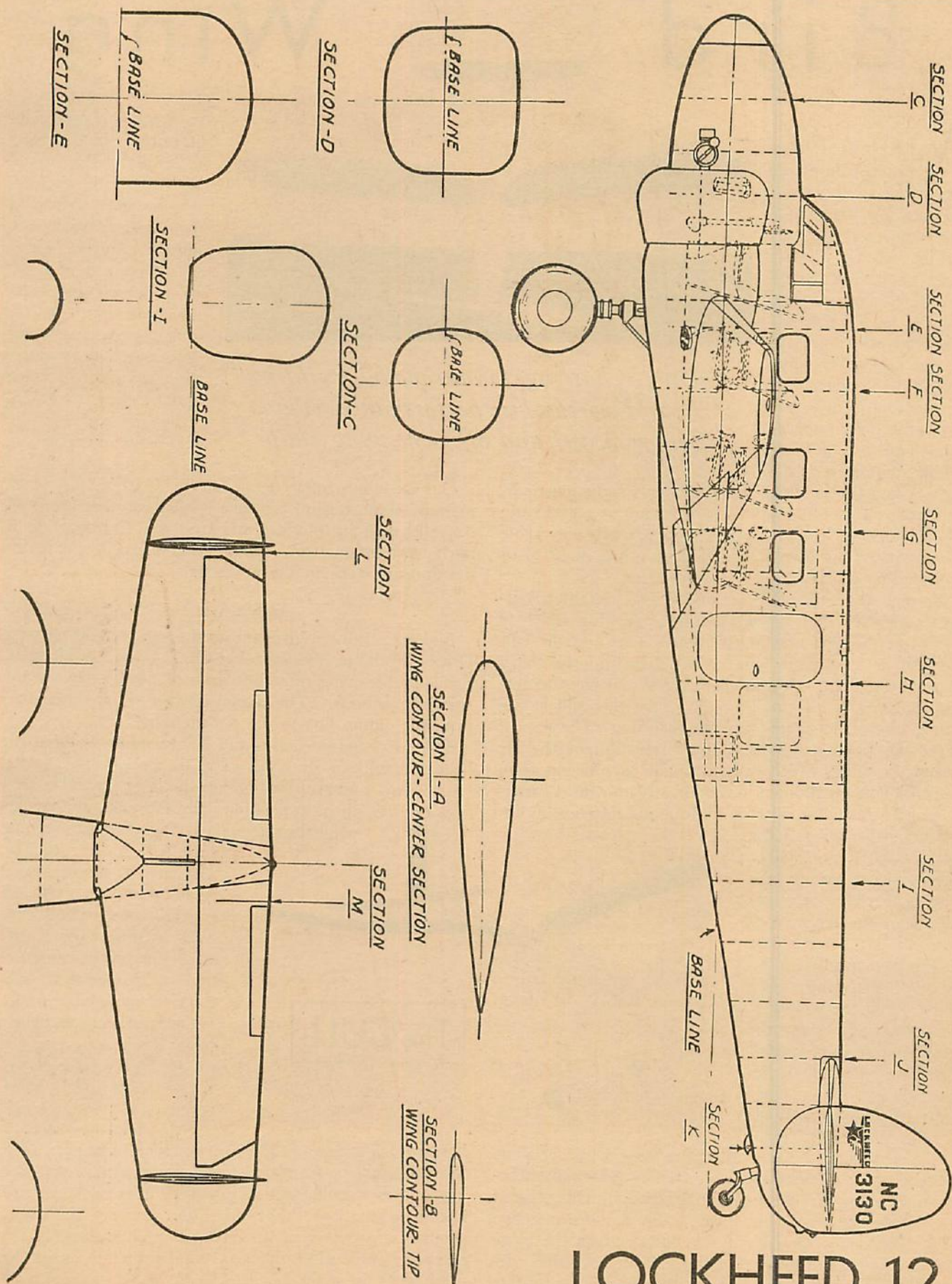
Another transport, similar in design to the Electra but larger in all dimensions, is now on the drawing boards and will be introduced early next year. To be known as the Super-Electra, it will be a 12-passenger job.

We can expect, therefore, to see next year the spectacle of three sizes of the same plane parading our airways—a sort of aerial counterpart of the little bear, the medium-sized bear and the big bear of the fairy tale. But unless Lockheed hangs a lot more horse power on the leading edge of the Super-Electra's wing, the little Electra—the Lockheed 12—is going to lead the parade when it comes to the matter of speed.

Official Lockheed Co. plans appear on following pages.







LOCKHEED 12

Scale: $\frac{1}{4}$ "—1"

Bird Wing

WHAT is the most efficient wing shape? Is it a taper wing, gull wing, straight wing, long, narrow wing, or short, stubby wing? Each modeler has a wing type he thinks is most efficient, and each is convinced his choice is the best. It takes only the slightest suggestion to start a group of builders arguing about wing shapes.

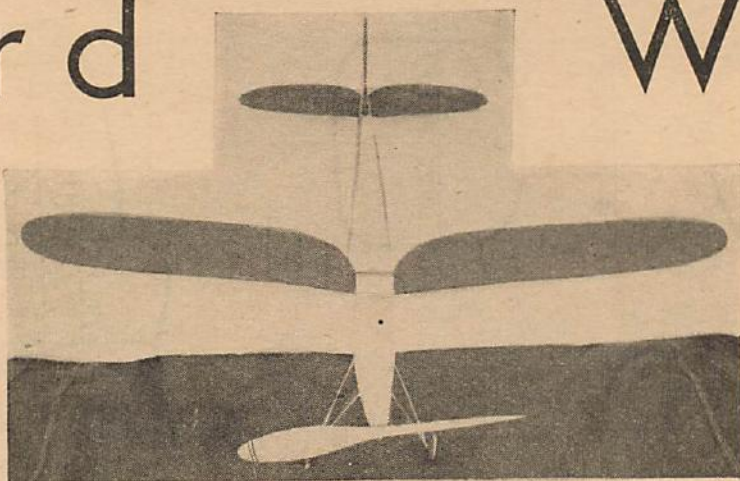
This month we present our favorite candidate for the honor of the most efficient wing shape. It's a gull-shaped wing of aspect ratio 10—a value which falls between the extremely low value of 6 advocated by some and the higher values of 12 to 14 supported by others.

We picked a gull wing because it has certain advantages over the other types of wings. A wing which is tapered at the tips and at the center shows better efficiency than a straight wing which has uniform chord length throughout. A straight wing shows considerable drag and also a loss in lift both at the tips and at the center, where the wing joins the fuselage. The loss of lift at the tips results from the circulation of the air around the wing, which causes the air to spill out from the end. This breakdown in the air stream causes turbulence and a resulting increase in drag and decrease in lift.

Where the wing joins the fuselage there is likewise a let-down in the wing's efficiency. This results from interference between the air flowing past the fuselage and that moving over the wing. The result is that the section of the wing adjoining the fuselage shows marked increase in drag and decrease in lift.

There are two methods of improving the efficiency of this section. One is to fillet the wing where it joins the fuselage. These fillets make the transformation between the wing and the fuselage gradual and smooth out the airflow, thus reducing drag. But a more effective way of reducing the interference is to taper the wing where it joins the fuselage. Drag and lift both show desirable changes following a reduction in wing chord at the wing-fuselage junction.

In contrast to the desirable aerodynamic characteristics, the gull-shaped wing is undesirable from a construction viewpoint. The taper at the center makes it difficult



There's a challenge to your model-building skill, and worthwhile performance reward in this graceful and efficient wing shape.

to build in sufficient strength. If the wing is externally braced with struts, the problem is simplified, but in a cantilever wing it is a difficult problem. Likewise the shape of a gull wing doesn't lend itself to easy construction, the curved portions proving difficult. Fortunately these two construction problems are not as difficult in models as in real-plane construction, so let's try the Gull.

Our model proved to be a good flier. It was not meant to be a contest ship, but one which can be flown repeatedly with little effort and trouble. Construction is fairly conventional and the instructions will emphasize the unusual steps in the procedure.

FUSELAGE

Making a full-size drawing of the side is the first step. Draw the datum line and lay off $2\frac{1}{2}$ " spaces along it. From the drawing find the depth of the fuselage at the various positions. The dimensions given are measured from the datum line to the outside edge.

The two fuselage halves can be assembled without the help of a full-size drawing. Cut the cross braces to the length given in the top-view plan and cement them in position. Pin the fuselage together while the cement is drying. Check to see that each half is bent equally. The upright pieces should be at right angles with the cross braces. Check this with a square or a triangle, for proper construction will insure an efficient, rugged job.

The rear tip is cut from a balsa block and cemented to the ends of the long-rons. This block is tapered to a point to round out the fuselage shape.

Hard balsa $\frac{1}{4} \times \frac{3}{8} \times 23$ " is used for the motor stick. The balsa nosing cemented to the front serves as a bearing for the propeller and as a means of securing the stick inside the fuselage. For this latter purpose the nosing should be grooved to fit. The rear stick support is a notched double piece of sheet balsa cemented inside the fuselage at the point labelled A—A.

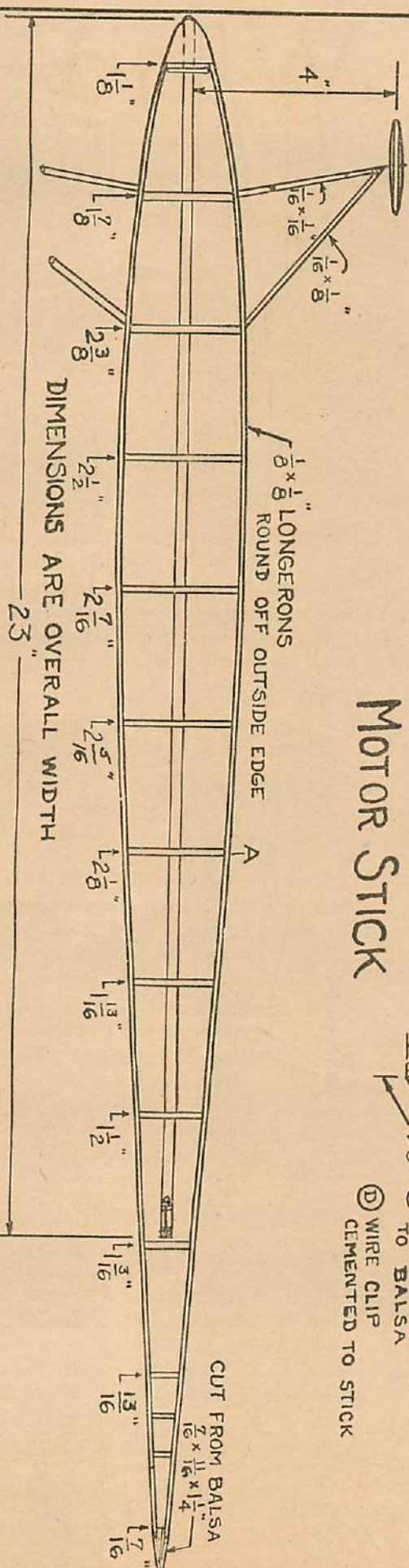
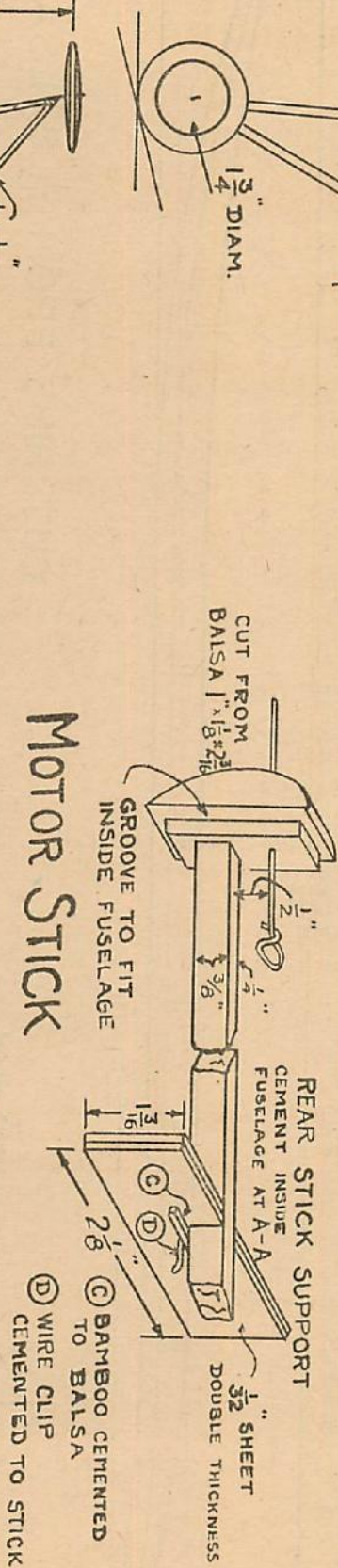
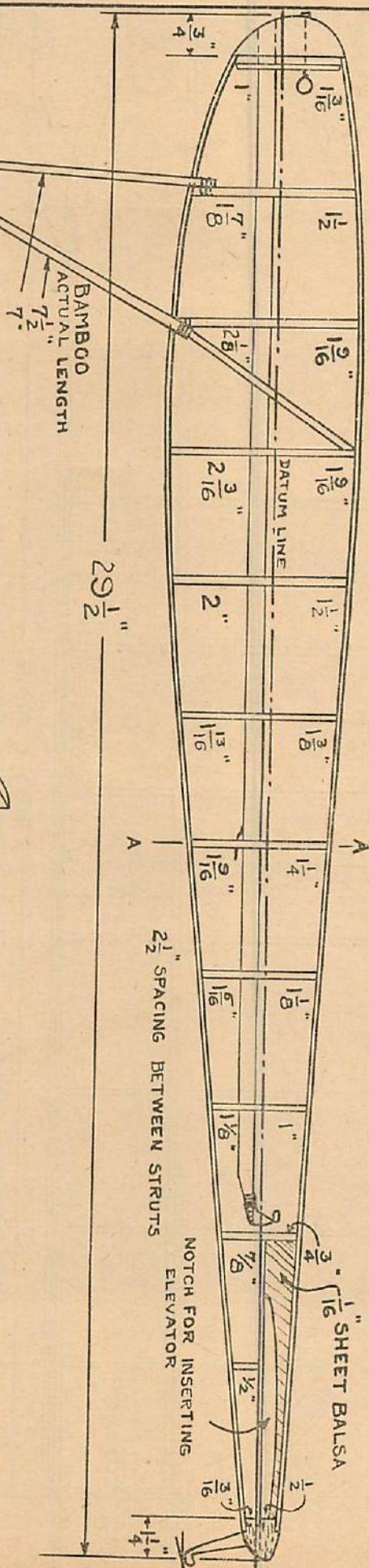
LANDING GEAR

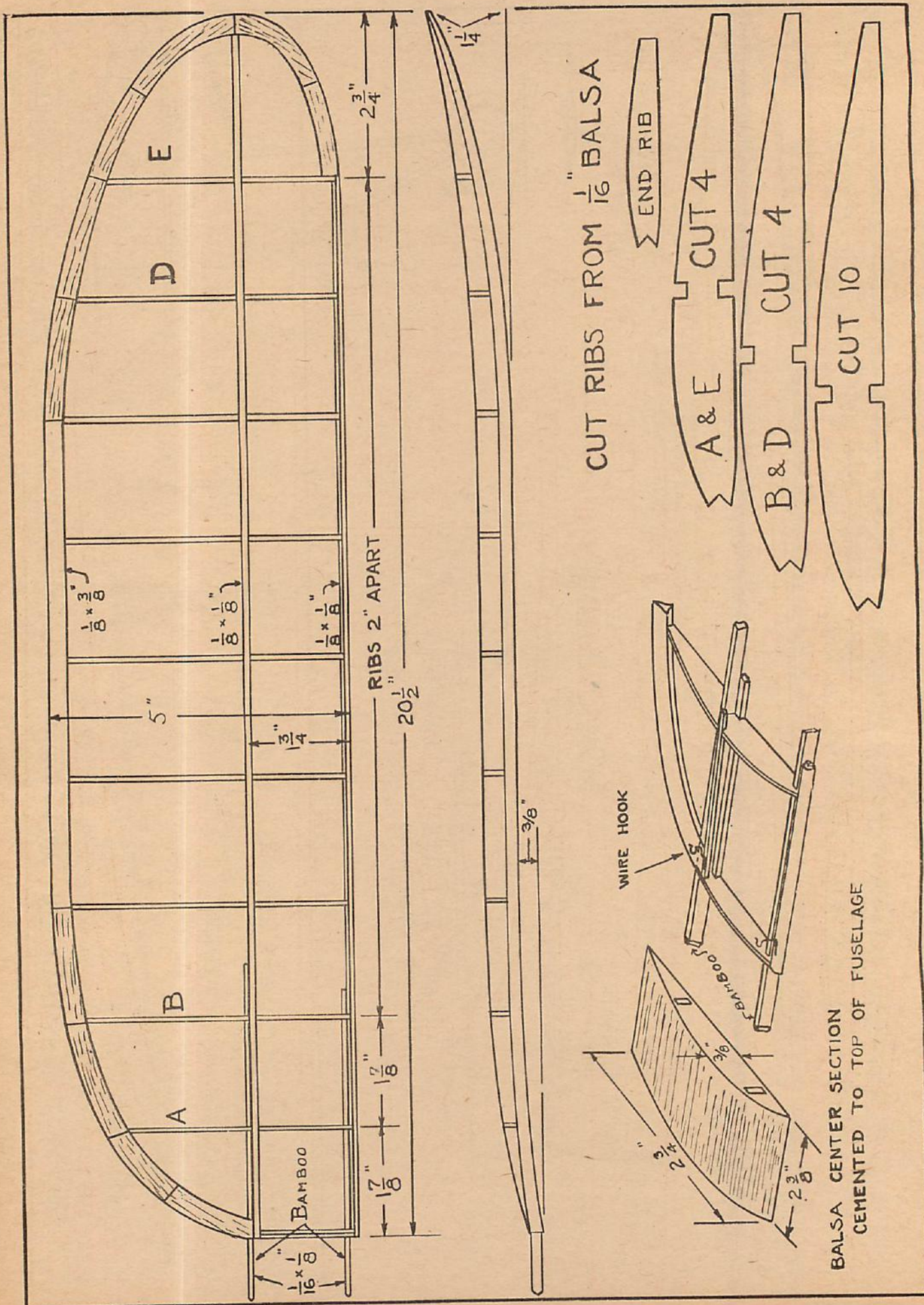
Each half of the landing gear consists of a V made up of two bamboo struts, which are cemented and threaded

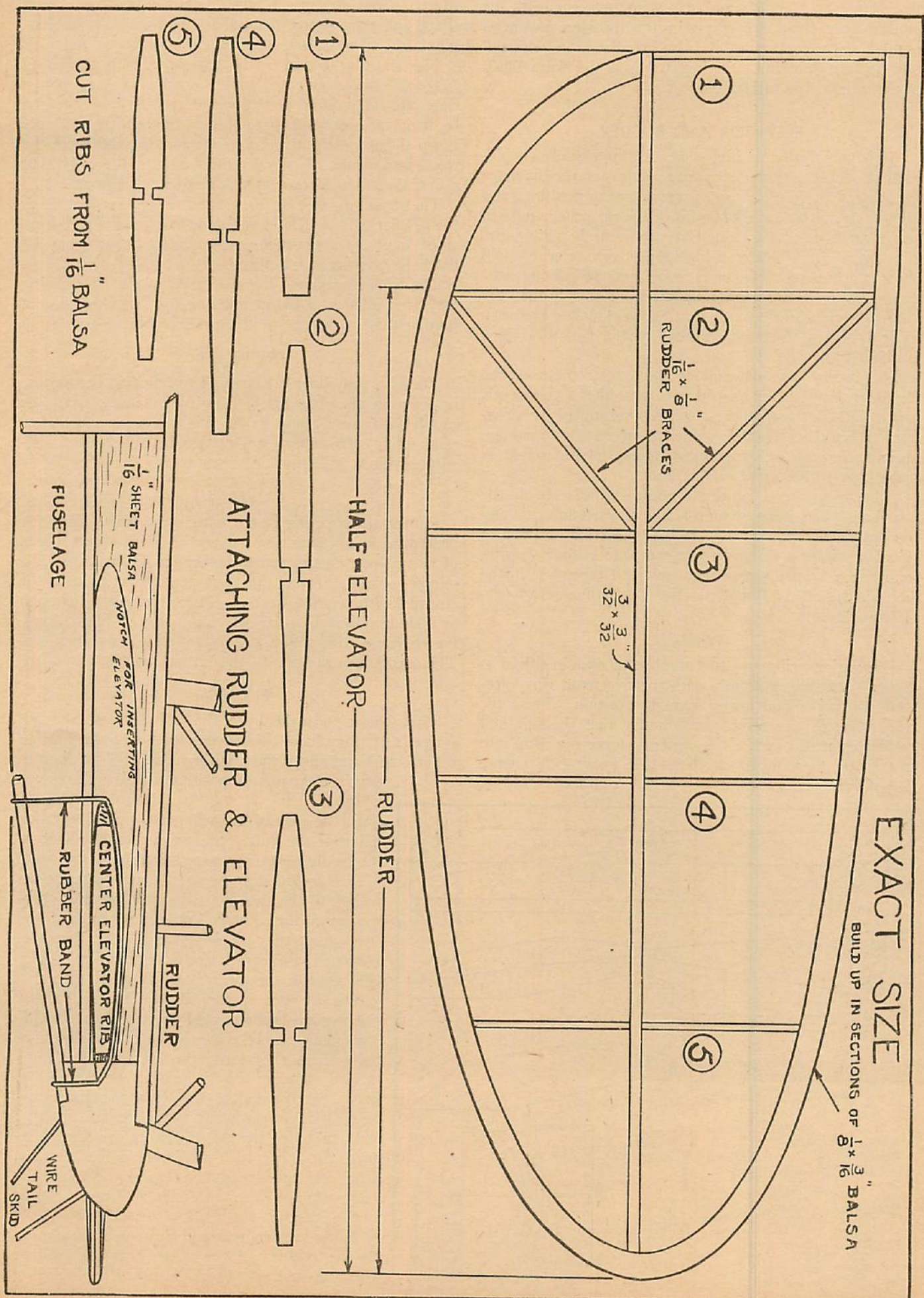


The GULL

DIMENSIONS GIVEN ON SIDE VIEW ARE MEASURED FROM DATUM LINE TO OUTSIDE OF FUSELAGE







The Discussion CORNER

The model art progresses through exchange of ideas. The Discussion Corner is a monthly sounding board for your opinions. This month readers discuss contest rules. For January, the subject is age classes. Other topics are listed below. Think about them, then write your opinion in 150 words or less and send it to The Discussion Corner. One dollar is paid for each answer printed.

OFTEN where thermals are present, winning ships are those which stay in sight for the greatest time, not necessarily those with the greatest duration. Luck decides. I feel, therefore that the N. A. A. wing-loading of 1 ounce to 50 square inches is insufficient. However, the once-attempted rule of 1 ounce per 25 seems too stiff for rubber-powered jobs. I would advocate a moderate loading of 1 ounce for $33\frac{1}{3}$, or 3 per 100. With this loading, one flight would be sufficient to determine the winner.

It is possible that there are wizards of design who lack building ability, but whose theories are valuable, nevertheless. Therefore I consider a test on theoreticals worth while, if well conducted and kept subordinate to the flying events.—ARTHUR LESSELBAUM, New York City.

The best of three flights should count. One or two bad flights would not eliminate the builder, as he would still have a chance to repair his model and turn in a good flight. The present weight rule of 1 ounce for 50 square inches should not be increased. Beginners find trouble in getting heavy models to fly properly. For the experts, 6 ounces should be the maximum weight for contest models.

I would like to see organized discussion on modeling because many builders would benefit from the material presented. Personally, I learned a great deal from the October discussion on demountable or fixed motor sticks. Contest discussions would be even more helpful.—TUCKER CRENSHAW, Richmond, Va.

I would like to see a weight rule involving the weight of the rubber-powered model and amount of rubber used, instead of weight and size. It would reduce the luck element. Also, I favor the average of three flights.

I believe organized discussion would not be a very intelligent addition to contests. The discussion could not be long enough for good or substantial thought. Also, in every science we have more theory than we can practice. Discussion would merely give modelers that much more material that they would be unable to use.—JAMES JOHNSTON, Brandon, Manitoba.

Since 1 ounce for 50 square inches is average weight for a reasonably sturdy model, the present outdoor rule is about perfect. Quite a few good outdoor builders never enter indoor contests except in the glider event. For indoors, therefore, a weight event of say 1 ounce for every 100 inches should prove popular, interesting, and more sensible to many than frail microfilm jobs.

Luck decides so many contests, why not give the ship its maximum turns and let it go, rather than worry about having the time divided by three if the ship is lost on a short first flight?

Discussion, with experiments to demonstrate, would help every one, especially the novice with few model-building acquaintances.—TED TEFFT, White Plains, N. Y.

This Month's Topic

What weight rules would you like to see adopted for contests? Should the best flight or average of three flights be taken? Would you like to see an organized discussion on modeling as one of the contest activities instead of confining the program to competitive flying?

Doubling the weight rule would help greatly to eliminate luck and give every one another chance at new records in every event. It would also give the heavier streamlined balsa-covered ships a chance at records taken by minimum-

weight ships which make 15, 25, and 41 minutes on light thermals. The best competition for all-around performance is the three-flight average. The ship must be consistent, dependable, and should stay over the field.

For the model builder who plans an engineering career, discussion of current problems would give splendid training, for he should be able to use his tongue as well as brains and hands. Model builders should find it instructive as well as interesting.—JOE BLOOM, Roxbury, Massachusetts.

COMING UP are these topics:

For February—*How much gas should be allowed each model for contest flying? Or do you favor discarding the present idea of maximum duration and substituting controlled flight in which the model would be judged on ability to land near a designated spot plus flying characteristics and appearance?* Answers must reach us by December 1st.

For March—*To what extent should a model be streamlined? Is careful attention to "cleaning up" the smallest details justified by improved flights?* Answers must reach us by January 1st.

One Thousand Horses

THE XF3F-2, latest development of the formidable Grumman shipboard fighters, is certain to prove a sensation when accepted for service. Powered by the new 1,000 h.p. Cyclone, the most powerful single-row engine in the world, and combining great strength with maneuverability, this aerial bulldog qualifies as probably the world's fastest biplane fighter.

The construction, which meets rigid specification standards, is of metal, with fabric-covered wings and movable tail surfaces. The main landing gear is retractable, as is the tail wheel, and even the carrier landing hook. The higher horse power of the new Cyclone necessitates the three-bladed propeller. In keeping with the quality of the ship, the prop is the recently developed constant-speed Hamilton that provides maximum performance under all conditions. Tests of the XF3F-2 have yielded a high speed of about 280 m.p.h., and a landing speed of only 72.

This latest Grumman makes one of the most beautiful replicas ever to grace a shelf. Its generous but graceful lines distinguish it from the usual run of fighters.

Before starting construction, check your material sizes with the list given below.

The fuselage block is squared down to its required outside dimensions. On it draw the side view of the fuselage and cut away the excess balsa. On the top of the block mark the outside lines of the body and again shave off the surplus wood. Round the fuselage in accordance with the cross sections given. Since the cockpit can either be painted on, or hollowed out and covered with celluloid, complete that part of the fuselage accordingly. The wheel wells for the dummy retractable landing gear might also be cut out slightly to add to the realism. Hollow out the front of the cowl section of the block as well for the sake of better appearance. If your patience is equal to the job, half-round dummy cylinders may be cemented in place. The fin-

The latest version of a favorite navy fighter, using one of the powerful new engines, develops high speed

by William Winter

GRUMMAN XF3F-2

mountings are made from scraps. There are two triangles on each side of the landing gear. Both of them are hinged on the large plane. As the lower one is open, it may be made from wire.

Cut the wings to their required outlines from $\frac{1}{8}$ " sheet balsa. Shape them to the approximate rib section and sand smooth. Mount the upper wing first on bamboo center-section struts and then invert the model to facilitate the installation of the lower ones. Cement the lower ones directly to the fuselage block and form the fillets from wood filler or other moldable substance.

Make the outer struts from hard balsa, sand them, and cement them in place with the model still held in the inverted position. Do not attach the wires until the painting is completed.

The three-bladed prop is constructed of sheet balsa scraps and mounted on a pin so that it is free to turn.

Give the entire model a coat of clear varnish, white shellac, or clear dope to fill the wood pores. Paint the surfaces when dry in accordance with the color scheme on the plan and trim with black. Remember that the star insignia have red centers and blue backgrounds. If you are sure of your ability, the control surfaces, etc., may be outlined with a hair line. Install the wing and aerial wires of #60 thread.

The materials:

1 $5\frac{1}{4} \times 1\frac{5}{8} \times 1$ "
1 $\frac{1}{8} \times 2 \times 18$ "
1 $\frac{1}{8} \times 2 \times 6$ "
split bamboo
#60 thread

1 pair $\frac{5}{8}$ " wheels
wood filler
silver, yellow,
red, blue and
black paints

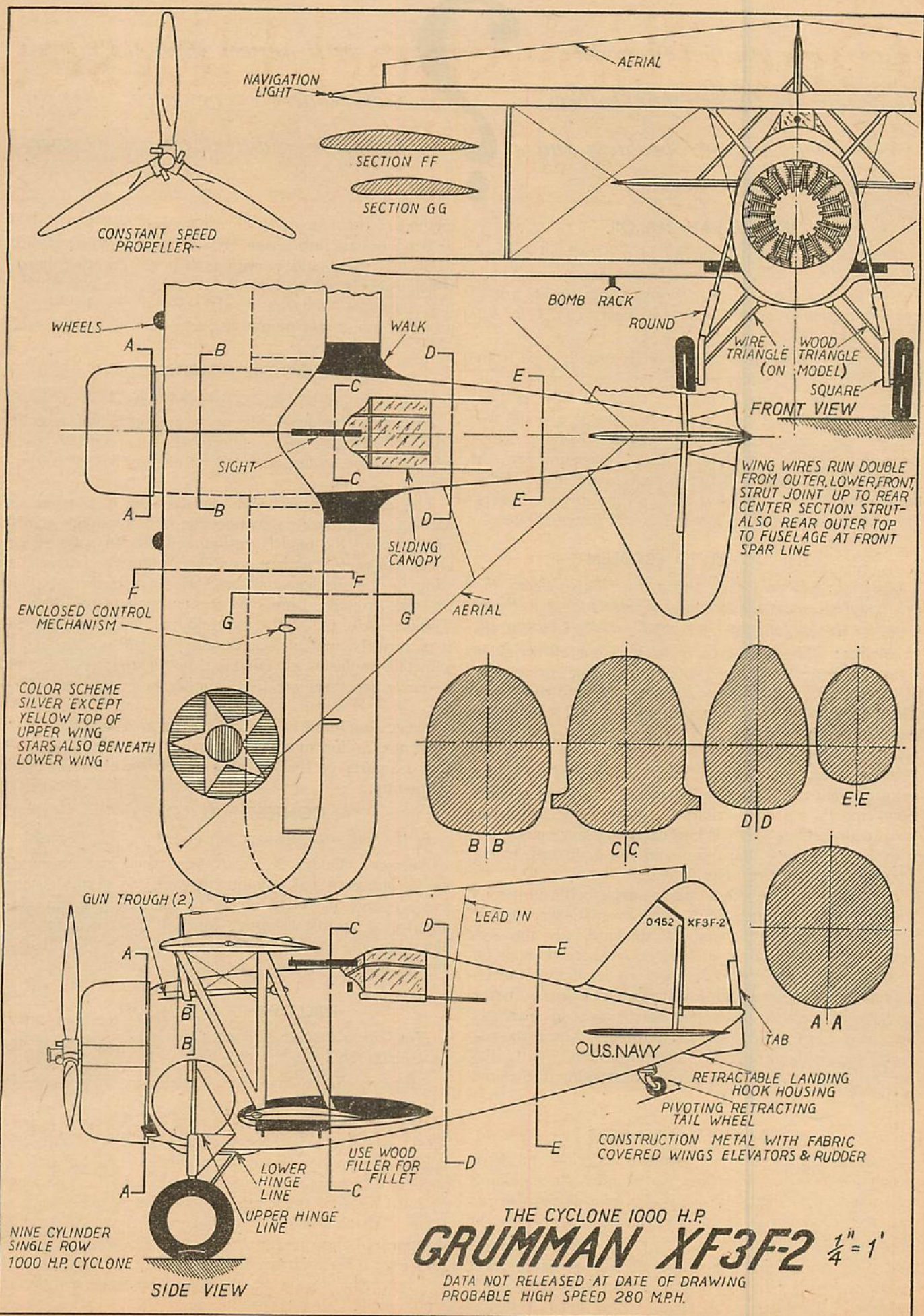
AIR TRAILS presents

The STOUT INTERNATIONAL TROPHY Winner

Authentic plans and instructions for building the New Zealand model flown at the Detroit national contest for 44 minutes 14 seconds!

by Gordon S. Light and Vernon Gray

Another Model Workshop scoop—in the January issue, on sale December 9th.



Have you a question on model building or flying that bothers you? Bring us your problem and



we'll answer it in the interest of readers everywhere. Replies by mail require return postage.

IMPURE BANANA OIL

Question: Recently I purchased a supply of banana oil from a local drug store and found that it would not "stick" the tissue to the wing frames. Is a special grade used in modeling or did I use it incorrectly? L. R., Tulare, Cal.

Answer: Drug-store banana oil is usually free from impurities, which, oddly enough, makes it useless for fastening tissue. The impurities found in less refined oil are what give it tackiness and make it a good adhesive. Use paint-store banana oil instead of the drug-store variety. It's considerably thicker and gummier. A good test is to "feel" it between your finger tips. If the banana oil is tacky and leaves a thin film on your fingers after drying, you can be assured it will fasten tissue.

THE COVERING PROBLEM

Question: Would you please describe in detail the best way to cover the wings and fuselage of a flying model—especially a round fuselage? A. P., Chicago, Ill.

Answer: The first step is to iron out all wrinkles from the tissue. Next give the entire framework a coat of banana oil. Allow this coating to dry into the wood. Then, when the second coat is applied, it will "stick" the tissue with little trouble. Remember that the tissue grain always runs lengthwise.

When covering the wing, "tack" the ends of the tissue in place with a few drops of banana oil while you carefully smooth out the wrinkles. Next fasten all loose ends with banana oil. Wherever necessary, paint the banana oil on top of the tissue and rub it through to the wood with the tips of your fingers.

A round fuselage necessitates covering with numerous small "patches" rather than with several larger pieces. Cut the tissue large enough to include only the sections between the fuselage formers. Where there is an abrupt change of shape of the fuselage, it might be necessary to cut the tissue into even smaller pieces. In the fuselage as well as the wing, use banana oil sparingly until you've smoothed out the wrinkles. Spray the tissue lightly with water. Use only light dope, or the tissue will be stretched excessively, destroying the round shape of the fuselage.

GAS-MODEL FUSELAGES

R. L. of Edson, Alberta, Canada, asks the questions which follow concerning gasoline models. In making a gas model, what material is usually used in making the fuselage framework—aluminum tubing, balsa strips, or spruce strips?

Answer: Aluminum tubing is difficult to handle, and is not worth the trouble, since it does not offer much increased strength over wood. The most common

method of construction is to use balsa wood. It is easy to bend or cut into shape and shows surprising ability to absorb shock and vibration. Spruce or other hardwoods were used exclusively in early gas models, but now only the "toughest" parts of the model, such as propeller and motor mountings, are made of hard woods.

MONOCOQUE CONSTRUCTION

What covering is used on the fuselage?

Answer: Japanese silk or a fine grade of aircraft fabric is generally used. Sheet balsa is applied to parts which require added strength or are subjected to handling.

The growing favorite in construction and covering methods is known as monocoque construction. Separate parts of the model are built up of thin balsa strips about $\frac{1}{8}$ or $\frac{1}{4}$ " square, running lengthwise along the wing or the fuselage. These strips are cemented edge to edge around formers to form a hollow balsa shell. The outside of the shell is carefully cut and sanded; when it is surfaced with a lacquer, it gives the impression of a metallic substance. In this way the construction and covering processes are tied together in an efficient manner.

Sheet aluminum has a limited use as a covering. Its chief use is for motor cowlings or inspection doors—that is, parts of the covering which must be removed frequently.

CONTEST FUEL LOADS

Is the gas supply given in contest models limited?

Answer: Under N. A. A. contest rulings, as much as $\frac{1}{4}$ ounce of gas (liquid measure) is permitted for every pound of weight of the model. Contestants usually feel it is just as much fun and that there is considerably less danger of losing their models if the gas supply is reduced to $\frac{1}{8}$ or even $\frac{1}{16}$ ounce.

FOLLOWING THE MODEL

How can a builder safeguard against losing his model on long flights?

Answer: Following a gas model in an airplane is the only sure-fire way of keeping after it! If it is not properly adjusted to remain over the field, it usually flies too fast or too high to follow by automobile. Of course, the builder's name and address should be on the model. It's surprising how few really stay lost. Sooner or later most of them are returned by people who find them. An example is Robert Long's model. His ship disappeared high in the clouds near his home in Reading, Pa. This was early in September. About the end of November it was returned to him by some hunters who found it in the mountains.

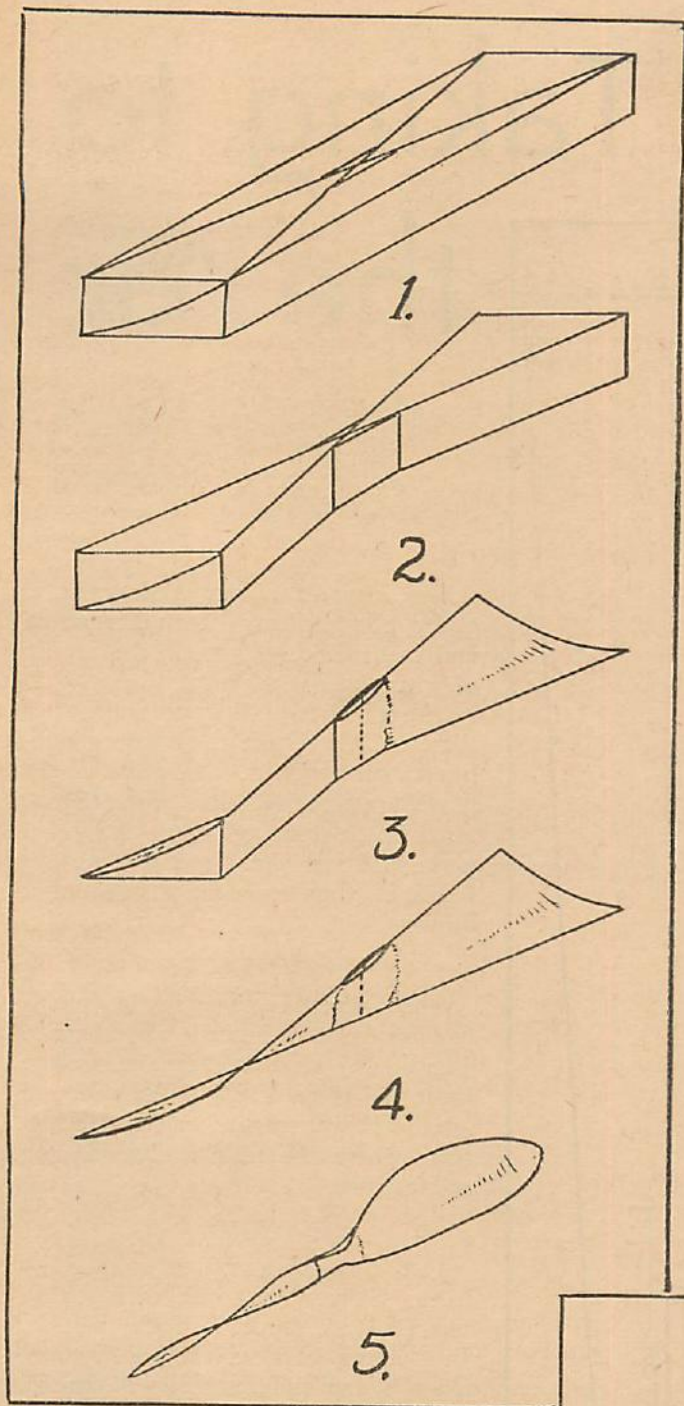
Indoor Props

They have to be good to produce long flights, and here's how to make them.

by Lawrence N. Smithline

models, prefers what is known as the helical-pitch propeller (which is true pitch, of course). A helical-pitch propeller is one whose pitch is at any particular point on the blade is exactly the same as at any other point. John Haw, senior fuselage-model champion, believes in an average-pitch propeller, that is, one which has more pitch at the tips than near the hub. His success with this type is well known. John Stokes, holder of most of the junior records, is an exponent of the true-pitch propeller that is not of the helical type. Such a propeller would be similar to the kind recommended by Gordon Light, that is, a lower angle at the tip than halfway out, but with the angles not varying helically. This evidence seems to indicate that which type you decide upon is merely a matter of taste.

After you have made your choice as to type, the next thing to decide upon is the pitch. Generally speaking, Class A models should have props of pitches between 10 and 20°, Class B, between 20 and 27°, and Class C, between 27 and 36°. Exactly what pitch to use is determined by: (1) the weight of the plane, (Turn to page 93)

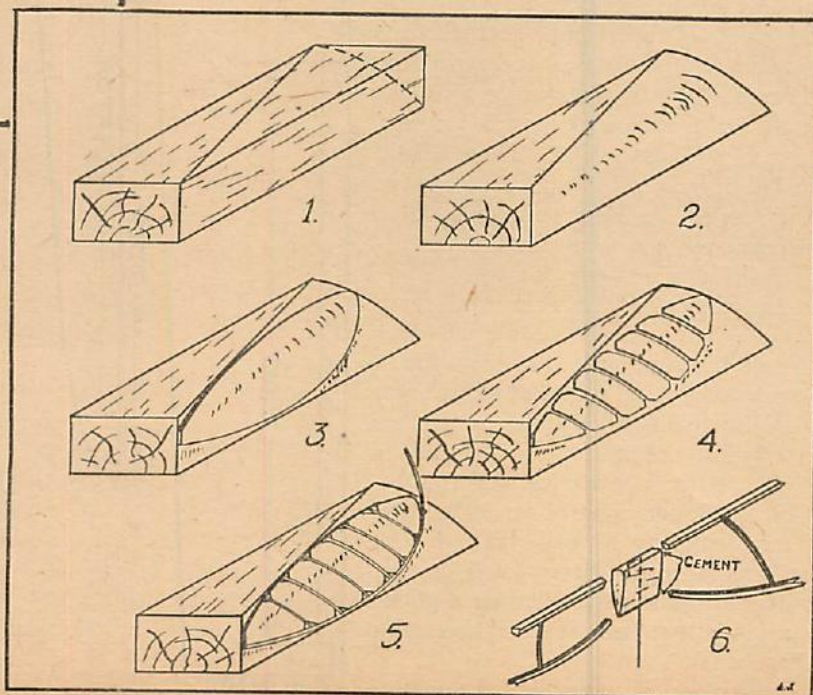


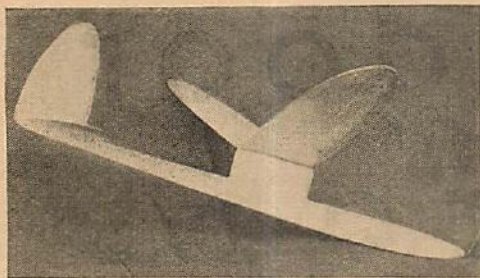
Solid and built-up prop construction steps.

THE most important single thing on an airplane is the propeller, and a good prop is far more vital on an indoor model than on an outdoor model because the duration of an indoor flight depends on the prop, and on the prop only.

Indoor builders may be separated into two classes, those who prefer low-pitched props with rubber of small dimensions and those who believe in high pitch and more power. Equally lengthy times have been done by both. High-pitched props with more power, however, seem to give more consistent performance.

There are three designs an indoor propeller can have. Carl Goldberg, a man generally believed to know most about indoor





The DART

IF wishes were horses, beggars could ride," is an old truism we've heard many times. There are probably nice sunny days when you'd like to fly a model, if only you had a model to fly. There's no excuse for wishing when a half hour of work will transform 20 cents' worth of material into an aerial mount that takes to the air with the same fine style that a thoroughbred shows on the race track.

A glider is usually included when we go out flying. It offers pleasant relaxation from the more serious business of flying rubber- or gas-powered models. It also offers a convenient way to determine wind direction. It is better than using a wind sock or similar device, since the glider reveals the upper air currents as well as the surface breeze.

Glider have other valuable uses. They make excellent models to give to younger brothers or cousins just becoming air-minded. A small youngster is always attracted by models, although he is usually unable either to build or fly them properly. But that does not dampen his enthusiasm. Sometimes the only way to keep peace in the family is to give Junior a model. You'll make things easier for yourself if it's an all-balsa glider. There's little trouble in building it, and when you're called on to do the repair work after the crack-ups, a few minutes of cementing will fix almost any damage.

Throwing a glider back and forth between two or more people standing a short distance apart is good fun—considerably more fun than throwing a ball. Launching the glider so it flies directly into the other person's hands is an art. After a few tries, you can develop sufficient control to make the glider complete a half turn before reaching its goal. Soon you'll be able to develop as much skill with a glider as a big-league ball player shows with a baseball.

Regardless of how skilled, or un-

Taking to the Air

A beginner's glider that will also serve the expert in several useful ways.

skilled, a model builder you may be, a glider offers plenty of entertainment and instruction. It should be a part of your flying equipment.

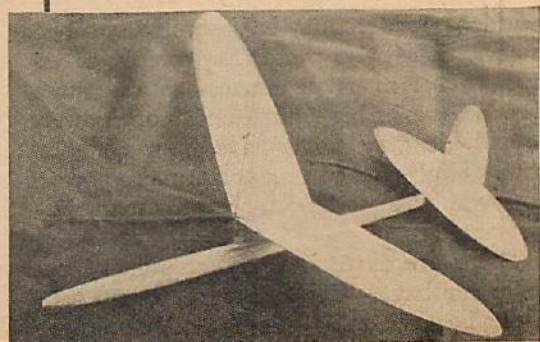
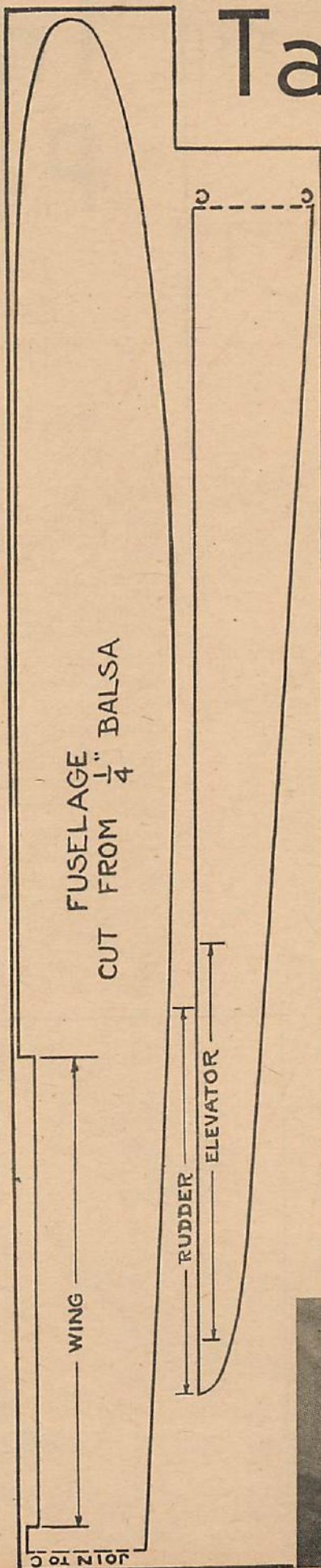
The glider is so easy to make, that there is little chance to go wrong during its construction. All parts of the model are given full size. Use the patterns in the drawing when cutting the parts. If you don't care to cut the pages of your magazine, trace out a duplicate set.

FUSELAGE

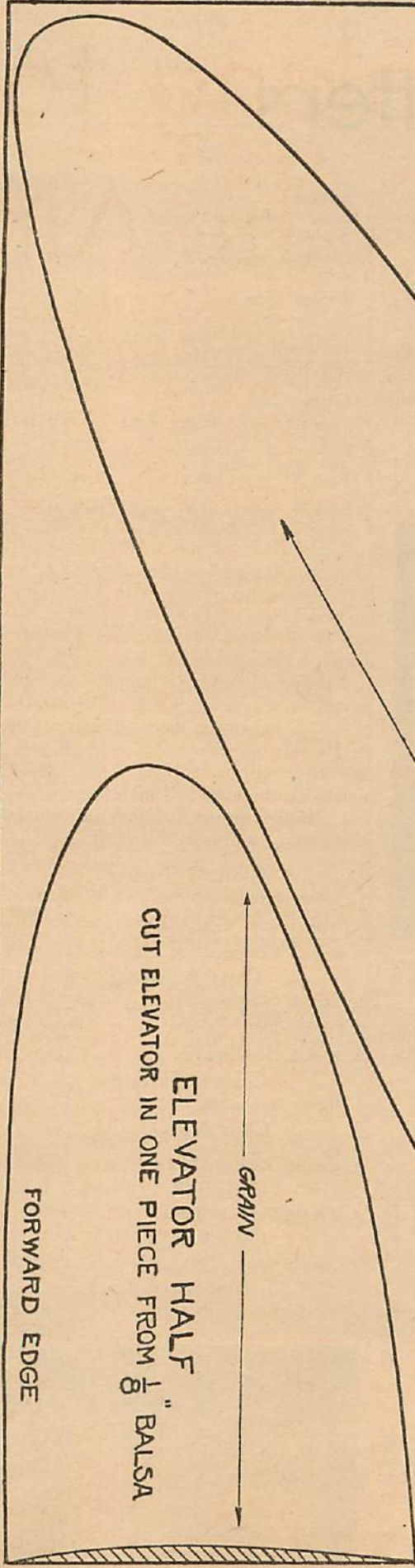
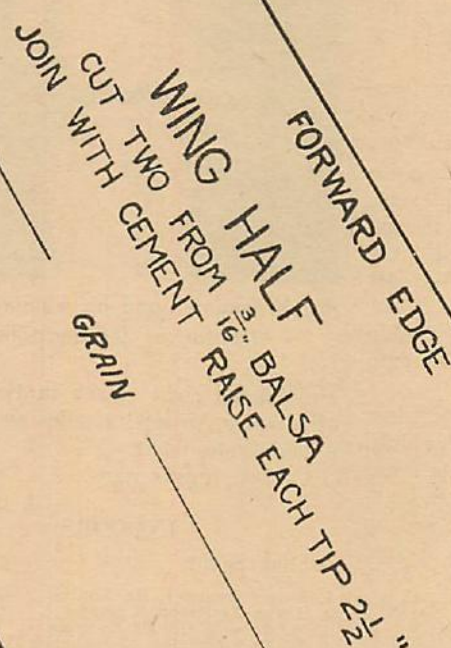
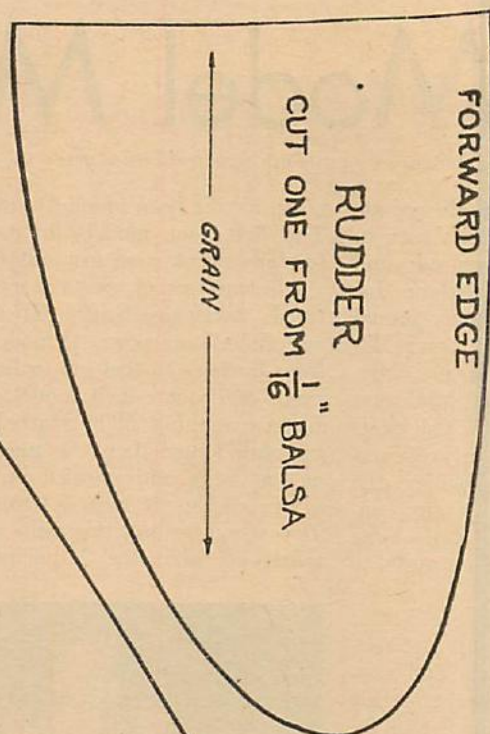
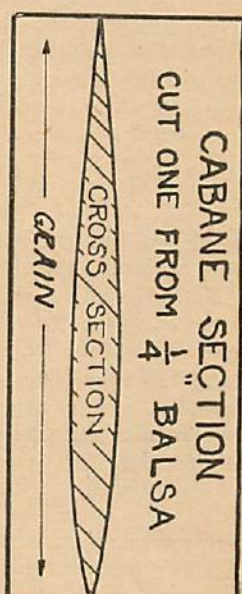
The pattern is given in two pieces because of the limited page length. Join the two pieces and cut the fuselage from one piece of $\frac{1}{4}$ " balsa. Round all the sharp corners except the top rear, where the rudder and elevator are fastened.

WING

Cut two wing halves from $\frac{3}{16}$ " balsa. Shape them to the cross-section indicated on the end of the pattern. In shaping balsa you'll find a small plane, sharp knife, and several grades of sandpaper are handy tools. The ends of the wings are bevelled so they fit together snugly when each wing tip is raised $2\frac{1}{2}$ " above the center. Join the wings with cement. Liberal coatings of cement and ample drying time will insure a firm joint. (Turn to page 94)



THESE PATTERNS ARE
EXACT SIZE



*Flight records
and contestants
in competitions.*

Model Matters

*Club notes and
news of model
organizations.*

(In contest tabulations, results are to be read as minutes (to left of colon), seconds, and fractions.)

American Legion contests always attract a full list of entrants who turn in excellent flights. One hundred and twenty-five modelers converged on Indianapolis for this year's fourth annual meet, held Aug. 29 and 30, from Illinois, Indiana, Ohio, Pennsylvania, Missouri, Wisconsin, Georgia, and Michigan. Contest headquarters were in the Hotel Antlers, and the hotel manager won everlasting fame by giving the builders the largest workroom ever seen at any contest. It was a banquet hall—large enough for overenthusiastic entrants to glide their gas models.

Indoor flying was held in the Butler University field house. The 70-foot ceiling was high, but the girders and low-hanging wires snared more than their share of models. Ralph Kummer of St. Louis won the indoor stick event with 13:08. Tissue covering was required on all indoor planes. Kummer's winning model was the same one which, film-covered, had won the Mississippi Valley contest with a 21-minute flight.

William Gough's winning indoor fuselage model was a low-winged job of triangular fuselage design, with apex at top.

Late Saturday afternoon was given over to the freak, or experimental, event, aimed to bring out originality in design. Lawrence Harlow won first with the same design with which he won first last year. It flew 10 seconds longer this year, showing some refinements. Harlow's ship was a twin-motored autogiro with twin rotors.

An 18-m.p.h. wind greeted the outdoor fliers on Sunday. It didn't calm until late in the evening, after the contest was finished. Many ships made perfect landings into the wind, but were wrecked by being blown across the airport before the builders could retrieve them. Dick Everett sent his plane up in the morning and lost it out of sight after 10:08. It was returned to the airport in the after-

noon, having been found 2½ miles away. The first four models in the outdoor fuselage event were lost out of sight.

All varieties of gas motors were entered. Cyclones, Brown, Thrush, Loutrel and Elf motors powered models ranging from Boehle's 15-foot job to Jim Lovett's small 300-square-inch model. Kenneth Ernst's winning flight started off with two full loops; then the model fell off on one wing and spiraled upward with a nice climb. It landed 18 miles away. Two weeks before, this same model had taken off from the Municipal Airport



Ralph Kummer and his winning indoor tractor at Indianapolis.

and landed right smack in the middle of Hoosier Airport, 9 miles away, after a 66-minute flight.

Contest results were:

INDOORS

Stick Event

1. Ralph Kummer, St. Louis	13:08
2. Alvin Anderson, Chicago	12:14
3. William E. Gough, Chicago	11:45
4. Wallace Simmers, New Lenox, Ill.	10:30
5. John Houbolt, Joliet, Ill.	10:01

Fuselage

1. William E. Gough, Chicago	8:35
2. Jim Cahill, Indianapolis	7:59
3. John Houbolt, Joliet, Ill.	7:25
4. Wallace Simmers, New Lenox, Ill.	6:38
5. Bob Cleary, Joliet, Ill.	5:59

Experimental

1. Lawrence Harlow, Ind'p'ls	twin autogiro
2. R. Kummer, St. L.	autogiro
3. J. Foster, Ind'p'ls	barrel-hoop-wing job
4. Leonard Elgensen, Chicago	autogiro
5. R. Miller, Beach Grove, Ind.	flying crescent

OUTDOORS

Fuselage

1. Dick Everett, Washington, Pa.	10:08
2. William Brumm, Dayton, Ohio	7:04
3. John Foster, Indianapolis	6:40
4. A. Cowels, Atlanta, Ga.	4:59
5. Harry Delfi, Chicago	4:25

Speed

1. Bob Jefferies, Findlay, Ohio	2:08
2. Kenneth Ernst, Indianapolis	3:01
3. Bob Chafian, Findlay, Ohio	3:25
4. Bob Eby, Findlay, Ohio	4:05
5. John Foster, Indianapolis	4:09

Senior Gas

1. Kenneth Ernst, Indianapolis	54:43
2. Gerald Ritzenthaler, Chicago	6:03
3. Bill Owens, Chicago	5:29
4. Lee Vartanian, Chicago	5:21
5. Don Caffee, Muncie, Ind.	3:18

Open Gas

1. Harold Stoffer, Indianapolis	25:13
2. Miles I. Stone, Joliet, Ill.	19:45
3. Stewart Harper, Wilmet, Ill.	11:21
4. Mrs. Thelma Stoffer, Indianapolis	7:12
5. P. J. Sweeney, Chicago	7:06

TWO NEW INDOOR MARKS

The Lakehurst meet held Saturday, Sept. 5, was particularly satisfying, as two new major records were set in phenomenal flights. The Class C tractor record is now 25m 29s, and the R. O. G. Class A record 15m 47.4s.

Lakehurst meets are unique inasmuch as prizes are never given. The attraction at a Lakehurst meet (flying is done in the big airship dock, which is over 200 feet tall) is the fact that official marks can be made. This feature brings out chiefly record builders, of whom there were 19 present. Results were:

Class C Tractor

1. Robert Jacobsen, Phila. (sr.)	25:29
2. Lawrence Smithline, N. Y. (sr.)	21:23.13
3. John Young, N. Y. (open)	18:22.2
4. Jesse Belberman, Phila. (open)	18:06.1
5. Hewitt Phillips, Phila. (sr.)	16:29

Class B Tractor

1. Ernest Whalen, Springfield, Mass. (open)	17:00
2. Daniel Cline, Springfield, Mass. (sr)	12:42
3. Morton Hecker, N. Y. (sr)	9:07

Class C Fuselage

1. Edwin Manaulkin, Phil. (sr)	16:01
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Class A (R. O. G.)

1. Ervin Leshner, Phil. (sr.)	15:47.4
2. Colman Zola, N. Y. (sr)	9:40.2

Class B (R. O. G.)

1. Arnold Cohen, Phil. (sr.)	10:11
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Class B (R. O. W.)

1. Arnold Cohen, Phil. (sr.)	9:46.4
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Class B Glider

1. Louis Milowitz, N. Y. (sr.)	:38.7
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Snapped at the Legion contest, left to right: John Houbolt, Ralph Kummer, Wallace Simmers, Alvin Anderson, Bill Owens, Bill Gough, Mike Holly.



Carl Goldberg helps wind Kummer's indoor Legion winner.

INDIANA GAS MODELS

The Indiana Gas Model Association sponsored a gas model contest Sept. 20. A 13-m.p.h. wind—strong winds have haunted every Indianapolis meet this summer—made flying difficult. Boehle's 15-foot gas model, powered with a Cyclone, was lost out of sight almost directly over the airport.

A 5-foot gas model of the Flying Flea made its appearance at the contest, built by Louis Mathe and powered with a Cyclone. One wing tip was badly warped, causing the plane to bank sharply and dive into the ground. Otherwise the Flea model showed great promise, in spite of this minor disaster.

Summaries of the flying (name, age, time, motor, wing span):

1. Vernon Boehle (21)	35:05	Cyclone	14' 8"
2. Don Lodge (15)	28:00.2	Loutrel	8'
3. Kenneth Ernst (20)	16:00	Brown	8' 2"
4. Harold Stoffer (24)	6:57	Loutrel	10' 8"
5. F. Harold Smith (30)	3:14	Brown	8' 6"

CANADIAN NATIONAL CONTEST

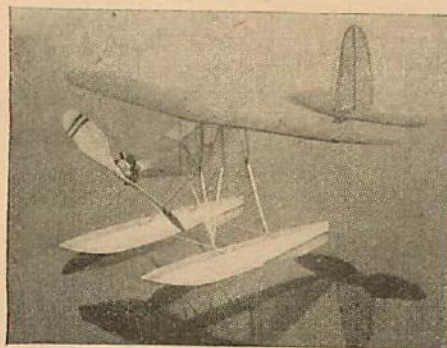
Results of the Canadian national contest held at Toronto, Aug. 31-Sept. 2, are listed below. New Canadian records are marked with an asterisk (*).

OUTDOORS

Stick Models

15 and under

1. Leonard Fisher, Winnipeg	* 4:12.6
2. Clarence Dunn, Hamilton	2:55
3. Harry Doe, Vancouver	2:11
4. L. Carpenter, Hamilton	1:55
5. Bert Norman, Vancouver	1:02
6. Cliff Baker, St. Catherines	:51



This neat hydro by J. G. Wheeler of Victoria, B. C., has made some splendid flights.

16 and over

1. Bill Doe, Vancouver	6:27
2. Norman McDonagh, Hamilton	4:41
3. James Jensen, Unity, Sask.	4:10
4. Thomas G. Harris, Toronto	3:36
5. James J. Haffey, Toronto	2:42
6. J. Arthur Covey, Saint John	2:33

Wakefield (aver. of 3 flights)

Open

1. Paul Verdier, Ottawa	* 4:53
2. Bruno Marchi, Boston, Mass.	3:09
3. Owen Corfield, Port Dalhousie, Ont.	* 2:59
4. James J. Haffey, Toronto	2:45
5. John Lemick, Toronto	2:29
6. Clarence Dunn, Hamilton	* 2:14

Gas Models

Open

1. Bruno Marchi, Boston, Mass.	* 7:45
2. Ed. Romiens, Windsor, Ont.	2:18
3. Ray Hunter, Guelph, Ont.	:15



Chester Lanzo adds the Junior Aviator championship to his laurels.

INDOORS

Semi-Scale

Junior	Points	Time
1. Clarence Dunn, Hamilton	* 218	2:09
2. Robert E. Milligan, Toronto	183	2:29
3. Cliff Baker, St. Catherines	135	1:20

Senior

1. Paul Verdier, Ottawa	* 388	4:58
2. J. Arthur Covey, Saint John	290	3:52
3. Fred Hollingsworth, Vancouver	289	3:40

Adult

1. Owen Corfield, Port Dalhousie, Ont.	229	2:33
2. Melvin Bardsley, St. Catherines	200	2:28
3. John T. Dilly, Galt, Ont.	186	2:01

Fuselage

Open	Points	Time
1. James J. Haffey, Toronto	* 9:59	
2. Joseph P. Matulis, Chicago, Ill.	* 8:55	
3. Fred Hollingsworth, Vancouver	8:17	

Stick

Junior	Points	Time
1. Bert Norman, Vancouver	* 10:15	
2. Harry Doe, Vancouver	7:44	
3. Don McIntyre, Guelph, Ont.	6:51	

Open

1. Joseph P. Matulis, Chicago, Ill.	* 12:29
2. Fred Hollingsworth, Vancouver	* 11:59
3. Bruno Marchi, Boston, Mass.	11:58.2

Junior Champion

Clarence Dunn, Hamilton.

Senior Champion

Paul Verdier, Ottawa.

Adult Champion

Bruno Marchi, Boston, Mass.

JUNIOR AVIATORS

Buffalo Airport was the scene of the annual national contest of the Junior Aviators, Aug. 30-Sept. 2. Entrants from all parts of the country numbered 38. They were the winners of the elimination contests conducted earlier in the summer in wing cities. Twelve trophies and \$1,500 in prizes were given.

Chester Lanzo of Cleveland proved to be the outstanding champion, winning two firsts. In the stick event he set a new open record of 18:10. He also won

the acrobatic novelty event, in which his model dropped gliders and small bombs while in flight and finally the model itself exploded while the tiny figure of the pilot was floating to the ground via the parachute route.

The 1936 trophy winners:

TEXACO TROPHY: Michael Kostich, Akron, first, 4:00; William Kluss, Cleveland, second; no third.

BUFFALO "TIMES" TROPHY: Ferdinand Falkowski, Buffalo, first, 22:30; Harry Thomas, Akron, second; Clement Turansky, Pittsburgh, third.

GOODYEAR TROPHY: Seymour Stein, Akron, first, 7:35; Joseph Nagy, Cleveland, second; Robert Fitzgerald, Denver, third.

BLUE FLASH TROPHY: Albert brothers, Cleveland, first, 32:30; Richard Everett, Pittsburgh, second; Ferdinand Falkowski, Buffalo, third.

MODEL AIRCRAFT BUILDERS TROPHY: Chester Lanzo, Cleveland, first, 18:10 (new open-age Class D stick record); Herbert Fish, Akron, second.

PEERLESS TROPHY: Won by Edward Yambor, Cleveland; second, Cowles



View of the Junior Aviator annual contest at Buffalo.

Davis, Pittsburgh; third, Charles Smith, Toledo.

B. F. GOODRICH TROPHY: Won by John Banko, Cleveland; second, Richard Bodle, Akron, O.; third, Roman Lyszczarz, Buffalo.

THOMPSON TROPHY: Won by Richard Korda, Cleveland; second, Henry Thomas, Akron, O.; third, Charles Davis, Pittsburgh.

L. W. GREVE TROPHY: Won by Chester Lanzo, Cleveland; second, Clement Turansky, Pittsburgh; third, Seymour Stein, Akron, O.

SHELL TROPHY: Won by Ed Deemer, Cleveland; second, Richard Sloan, Columbus; third, Anthony Kazlouskas, Akron.

BENDIX TROPHY: Won by Don Mertens, Buffalo; second, Anthony Kazlouskas, Akron; third, Bob Pfeiffer, Cleveland.

N. Y. STATE FAIR CONTEST

Holding the largest model contest ever staged in central New York, the annual State Fair meet at Syracuse, Sept. 9, under the sponsorship of the Exchange Club and the Syracuse Model Airplane Club, drew 115 entries. (Turn to page 95)

THE PICSKIN BAG

(Continued from page 14)

stick in his hand, now, which he used as a baton. Bill began to search for Barney Cockrane as Stewart's chorus became immersed in the song. But he saw no sign of him. He decided to wait a few more minutes in the shadows trying to pick out Barney before he went on an active hunt for him.

Just as Bill had given up hope and was about to start out looking for him in the milling crowd, he heard the drone of an airplane overhead. He could see its running lights as it circled low over the Stewart home and out over the cove. He watched it as it circled around into the wind, flashed on its landing lights and came swooping down a few hundred feet from the Stewart pier.

As Nick Stewart's chorus finished a song and turned toward the cove, the pilot in the plane killed his engine. As it sputtered and gasped, the voices of four men came across the water in a song that has been sung by barber shop quartets since the beginning of barber shops.

Their voices rose clear, and in perfect harmony, as the tenor took a high note, the bass rumbled and the second tenor and baritone came in at the right beat.

Nick Stewart and his chorus stood in open-mouthed amazement until the last note floated across the water. Then they burst into thunderous applause. Nick Stewart cupped his hands to his mouth and shouted, "All ashore who is comin' ashore!"

"Send out the dinghy," some one called back.

"Man the dinghy!" Stewart shouted. "All hands on the quarter deck. Rescue that bass and bring him ashore!"

Bill Barnes couldn't help laughing at the absurdity of the thing. Here were grown men and women acting like a flock of clowns. He moved toward the crowd to find Barney Cockrane.

He searched the grounds while the people crowded down to the pier to greet the flying singers. They were singing while they were being brought ashore in a small boat.

Then, suddenly, Bill Barnes knew that something was wrong. He saw a burly man with a square jaw and the shoulders of a wrestler standing near a clump of bushes, watching the guests. The man was trying to look like a guest, but Bill knew he wasn't a guest. He knew he was a detective.

What held Bill's attention were the two men who slipped out of the bushes behind the burly man. They crept up behind him. Bill saw an arm raise; something round and black slapped the burly man on the head. He dropped as though he had been shot through the heart. In less time than it takes to tell

it the two men had pulled him back into the bushes.

Bill's first instinct was to go charging across the lawn to the man's aid. But that second sense that had pulled him out of a thousand tight spots told him to sit tight and see what happened next. He didn't have to wait long. He swept the lawn with his gaze and saw another of Nick Stewart's guards clipped on the head and dragged behind a hedge.

Then he knew what it was all about. He saw the people on the pier raising their hands high in the air as the four occupants of the boat climbed on it. They all wore masks over their faces and they carried short, black things under their arms that Bill knew were tommy guns. Bill tried to fade back toward the house to reach a telephone, but he didn't get far before a gun was pushed into his back.

"We're watching you, Barnes," a voice that wasn't pleasant said behind him. "Get your hands in the air and move down toward the crowd on the dock."

Bill put his hands in the air because he didn't want to be the cause of half a dozen people being shot. He knew, if the breaks were with him, he could swing around and take the man who was covering him out of action. But he also knew it would start the others shooting and throw Nick Stewart's light-headed guests into a panic. He shrugged his shoulders, stuck his hands high in the air, and moved down toward the water. On the way, he looked behind him and saw that there were at least four men with masks on their faces herding the guests toward the crowd on the pier.

Bill smiled a wry smile as he watched the four singing bandits round up the men in one line and the women in another. He couldn't help admiring the ingenious method the robbers had used to receive an invitation to come ashore and rob Stewart's guests. It was almost laughable.

He tried to estimate the value of the diamond rings, pins and bracelets he had seen glistening on the women guests. And there would be no small amount of cash carried by the men.

He heard Nick Stewart protesting in a thick voice that the whole thing was an outrage. He saw a heavy fist swing in an arc, saw Stewart sprawl on his face. A half dozen of the women were sobbing hysterically. Some of the men were cursing—but not too vociferously. They valued their own skins beyond the valuables they wore or carried.

Bill tried to find Barney Cockrane in the stewing crowd, as the robbers methodically stripped the guests of their jewels. He was nowhere in sight.

A dull, half-muffled explosion sounded inside the house and Bill knew that Nick Stewart's safe had been blown open. He wondered if the famous Stewart emeralds were inside.

Bill watched the big man on the pier with the brown hair and the mask over his face, as he directed the operations of the men under him. He gave his orders in short, clipped words and nothing seemed to escape his eyes. Bill saw him put his right hand to his forehead and acknowledge a waving handkerchief on the porch of the Stewart home. A moment later a powerful motor roared into action on the driveway.

Two of the robbers were carefully going over the men and women lined up before them. Each had a small zipper bag hung around his neck, and as the victims removed each valuable, he dropped it into the bag. They were, Bill reflected, as cool and efficient as a pair of expert fruit pickers. They knew their jobs and they were taking it in their stride. They even talked to their victims as they robbed them.

When the two men with the zipper bags had finished, they signaled to the big man on the pier. He, in turn, signaled to the men on the lawn and on the porch of the big mansion. The car in the driveway roared again as all but the four singing bandits moved quietly toward it.

The four men on the pier moved down to the end. They kept swinging their tommy guns back and forth as they retreated, step by step. When they reached the steps leading down to the boat the big man spoke.

"Hold it, all of you," he said. "Don't move until after we take off. We'll keep you covered and the first one who makes a break will not live to be sorry."

The outboard motor of the little boat caught. The leader stood in the back, his tommy gun slowly swinging back and forth. A powerful young fellow that Bill recognized as young Stanton, the polo player, lost control of himself. He cursed, started to run toward the end of the pier as though he would stop the robbers single-handed. The tommy gun of the leader went *tat-tat-tat-tat-tat*, just that many times, and the young fellow pitched forward on his face.

Bill knew what was coming then, so he leaped in front of the crowd and shouted for quiet. But the strain had been too great. They became an incoherent, hysterical mob of people. The leader fired another burst over their heads. They broke in all directions while Bill tried to quiet them.

Young Stanton, Bill found, had been killed instantly. Three bullets had torn through his heart and lungs. That was when Bill saw red. He could feel the

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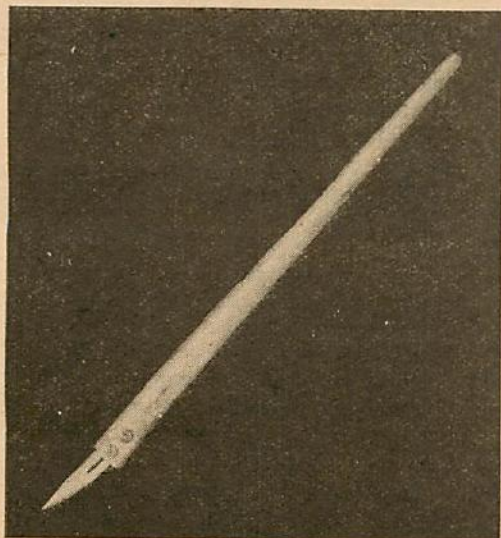
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blood throbbing in his brain as he gazed down at the torn body on the pier and then bellowed a curse at the retreating bandits.

The thing he did next was typical of him. He made a flying leap, landed in the bottom of a rowboat that was tied up alongside. He untied it, sat down and bent his back to the oars. Robbery, he told himself, was one thing; murder was another. He pointed the prow of the rowboat toward Barney Cockrane's amphibian. He knew that if he could get into the air soon enough, he would be able to cut them off and effect their arrest. He didn't pay any attention to the warning shouts that came through the night from the robbers' amphibian. He didn't believe they would be able to pick him off because of the darkness. He ducked his head, instinctively, as a burst of machine-gun fire roared off to his left.

Then the oar blades dropped into the water with a splash and Bill pitched forward on his face, much like young Stanton had done.

WHEN Bill opened his eyes he saw a half dozen dim, hazy figures blurred around him and heard the far-away whisper of voices. He closed his eyes and heard some one say, "He's coming around."

A hand grasped his pulse and something soft and cool was rubbed over his face. In a moment he opened his eyes again and tried to focus them. Barney's voice came to his ears. He clenched his teeth.

"How you doing, fella?" he heard Barney ask.

"I'll do," Bill said. "What happened?"

"They creased your scalp with a machine-gun bullet," Barney said. "How do you feel?"

"Rotten headache," Bill answered. "The wound doesn't amount to anything?"

"The doctor says you just need a few hours' rest," Barney said, his voice tense with emotion. "I was scared for a bit. I thought the rats had killed you."

Bill opened his eyes, startled at the intensity of Barney Cockrane's voice. He saw that Barney's face was livid with anger. And then he noticed something else for the first time in his life.

He noticed a curious, crescent-shaped birthmark on the side of Barney's neck. It fascinated him because it was red in contrast to Barney's almost-purple face.

Something vague stirred within him, some memory that eluded him for the moment. Why, he asked himself, should that odd birthmark on Barney's neck bother him? He wondered why he had never noticed it before. He shook his head, swung his feet off the bed and sat up. Barney and a man Bill knew was a doctor tried to push him back on the bed.

"I'm no cripple," Bill said. "I've got to get back to Barnes Field."

"You'd better rest for a few hours, Mr. Barnes," the doctor said.

"I'll rest when I get back to the field," he said. "What happened? Did they catch up to any of those gorillas?"

Barney Cockrane shook his head. "They all got away clean," he said. "It was a neat job—that singing stunt to throw Nick off guard. He has been scared to death of robbers because of the Stewart emeralds. A lot of good his guards did him."

"They got the emeralds?" Bill asked, getting to his feet. The room spun for a moment, then settled.

"They got 'em," Barney said. "And a hundred thousand dollars' worth of other stuff from the guests."

"What about the police?" Bill asked. "Will they let us out of here?"

"They won't hold us up if you think you ought to go," Barney said.

During that fifteen-minute flight down the length of the Island, Barney Cockrane said a curious thing to Bill Barnes, a thing that set Bill to wondering.

"I—I may run into some trouble soon, Bill," he said. "I wanted to tell you about it to-day, but I didn't have time. I'll probably need your help. It's a mess that may be hard to explain. I'll get in touch with you again in a couple of days because I want to talk it over with you."

"Okay, fella," Bill said. He didn't pay a great deal of attention to what Barney was saying at the moment because his bandaged head ached beyond belief.

But when he stood beside Barney's plane on Barnes Field and Barney leaned out of the front cockpit to shake his hand before he took off, Bill thought about that curious birthmark again. And as Barney kicked the amphibian around into the wind and took off, the thing that had eluded him came back to him. He gasped in amazement.

He suddenly remembered the jewel robbery that had occurred between Newark and Chicago on Transcontinental Airways nearly a year ago. He remembered the description the co-pilot of the plane had given of the leader of the robbers.

And he remembered Barney Cockrane's eccentric reputation about being a Robin Hood, a man who took profits away from the rich to help the poor.

Bill shook his throbbing head and made his way toward his quarters. Then he remembered what Barney had said to him over the intercockpit phone on the way back to Barnes Field.

"A man might get a goofy idea about robbing the rich to help the poor," Bill said, aloud, to himself, "but he wouldn't murder in cold blood to accomplish it."

IV—A MILLION—IN CASH

BILL BARNES was too busy during the next few days to think much about Barney Cockrane. But he was forced to think about him occasionally, because detectives interrupted him a dozen times to ask him questions about the robbery at Nick Stewart's.

The fourth day after the robbery, Bill was standing at a window of his bungalow on Barnes Field, gazing toward the administration building and the traffic-control tower. He was gazing at them, but he didn't see them. His thoughts were, for the first time since the robbery, entirely occupied with Barney Cockrane.

He had called Barney Cockrane's office a few minutes before. Old Leander Trimble, the man who had been Anthony Cockrane's right arm and was now Barney's faithful employee, had come on the wire. He told Bill that Barney hadn't been in the office for three days. He said Barney had flown up to one of his country places in the Berkshires two days before. He went on to say they hadn't been able to get in touch with Barney for the past couple of days; they were becoming worried. He promised to tell Barney that Bill was trying to reach him as soon as they made contact with him.

Bill jammed his fists deeper into the pockets of the flannel dressing robe he wore over tweed slacks and white flannel shirt. Why, he asked himself, had old Trimble been so mysterious about the whole thing? He had made it sound like a secret.

He whirled, paced across the room a half dozen times, his head bent in thought, his forehead furrowed. He was plainly worried. He liked and admired Barney Cockrane as well as any man he knew. He considered Barney his friend, and Bill was not the kind of man to treat friendship lightly. He remembered what Barney had said to him about running into some trouble, needing help. He wondered if Barney had already run into trouble.

It occurred to him a few minutes later, when Sandy Sanders came bursting into his quarters with a telegram, that the extravagant claims of the prophets of mental telepathy might be worth listening to.

The telegram was from Barney Cockrane. It read:

AM WIRING TRIMBLE CERTAIN INSTRUCTIONS IN CODE STOP IT IS OF THE UTMOST IMPORTANCE TO ME THAT YOU FOLLOW HIS INSTRUCTIONS WHEN YOU HEAR FROM HIM STOP PLEASE DO NOT FAIL ME STOP
BARNEY COCKRANE

Bill read the telegram twice, then handed it to Sandy, whose freckled face exuded curiosity. Before Sandy had

finished reading it the telephone on Bill's desk rang. He picked up the instrument and spoke to Tony Lamport.

"It's Mr. Trimble, from Barney Cockrane's office, Bill," Tony said.

"Put him on," Bill said.

"Mr. Barnes?" Leander Trimble's thin voice came over the wire. Bill could picture his gaunt, lean face as he told him he was on the wire.

"I just had a code wire from Mr. Cockrane," Trimble went on. "He makes a very unusual request. I don't think it is safe to communicate the substance of it to you over the telephone. How long will it take you to reach our offices?"

An expression of annoyance swept over Bill's bronzed face. Why, he thought, couldn't people leave him alone for a while? Why did they always have to pick on him to— He brushed the thought out of his mind as the sound of Barney Cockrane's troubled voice echoed in his ears.

"I can get over there in half an hour. Perhaps sooner," he said. "I'll fly in and land at the Battery."

"You'd better bring a small bag of overnight clothes with you," Trimble whined. "Mr. Cockrane's request involves a short trip."

"O. K.," Bill said, and snapped the receiver on its hook.

"Where you goin' Bill?" Sandy asked him, running the words together as though they were one.

"Hop out and tell Martin to warm up and check the Lancer," Bill answered. "I'll be using it within fifteen minutes."

"Listen, Bill," Sandy said, his blue eyes shining. "I'm all ready to go with you."

"If I wanted you to go with me I'd mention it," Bill growled. "Haul your useless carcass out to the hangars and do what I told you to."

"Aw, have a heart, Bill," Sandy implored. "I've been sitting around here for a week, listening to that fathead Shorty make wisecracks. If I don't get away for a bit I'm apt to lose my temper and hurt him."

The idea of Sandy hurting the one hundred and seventy-five pounds of dynamite that was Shorty Hassfurther made Bill break into laughter.

"All right, kid," he said. "After you give Martin my instructions, pack an overnight bag and be back on the apron in ten minutes."

"O. K.," Sandy said, and jumped for the door.

"I said ten, and not fifteen, minutes!" Bill roared after him.

There was an expression in Bill's eyes that is hard to describe as they ran over the sleek, gleaming thing that was the Silver Lancer a few minutes later.

He listened to the idled three thousand horses in the twin-Diesel engine and watched the two silver disks that

were triple-bladed, automatic-pitch propellers.

From the center of the propeller cap peeped the muzzle of a 37-mm. automatic engine cannon that was built integrally with the motor in the V of the twenty-four cylinders. Firing through the hollow prop shaft, it could pour explosive, incendiary or armor-piercing shells at the rate of three hundred a minute.

From troughs along each side of the engine peeped the noses of two .50-caliber machine guns. They were equipped with automatic ammunition counters and engine-driven synchronizing gear. The dull, burnished metal sight that sat directly before Bill's eyes when he was in the air was a telescopic one such as the U. S. army uses.

At the ends of the silver, all-metal, cantilever wings gleamed the navigation lights. Underneath the belly, protruding slightly, were the slots containing the emergency landing flares.

As the ship stood there in the hangar, it seemed to be a sort of biplane. But once it was in the air the amphibian gear folded completely into the fuselage and wings and it became a silver bullet that was a monoplane. With the low-speed landing gear retracted, the main float vanished into the belly of the fuselage, and the auxiliary wings, with their wing-tip pontoons, nestled into the main wings between the spars. In front of the two regular landing wheels was an auxiliary nose wheel to take up the shock of rough landings.

In the tail assembly was a balanced rudder, elevators, and cantilever stabilizers.

The pilot's cockpit, back of the rear wing spar, contained a complete set of blind-flying instruments, including the Kruesi short-wave direction finder, along with all the other instruments to be found in Bill's Snorters.

The rear cockpit was equipped with a complete set of duplicate controls, navigating instruments and a flexible .30-caliber Browning, mounted on a track.

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

In the fuselage, immediately behind the cockpits, in a locker, was the usual Barnes emergency equipment, which included a small outboard motor and a folding rubber boat, a small tent, rations, an ax, a pick, a short spade, a .45-caliber Thompson submachine gun, one Springfield rifle with a telescopic sight, and one repeating shotgun.

"You checked her carefully?" Bill asked Martin, head mechanic of the field.

"Yes, sir," Martin answered. "There was a slight amount of torque when you brought her in last time. I took it out by checking the timing in the forward engine. She neutralizes perfectly now."

"Good work, Martin," Bill said. He leaned into the cockpit and looked at the tachometer. Then he looked around for Sandy. At just that moment Sandy came running around the corner, trying to put on a white overall and white helmet while he ran. He carried a small bag in one hand.

"Haul yourself in there," Bill shouted as he gunned the engines for a moment. Swinging the Lancer lightly around, he rolled down the center runway into the wind. In the center of the field, where the main runways converged, he tapped the rudder to kick the ship directly into the wind. The engine blasted. The three thousand horses in the nose roared. The tail lifted and a moment later the retractable landing gear slid up into the belly as Bill stuck the nose of the ship toward Manhattan.

The two plain-clothes men, pacing back and forth before the marble façade of Cockrane's building, nodded deferentially to Bill and Sandy as they mounted the steps. Another guard swung the inner door wide.

They were in the main lobby of one of the largest corporations in America. A uniformed attendant took them to a girl who phoned Bill's name to Leander Trimble. The attendant guided them through a maze of corridors and offices until they came to one marked: "OFFICE OF THE PRESIDENT." The attendant opened the door, bowed and departed.

Leander Trimble's secretary led them through two offices and knocked on a door. The thin voice of old Trimble floated out to them. The secretary opened the door, and departed.

Bill and Sandy stepped into the most sumptuous office either of them had ever seen. The wide, high window at the front was hung with soft, wine-colored drapes to shut out the gaze of the crowds who passed on foot along Wall Street. The walls were hung with autographed pictures of world-renowned men. Behind a great, gleaming mahogany desk sat the man who was supposed to know more about the details of the North American Steel Corporation than any other living man.

He was a man of indeterminate age, with thin, white hair and black, bristling eyebrows. His eyes were mere slits in his lean, lined face, and his hands were long and thin, like the claws of some enormous bird.

As Bill bowed and smiled at him, a trace of a smile flitted across his face, then was gone. He got up from his desk and advanced toward Bill with outstretched hand.

"This is a pleasure, Mr. Barnes," he said in that high, whining voice. He shook Bill's hand and turned toward Sandy with an expression that was anything but cordial.

"Mr. Sanders," Bill said. "One of my best men."

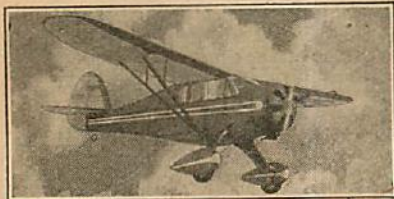
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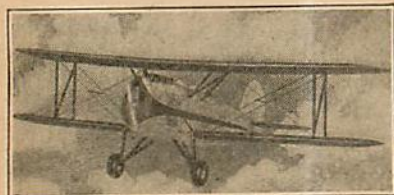
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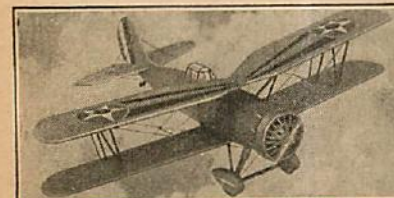
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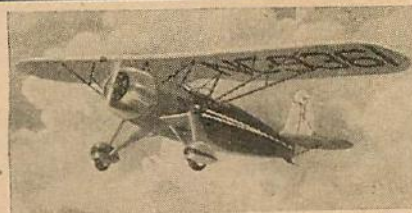
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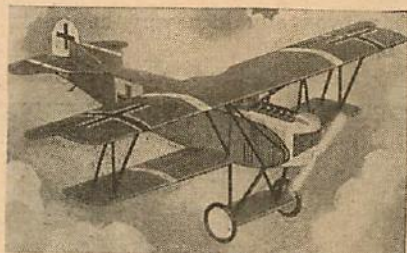
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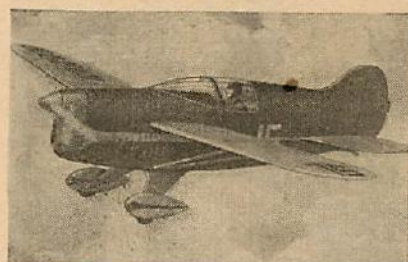
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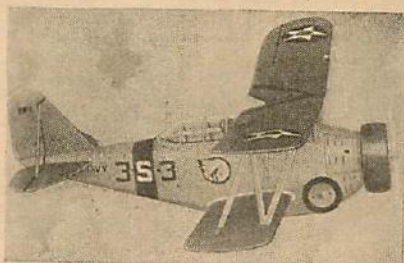
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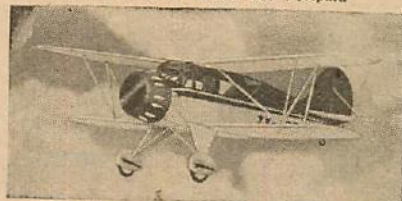
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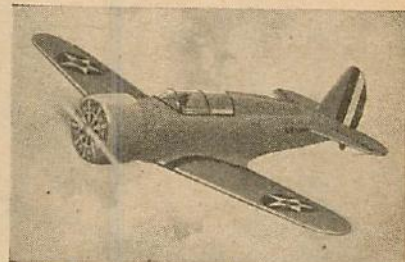
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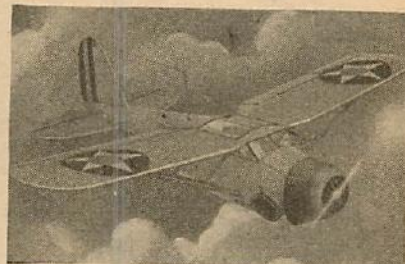
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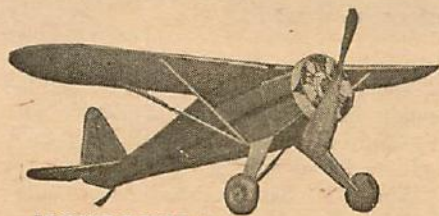
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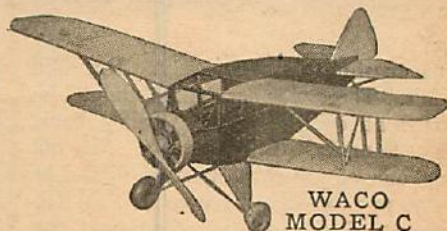
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"A little young, isn't he?" Trimble asked.

"I'm old enough," Sandy said, his face flushing.

"I'm afraid," Trimble said, his annoyance evident, "you'll have to wait in the outer office while I talk to Mr. Barnes."

"O. K.," Sandy said, and started toward the door.

"Just a minute, Sandy," Bill said quietly. He turned to Leander Trimble, measured him with his eyes. There was something, Bill decided, he didn't like about the man. He knew Barney Cock-

a telegram. His eyes ran across the face of it several times before he finally spoke.

"Mr. Cockrane," he said, "intimated before he left that I would have a request for funds from him while he was gone. He flew up to his place in the Berkshires. From there he was going to do a little hunting, perhaps go into Canada. He has some very fine coon dogs at his place up there and takes great pleasure in hunting with them."

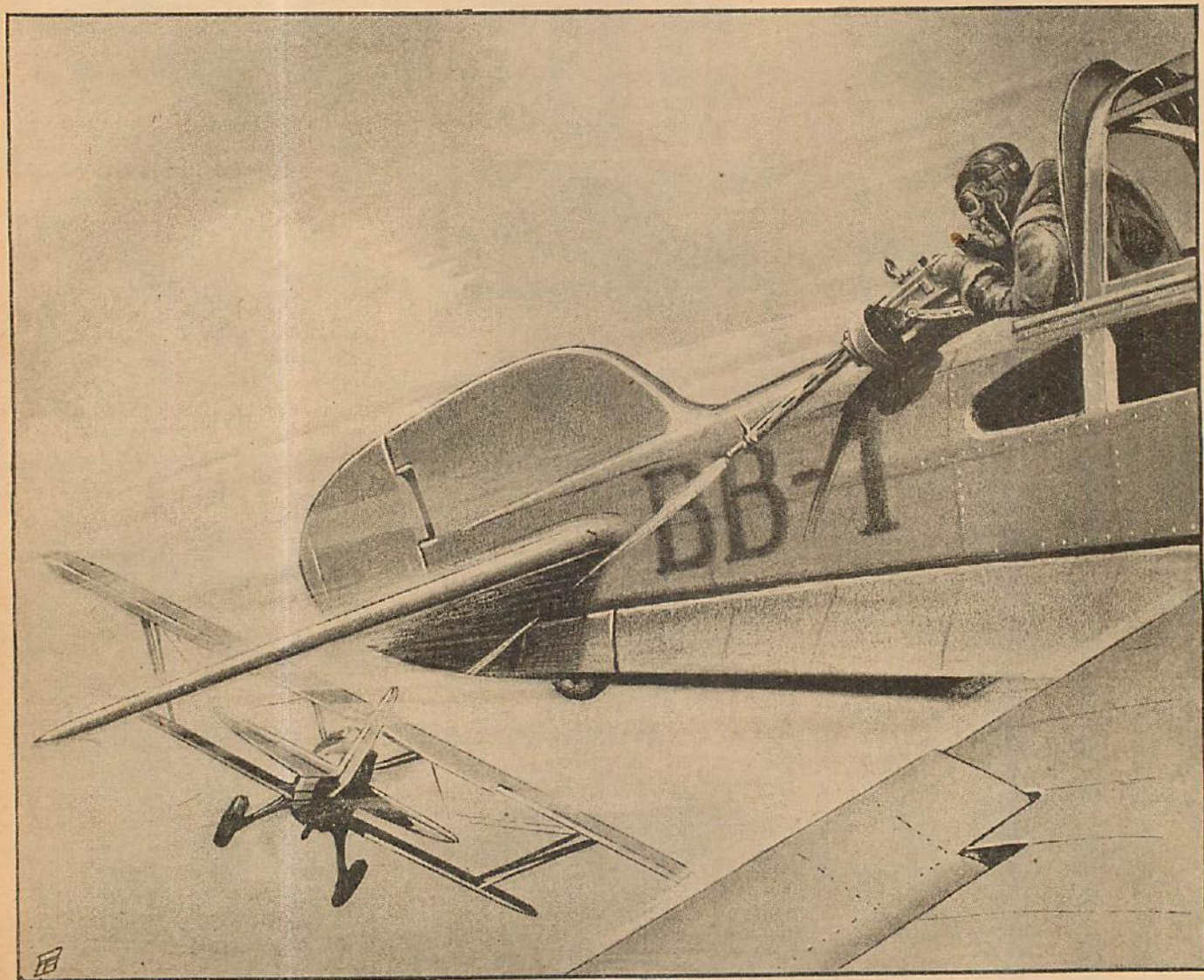
Bill nodded his head and took the telegram Trimble extended. The words meant nothing to him, being in code.

in that telegram to send him a million dollars in cash. I will give you our code book and you can decode it yourself if you wish."

"Never mind that," Bill said. "I believe you. Does he say why he wants it?"

"No," Trimble answered. "But the request is not—er—unusual, coming from Mr. Cockrane. He does strange things at strange times. But it is his money, and it is his to do with as he sees fit."

"Have you any idea why he wants it?" Bill asked.



Bill heard Sandy's gun yammering, and then his wail of disgust as he missed.

rane trusted him implicitly. But Bill didn't. There was something about him that sent cold shivers up Bill's back. "Mr. Sanders," Bill went on, "is not only one of my most trusted pilots, he is also my confidential secretary. Whatever you have to say to me you can trust with him."

For a moment Leander Trimble hesitated. Then he cleared his throat, nodded his head and went back behind his desk. From a top drawer he took out

He raised his eyes and found Trimble studying him with a gaze that annoyed him.

"What does it say?" he asked impatiently.

"Mr. Cockrane," Trimble said evenly, "requests me to send him one million dollars in cash."

"He what?" Bill said.

"I don't wonder that you are dumfounded," Trimble said, a ghost of a smile flitting on his lips. "He asks me

"None," Trimble said. "I"—Bill thought his voice became suddenly bitter—"am only his secretary."

"It's a lot of money," Bill said.

"Whooley!" Sandy interposed. "I'll say it's a lot of money."

"The question is whether you will take it to him," Trimble said.

"You have the money ready?" Bill asked.

Trimble opened a bottom drawer in his gigantic desk and lifted out a pig-

skin bag of medium size. He put the bag on his desk, took a small key from his vest pocket and unlocked it. He opened the bag and motioned with one finger to Bill. Bill and Sandy moved across the room together and gazed at the contents of the bag. Their eyes became incredulous as they saw the contents.

"There is a million dollars in cash there?" Sandy asked in a whisper.

"In quite small denominations," Trimble said. "He specified that in his telegram."

"Do you suppose this thing is blackmail, or a kidnaping?" Bill asked.

"I don't know," Trimble said. "I only know he asked me for the money, and there it is. The question is will you take it to him?"

Bill's common sense told him to say "No." But some instinct that was stronger than logic made him nod his head that he would take it.

"I'll want to check it over and exchange receipts with you before I go," he said quietly.

"That's quite agreeable to me," Trimble said. "We'll do it now. You can get the stuff up there in a couple of hours. He has his own landing field at Barcock—that's the name of his estate. It is understood, of course, that you are to deliver the money to no one but Mr. Cockrane."

"O. K.," Bill said. "Let's get at it."

"You brought some extra clothing with you in case you have to wait over for a day or so?" Trimble asked.

"Yes," Bill said.

"A million bucks—in cash!" Sandy said. "Zowey!"

V—SURPRISE ATTACK

"I SUPPOSE you are armed," Trimble said to Bill after they had checked over the money and signed a duplicate receipt.

"No," Bill said. "I didn't expect to be carrying a million dollars around with me. When I reach my plane I will be."

"Here is an automatic," Trimble said, taking one from his desk. "I will send you down to the Battery in one of Mr. Cockrane's cars. The car and chauffeur are parked in front of the building. Another car will follow you with two armed guards in it."

"Are they ready now?" Bill asked.

"They are always ready," Trimble said, smiling. "I am quite sure you will find Mr. Cockrane at Barcock when you arrive. I will telephone ahead and tell them to have the landing lights on. It will be dusk, nearly dark, before you arrive."

Bill nodded his head and wrapped the strap fastened to the pigskin bag around his wrist. "All right," he said to Sandy. "Let's go."

The two guards followed Bill and Sandy out of the front door and down the steps of the ornate building. One of

the guards opened the door of the big, black limousine parked alongside the curb. The chauffeur stepped on the starter and the car glided silently into the traffic.

Bill warmed up the Lancer while a Staten Island ferry boat eased into its slip and a large Atlantic liner made its way into the mouth of the Hudson River. Ten minutes later he came around in a steep bank over Governor's Island and stuck the nose of the Lancer north above the river.

"Listen, kid," Bill said into the inter-cockpit telephone as the northern tip of Manhattan flashed under their wings, "swing out that swivel gun back there, just in case. I'm not used to lugging a million dollars around in the air, or any place else."

"You stick around with me, Bill," Sandy said, laughing, "and you'll get used to it. A million will seem like so much chicken feed to you."

"You keep your eyes open and stop trying to be funny," Bill growled. "I don't like any part of this. The whole thing sounds goofy to me."

"My gosh, Bill," Sandy said. "If you smell a rat, let's take it back. It all seems all right to me. Barney is the one who sounds a little goofy to me."

Bill stuck the nose of the Lancer up until he had eight thousand feet under him. The Hudson River gleamed dully in the light of the setting sun. Off to the left, the sky became a symphony of pink and mulberry behind the scowling Catskills.

Yonkers, Tarrytown and Poughkeepsie flashed under their wings as they held a course parallel to the river. At Rhinebeck Bill glanced at his map and altered his course to the east toward Stockbridge and Great Barrington. Above Mt. Livermore, in the Berkshires, Bill kicked his rudder again and laid his course due north.

"Sweet mamma!" Sandy said into the telephone. "Look what's coming at us!"

Bill looked and jerked the stick of the Lancer back into his stomach as he fed the Diesels juice. One of the thunderstorms for which the Catskill and Berkshire mountains are famous was racing toward them.

"Be ready to switch on the oxygen," Bill said to Sandy. "I'm going above it. We can never land while it's roaring."

The clouds were racing to meet them. Bill held the stick back rigidly. His face was grim as he thought of the million dollars they were carrying.

Yellow stabs of lightning flashed in the oncoming clouds. He altered the pitch of the propellers and eased down the wing flaps. Then he tightened the overhead hatch and locked the lugs that made the cockpits practically airtight.

As the altimeter read twenty thousand feet, the storm hit them. It was like a million bowling balls thundering around

their heads. Lightning flashed all about them in jagged welts. Rain beat down on the wings and hatch like the pound of machine-gun bullets. The big ship reeled and skidded. Bill fought the controls with a grim tenacity that was characteristic of him. They were both flung back and forth on their safety straps until their stomachs ached. The wind and rain lashed against the windshield with an ever-increasing fury. Bill opened the throttles of the Lancer and tried to get the nose up. It wallowed and rolled under the force of the wind and rain.

"How about some oxygen?" he shouted at Sandy.

For the next twenty minutes Bill held the Lancer head-on into the face of the storm. His face was streaming with perspiration. The cabin was becoming suffocating. The heavy artillery of the heavens rumbled and crashed in their ears as Bill fought to hold the ship on an even keel.

"Ease off on the oxygen," he shouted at Sandy. "I'm going to see what it's like down below."

The Lancer nosed down through the storm in a terrific dive as Bill slapped the stick forward. At ten thousand feet he eased back on the control column and brought the ship out in a series of shallow dives. The storm seemed to reach all the way to the mountaintops.

Again he slapped the stick forward. The roar of the twin Diesels mounted to a high-pitched scream. As it came to a peak whine, Bill eased up on the stick again. He opened his mouth and shouted at the top of his breath to take the pressure off his ears.

At four thousand feet he leveled off again and began to search for a hole in the clouds. When he could find none he opened his throttles and held the nose of the Lancer into the storm again. She rocked and plunged and dived as the rain and wind beat at her.

Then, because of the Lancer's terrific speed, they were out of it. The bank of angry clouds whirled away from them to the southwest. Below them the autumnal forest of greens, reds and browns spread out in every direction in the dim light.

"Listen, kid," Bill said into the telephone, "take the controls for a minute until I figure out our exact position. I'm not sure where we are."

Sandy nodded and took the dual controls in the after cockpit. He banked around and around in wide circles while Bill checked their position. Because it was stuffy in the cockpit, Bill slid back the overhead hatch.

As he settled back in his seat, his eyes suddenly flew open, and he sat up on the edge of his bucket seat again. He probed the air all about, and when he hitched around to look over his right shoulder, he saw what he had heard.

He saw a red-lacquered, bi-motored, cantilever monoplane diving at them from the east at high speed. And while he gazed at it he heard the *tat-tat-tat* of a machine gun and saw white, feathery streams of smoke that were tracer bullets.

Bill's head came up; his eyes were wide and startled as Sandy screamed in his ear. Then he waved a hand at Sandy and pulled the stick of the Lancer back into his stomach. The Lancer leaped out of range of the guns of the streamlined ship, but not before Bill and Sandy could feel bullets pounding into her tail assembly. The flame from the exhaust pipes of the red-lacquered plane showed brightly in the dim light as it dived beneath them.

As Bill brought the Lancer up to the top of a loop, he half rolled it level and gazed down over the side as the monoplane came out of its dive and came around in a sweeping bank.

"That is the ship I tested for Barney Cockrane the other day," he said aloud. "There couldn't be two ships like that one. Since I took it out to the end of Long Island, Barney, or some one, has had a pair of synchronized machine guns stuck in her."

"What are you saying, Bill?" Sandy shouted at him.

"Nothing," Bill said. "Get that swivel gun ready. This guy is going to try to chop our heads off."

"She's ready, Bill!" Sandy said, his voice tense.

Bill's face was suddenly burning; his blood was racing through his body like fire. Who, he asked himself, was piloting that other ship? Was it Barney Cockrane? Was Barney Cockrane trying to frame him?

He opened his throttles wide and zoomed upward again in an abrupt, climbing turn. He debated with himself for a moment about what he had better do. He was still responsible for that million dollars in the rear cockpit. Should he open his throttles and run?

While he was leveling the Lancer off, the monoplane decided the question for him. It zoomed up underneath him, its guns spewing lead and fire. The lead chewed through his right wing, and he skidded the Lancer out of the line of fire as anger welled within him.

The monoplane roared upward and dived back to the attack. Bill pulled the control column back and raced upward to meet the diving ship. The two planes roared at one another at terrific speed.

Bill's fingers tightened on his gun trips. His guns chattered their song of death. His bullets drove through the monoplane's fuselage as the pilot sideslipped out of range.

Bill could hear young Sandy talking to himself in his microphone before the *tat-*

tat-tat of his swivel joined the crescendo of screaming motors.

The two ships streaked and tumbled all over the heavens, filling the air with whining lead. They fired burst after burst at one another as they jockeyed for position.

"He knows his onions," Bill grated into the telephone to Sandy. "And he can shoot."

"Go at him head-on," Sandy shouted. "When you come up to chandelle back I'll get him. He's a sucker for my gun. I can get him."

Bill's fingers clamped down on his gun trips again as the red-lacquered ship came under his sights. But before his bullets had reached their mark the pilot had slipped away. Sandy made noises in his throat, screamed something into the telephone. Bill's lips became a hard, set line of determination. His face was dripping with perspiration. He was using all his powers of concentration as he studied the other pilot's tactics.

Bill sideslipped the Lancer out of range as the monoplane came at him head-on, guns yammering. Then he opened his throttles as he went by and stuck the nose of the Lancer upward again. He heard Sandy's gun yammering, heard Sandy's wail of disgust as he missed.

As Bill came up and over in a chandelle, he dived on the monoplane. But when he clamped down on his firing trips, the plane faded from under his sights as though a magician had flicked it away with a handkerchief.

Bill was getting mad now, and he was getting worried. It was so dark that he could locate the other plane only by the fire belching from its exhaust. He cursed himself for having left Barnes Field without his electron telescope set in his instrument panel.

And he realized that he was trying too hard because of his anxiety. He was "over-controlling" the Lancer because of that million dollars in the after cockpit.

The next time the monoplane flashed across his sights, he kicked his rudder ever so little as his fingers gripped hard on his gun trips. The nose of the Lancer followed the swerve of the monoplane for a split fraction of a second.

Bill's bullets wove a pattern from the engine housing to the tail assembly. He couldn't see them, but he knew he had scored a number of hits from the way the monoplane skidded off dangerously on one wing and yawed wildly. He whipped the Lancer around and returned to the attack. His breath was coming in short gasps now, and his body was saturated with perspiration from his efforts and the terrific speed of his maneuvers. He poured burst after burst at the retreating ship as it tried to dive out of danger.

Bill pushed the stick of the Lancer forward and tried to follow it. Then he

ceased back as the other ship came up and over in a flashing Immelmann. Now the monoplane was above him and diving, its guns flaming. Bill glanced at his altimeter, saw that he was only a thousand feet above the treetops. He opened the throttles of the Lancer and shot upward as the monoplane dived beneath him.

Bill's stomach felt as though it had come to rest beside his tonsils as he brought the Lancer up and leveled off with a half roll. Then he felt bullets tearing up through the belly of the Lancer. He barrel-rolled to get out of range as the monoplane zoomed past him. Then he was under its belly, with his machine guns chattering. He could see his tracers pumping into it before it sideslipped out of range.

Again the two planes raced upward, each trying to gain the advantage of altitude. At four thousand feet, Bill whipped around to finish the fight. He was so tired his hands were trembling on the stick. His body felt weak, as though he had not slept or eaten in days.

As he searched for the other plane he could not believe his eyes. He heard Sandy shouting and followed the direction in which the kid was pointing. The other ship had peeled off and was heading north. It was running away!

For one brief instant Bill considered following it. It must have been damaged, or the pilot would not have pulled out of the fight.

Then Bill put the plane out of his mind. His teeth came tightly together as he remembered that he had a million dollars in the back that was to be delivered to Barney Cockrane. He wondered, as he began to check his position, what Barney Cockrane would have to say about that other plane when he saw him.

"Who do you suppose it was, Bill?" Sandy asked.

"I don't know, kid," Bill said wearily. "I don't know. We've got to find out where we are and locate Barney Cockrane's landing field. I didn't tell old Trimble, but I've been there before. I think I can find it as soon as I work out our exact position."

VI—BARCOCK

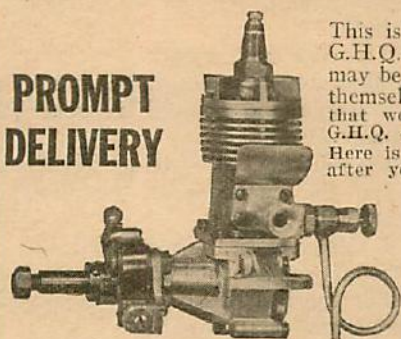
A HALF HOUR LATER Bill picked up a two-million-candlepower beacon flashing in the distance. He knew it was off the regular air lines, so it must be on Barney Cockrane's field. When they circled low above it they found that the floodlights were on at the small but well equipped field Barney Cockrane maintained.

Bill located the illuminated wind sock and lowered his landing gear. The powerful plane kissed the ground with its wheels at eighty miles an hour and came to a stop on the apron in front of the one hangar.

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A short, stocky man with a clipped mustache and close-set eyes appeared out of the glare of Bill's landing lights. A flying helmet was pushed back on his head. Two grease monkeys followed him.

"This is Barcock?" Bill shouted as he killed his motors.

The man nodded, smiled and asked Bill if he had had any trouble locating the field.

"Not much," Bill said. "My name is Barnes. Did Mr. Trimble phone you to expect me?"

"He did," the man answered, his eyes fitting over the long, streamlined fuselage of the Lancer. "I'm Warren, the field manager. I would have known you from your pictures if Trimble hadn't phoned."

"How far away is the house?" Bill asked, knowing full well that it was less than a half mile away. "Can you run me over in your car? Mr. Cockrane is expecting me."

"I can't run you over," Warren said, "because my car won't start. We've just been fiddling with it. The magneto has gone floozy."

"We can make it all right," Bill said, and he slid over the side. "Toss me the bags, kid," he said to Sandy.

He wrapped the thongs of the pigskin bag around his wrist and took the bag containing his own clothes in his other

hand. "Stick a gun in your pocket, kid," he said in a whisper to Sandy.

"Let's see your hangar," Bill said. "Is it large enough to hold my ship?" He wanted to see if Barney Cockrane's new, red-lacquered monoplane was inside. One glance told him that it wasn't. There was only a three-place cabin job and a single-seater biplane there.

"Lots of room," Warren said. "We'll roll her inside for you."

"And lock the doors," Bill said.

"Right," Warren agreed. "It's only a short walk to the house. I'm sure Trimble told Leeds, the butler, or majordomo, or whatever you want to call him, at the house to send the station wagon for you. He must have slipped up."

"We'll find it," Bill said. "Come on, kid."

"You can see the lights through the trees there," Warren said, pointing. "You take that road, and when you come to the edge of the field you turn right down the hill."

"Thanks. Let me show you how to tune in on my radiophone in case you should hear the buzzer. My field may want to get in touch with me."

The world about Bill and Sandy became a black void when the floodlights on the field were turned off. Only the two-million-candlepower beacon continued its intermittent flashes across the starless sky.

As Bill and Sandy reached the end of the field and took a dirt road to the right, a light rain began to fall; the wind began to whine through the great pines in the valley below them.

They trudged along side by side, stumbling now and then as their feet encountered unseen bumps in the road. A little over a quarter of a mile away a long string of lights gleamed from a house they knew was Barcock. They could hear the long, mournful howl of a half dozen hunting dogs in the kennels behind the house. But they could see no movement in the house itself.

"I'll walk ahead here, kid," Bill said as they came to a bend in the road that was as dark as the inside of a dungeon. "Then, if I stumble, you'll know where to take it easy."

"O. K.," Sandy said. "It's darker than the inside of your stomach."

As they rounded the bend, Bill became aware of some other person than Sandy close to him. He held his breath for an instant while he listened, but not the slightest sound came to his ears. Only the low moaning of the pines below them. Yet he could feel the presence of another person.

It was when he heard a sharp little crack and a moan behind him that he knew he had been right. He dropped the bag that held his clothes, jabbed his hand into his pocket to find the auto-

matic Trimble had loaned him. He spoke Sandy's name, but no answer came.

He took three cautious steps back. His feet came in contact with something on the road as a crash sounded in the bushes off to the right. He didn't bother to bend down to see what the thing in the road might be. He knew it was Sandy. He emptied the automatic he held in his hand into the night after the only sounds he could hear.

He heard a voice grunt and curse as a crash louder than the rest sounded. Then the sound faded away, and only the faint snapping of twigs came to his ears.

As he bent over the crumpled form of Sandy he cursed himself and old man Trimble and Barney Cockrane. He could feel something warm and sticky trickling down from under Sandy's helmet. He raised his voice and shouted as loud as he could toward the house below them.

Only the wail of the wind in the trees and the howl of the dogs came back to him. As he started to pick Sandy up in his arms a moan came from the kid's lips. Then a series of incoherent words. He spoke Sandy's name and felt his body stiffen, then go limp.

"Bill! Bill!" Sandy half screamed, while his body twisted.

"It's all right, kid," Bill said. "Take it easy. It's all right." He put him on the ground and leaned his back against the bank at the edge of the road. Sandy groaned and then his body became rigid.

"Bill!" he said. "Do you still have that pigskin bag?"

"Take it easy, kid," Bill said again. "I still have the bag. Do you know what happened? Did you see any one?"

"Not until just before something hit me," Sandy said, his voice weak and trembling. "Something big and black loomed up beside me. I started to call your name as I tried to dodge."

"Forget it now," Bill said. "Do you think you can walk? It's only a few hundred yards to the house. We can talk about it when we get there."

"If you'll give me a hand," Sandy said, and he struggled to his feet.

A man was standing on the stone porch of the long, rambling house as Bill and Sandy crossed a bridge over the stream that gurgled across the wide, spacious lawn. He was standing back so that he was not directly in the rays of the overhead light, and Bill saw that he had a double-barreled shotgun in his hands.

"Hey!" Bill called. "Come here and give me a hand!" He was supporting Sandy with one arm and carrying the pigskin bag and his own bag in his other hand.

The man hesitated for a moment, then ambled slowly off the porch. Bill saw that he was dressed in simple livery and

supposed he was Leeds, the man, Warren had spoken about.

"Take this bag," Bill said, sharply, "and put one of your arms under Mr. Sanders' other shoulder. You're Leeds?"

"Yes, sir," Leeds said. "You are Mr. Barnes?"

"That's right," Bill snapped. Leeds lowered the shotgun and attempted to take both of Bill's bags.

"Only the one," Bill said.

"I heard shots," Leeds said as he slipped his arm under Sandy's shoulder.

"You did," Bill said. "Some one hit Mr. Sanders on the side of the head and stole the bag of clothes he was carrying. I tried to hit him in the dark. He got away."

"Did you get a look at him?" Leeds asked.

"No," Bill growled. He supported Sandy's weight while Leeds opened the door. "Is there a couch down here where he can lie down?"

"In this room," Leeds said.

"Get some scissors, an antiseptic, some bandages and adhesive tape," Bill said. "And a basin of water—hot water."

Leeds disappeared. Bill helped Sandy onto the couch that was placed in front of the high, deep fireplace in which a cheery fire crackled.

"Feel any better, kid?" Bill asked.

"I'm all right now, Bill," Sandy said. But Bill knew he wasn't all right. His face, except for the dried blood on it, was as white as a Christmas morning.

Bill eased the helmet off Sandy's head and stopped the fresh flow of blood with a handkerchief. He knew when he saw the slight cut and lump on his head that if it had not been for the helmet, the blow would undoubtedly have crushed Sandy's skull. Leeds came in with the things Bill had asked for.

"Where is Mr. Cockrane?" Bill said. "Have you told him we're here?"

"Mr. Cockrane isn't here," Leeds said.

"He what?" Bill shouted.

"He isn't here," Leeds repeated imperturbably. "He hasn't been here for three days. Mr. Trimble knows that."

"Mr. Trimble said he would be here when we arrived," Bill said as he skillfully cut Sandy's hair away from the cut.

"I don't know anything about that, sir," Leeds answered.

Outside, the coon dogs began to snarl and howl as though a thousand devils were chasing them. Sandy's eyes grew wide and startled.

"What the devil is the matter with those dogs?" Bill asked irritably. "Can't you keep them still?"

"The cook is feeding them," Leeds said.

"They act as though they were being beaten instead of fed," Bill said. "Who else is here besides yourself, Leeds?"

"Just the cook, sir," Leeds said. "The summer staff is gone."

"You and the cook stay here the year round?"

"Mostly, sir."

"You've been with Mr. Cockrane for some time?"

"We've both been here for five years."

"Both?"

"The cook and myself."

Bill swabbed the cut on Sandy's head with iodine and slapped a square of bandage over it.

"Do you know where to get Mr. Trimble on the telephone at this time of night?" Bill asked.

"I think so, sir," Leeds said.

"See if you can get him," Bill ordered.

"I'll try his home, sir," Leeds answered, and disappeared.

"Bill," Sandy said when he had gone, "what's this all about?"

"I wish I knew, kid," Bill answered. "I wish I knew who was piloting that plane of Barney Cockrane's. It must have been his ship. It was a special job."

"All right," Sandy said. "Who hit me on the side of the knob and almost killed me?"

"There has been a leak about this money somewhere," Bill said. "Some one is doing a little double-crossing."

"You don't suppose Barney Cockrane has been twisting his books around and is getting this money to get out of the country and stay out?" Sandy asked.

"He'd just be stealing his own money," Bill said. Then he thought about the robbery at Nick Stewart's a few days before and the link between Barney Cockrane and the man who had directed the robbery of a Transcontinental Airways plane. He shook his head vigorously. "I don't know, kid," he finished. "I don't know."

A moment later Leeds stuck his head in the door to say he had Trimble on the wire. Bill followed him to the telephone, the pigskin bag still fastened to his wrist.

"Yes, Barnes?" Trimble said in his ear.

Bill told him of all the things that had happened since they had left his office that afternoon. On two occasions Trimble interrupted to ask inconsequential questions. When Bill had finished he could tell by the tone of Trimble's voice that he was more than a little excited.

"I'll get the first train up there," Trimble said. "An early-morning milk train. And Barnes—" His voice trailed off.

"Yes?" Bill said.

"Don't give that bag to Mr. Cockrane if he arrives," Trimble said. "Don't give it to any one until I reach there. Is that understood?"

"That's understood," Bill said.

VII—HOWLING DOGS

A LITTLE LATER Leeds served Bill a steak, hash-browned potatoes, buttered beans and a salad on a small table in

front of the fire, while Sandy, propped up on the couch, was satisfied with some soup.

Outside, the wind was howling down the valley like a thousand banshees. The windows rattled in their casements as falling leaves swirled against them. In the back of the house, Barney Cockrane's dogs raised their voices in a mournful dirge.

Once Bill saw a man in a white apron slip out of the pantry, into the dining

room what time they wished to be called in the morning.

"Mr. Trimble will be here at nine," Bill said. "You'd better make it eight o'clock."

"I'll come in and start the fire before I call you," Leeds said.

"Listen, Leeds," Bill said. "Don't make any mistake about this: Any one who tries to come into this room before we are awake in the morning is more than a little apt to be shot right through

"Hey!" Sandy said. "Don't leave me around here with those two cutthroats. The way I feel——"

"I'll only be a few minutes," Bill said. "I'm going to slip out this door onto the porch." He lowered his voice to a whisper. "On the way here, just before we came across the bridge to the house, I noticed an old dredge beside the creek. I'm going to slip out there and put this bag in it some place."

"Gosh, Bill," Sandy said, his eyes



Bill emptied his automatic into the night.

room. Bill noticed that one of his eyes was slightly cocked and he looked more like a strike-breaker than a cook. The man cupped his hands and stood peering out of the window into the pitch black of the night for a moment, then glided back into the kitchen.

After Bill had finished eating, Leeds led them up a flight of stairs to a bedroom on the second floor. Because the house was built on the side of a hill, the bedroom window opened on a driveway that ran back to the stables and kennels.

After he had lighted a fire that was already laid in the fireplace, Leeds asked

the stomach. Do you understand that?"

"It's plain enough," Leeds said.

"There is a lock on the door, isn't there?" Bill asked.

"A very good one, sir," Leeds answered. "You won't need to open the window because you'll have plenty of air from the door that opens on the porch."

"Good night, Leeds," Bill said.

"Good night, sir."

Bill helped Sandy into bed, propped him up with a couple of pillows behind his back and put an automatic in his hand.

"Just hold it like that until I come back, kid," Bill said to him.

wide, "remember what's in it. Suppose some one sees you."

"No one is going to see me," Bill answered. "It will be safer there than here. It will take me only a few minutes."

Bill eased open the door leading to the porch, slipped out into the darkness. He bent his face against the half gale that whipped at his clothes as he pushed down the steps and out to the road. The night was so dark that he could not see three feet away from him. The only thing that was visible in the darkness was the string of lights in the Cockrane house.

He felt his way across the little bridge and slipped down a slight embankment on the other side. The dredge loomed up before him like some huge prehistoric monster. Bill opened a little door in the side, found the fire box inside. Opening the door, he pushed the pig-skin bag far back, then banked dead ashes up around it. He could tell that the dredge had not been used in months, or perhaps years, and supposed it was one Barney Cockrane had used to dig out a swimming pool in the creek.

When he regained the road, Bill's heart climbed into his mouth as he heard a movement near him. Then he heard the scamper of a chipmunk. He slipped back into the house as noiselessly as he had left it. Sandy told him he had heard nothing but the continual wail of the wind and the howl of the coon dogs.

It was three o'clock in the morning that Bill was awakened by a horrible noise, one that was half scream, half shout. He sat bolt upright in bed, and he could feel the hair at the base of his scalp creeping. He slid his hand under his pillow, wrapped it around the butt of his automatic. As he slipped out of bed, he could hear Sandy breathing deeply and evenly.

He drew the bolt on the door that led to the hallway and crept out into the hall. Rain lashed at the window-panes; the wind had become a high-pitched scream. He could see a light shining under the door at the bottom of the steps and heard the faint murmur of voices.

Bill gazed out the door that led to the driveway and imagined, for an instant, he could see a form moving in the abysmal darkness of the night. Then he began a silent march down the stairs, step by step, careful that they did not creak under his tread.

He found the latch, lifted it silently. When he opened the door he saw that the light had come from the dying embers in the fireplace. The voices, more distinct now, were coming from the dining room. He glided the two or three steps to the doorway, stuck one eye around it. Leeds and the cook were sitting at the long table, playing cards. Bill studied them for a moment, saw that their clothes were dry.

Then he suddenly became aware of another thing. The dogs outside were no longer barking as they had been when he went to sleep. If that horrible noise had come from outside, the dogs would have been making the night hideous with their din.

He crept back up the steps and into the bedroom. As he bolted the door, Sandy's voice came to him in a whisper from across the room.

"Is that you, Bill?"

"O. K., kid. I heard a noise and got up to take a look around."

"You'll get a knife in your back if you go taking looks around this place," Sandy said. "I guess I heard you go out. You must have wakened me. I heard you walking on the stairs. I mean I heard the stairs creak. Then, a moment later, something loomed up against the window, something that was darker than the night outside. I felt for you in the bed and didn't find you. I didn't want to shout for fear I might upset the apple cart. Why did you get up?"

"I heard a scream," Bill said, and he shivered when he thought of it. "It wasn't like anything human, kid."

"The dogs have stopped barking, Bill," Sandy said excitedly.

"I noticed that a moment ago. Leeds and the cook are still up, playing cards in the dining room," Bill said. "I can't understand that scream or why those dogs aren't howling. The cook and Leeds are new here. Leeds said they had both been here for five years. If they had been, the dogs wouldn't have snarled at the cook when he was feeding them. Dogs don't snarl at a person who feeds them."

"All right, Bill," Sandy said, "what do we do next?"

"How does your head feel?"

"O. K. Aches a little."

"We go back to bed and try to get some more sleep," Bill said. "I have a hunch we're going to need it to-morrow."

THE WIND was still howling and rain was pounding on the roof and lashing at the windows when Bill heard Leeds knock on the door at eight o'clock. He slipped his automatic out from under his pillow and laid it on a chair beside the bed before he leaped out to unbolt the door.

"Good morning, sir," Leeds said in his even, oily voice as Bill ducked back into bed to get out of the chilly air.

"Good morning, Leeds," Bill said, and he saw that Leeds' eyes were running around the room in search of the pig-skin bag. "What time did you go to bed? Did you hear some one shouting last night?"

"I didn't hear anything sir," Leeds said. "I was probably asleep. I turned in at about one o'clock."

"You're a liar, Leeds," Bill said. "You were playing cards at three o'clock. I saw you."

"Begging your pardon, sir," Leeds said without looking at Bill. "I may have been wrong about the time. I heard nothing." He poured a little kerosene on the fire he laid in the fireplace and touched a match to it. Bill watched him, eyes narrowed, as he straightened up and began to search the room again.

"What has happened to the dogs, Leeds?" Bill asked. "They were howling when I went to sleep. But I haven't heard a peep out of them since. That seems a little strange to me. They

should have been howling if there was some one around here last night, and I'm sure there was some one around."

"The cook just told me they were all dead, sir," Leeds said, his face a mask of imperturbability.

"They died of old age, I suppose," Bill said. Suddenly he sat upright in bed and reached for the gun on the chair beside him. "Listen, Leeds," he said, and his voice was grim, "you're a smooth crook, but you're not smooth enough. You or the cook poisoned those dogs. You were bright enough to know why I asked you how long you had been here when you told me the cook was feeding the dogs. But you're not bright enough to get away with the thing you're trying to pull. Something screwy is going on here. I'm not sure what it is yet. But I'll know before I'm through. You take my advice and play things easy. Have you heard from Mr. Trimble?"

"Yes, sir," Leeds said. "He phoned from the station. He is on his way out here now. Breakfast will be served in twenty minutes, sir."

"Not to us," Bill said decisively. "We'll get our own breakfast."

"Yes, sir," Leeds said.

"How long since you got out of prison, Leeds?" Bill snapped at him.

"I beg your pardon, sir," Leeds said.

"Get out of here!" Bill roared at him.

VIII—A WARNING

AFTER a quick shower, Bill stripped off the bandage on Sandy's head and looked at the wound. The swelling had gone down and the cut was clean and healthy-looking.

"You feel all right, kid?" Bill asked. "Not dizzy or headache?"

"I can totter," Sandy said. He looked out the window at the driving rain. "I wish it was a nicer day. I'd like to get some exercise now that I'm up here in the country."

"You'll probably get all the exercise you want, in spite of the weather," Bill said dryly. "I'm going downstairs. I think I hear a car coming. It may be Trimble."

"I'll be down as soon as I'm dressed," Sandy said.

Bill went downstairs and stood at the windows as a battered old car with a taxi sign on it came down the hill. He watched it swing past the front of the house and into the drive. He sat down in front of the fire and waited for Trimble to come in while he reassembled in his mind the things that had happened.

After five minutes of waiting he glanced, impatiently, at the watch strapped to his wrist. Why, he asked himself, hadn't Trimble come directly in to speak to him? After all, he was carrying the million dollars.

Bill waited another ten minutes, then got up and strode the length of the dining room. He pushed the swinging door

into the pantry aside, stepped through. Trimble, Leeds and the cook were talking at the foot of the steps that led down to the kitchen from the garage. As Bill appeared, Leeds and the cook faded away and Trimble came toward him, his hand out and a smile on his lips.

"Hello, Barnes," he said. "I've just been questioning Leeds and the cook about Mr. Cockrane. I can't understand what has delayed him. I think he may arrive at any minute, or we may hear from him by telephone."

"Let's go in the front room," Bill said grimly. "I want to talk to you."

They sat down in front of the fire, and Bill went over the events of the day before with Trimble. He saw the old man's eyes glow with something besides interest as he told of the attack on them from the air and of the man who sapped Sandy on the head.

"There has been a leak some place," Trimble said. "And I can't imagine where."

"What about these servants, Mr. Trimble?" Bill asked. "Have they been with Barney for five years?"

"Oh, yes. Longer than that, I think," Trimble said.

"They told you about the dogs?" Bill asked.

"Dogs?"

"Some one poisoned Barney's coon dogs last night," Bill said. "And I heard some one scream in the night. I—" When he saw that Trimble was looking at him as though he were crazy, he stopped talking. He suddenly realized that all of his suspicions sounded fantastic.

"I don't like this, Trimble," he said, pacing the length of the room. "Barney Cockrane is my friend. But there is something screwy about this set-up."

"You're letting your imagination run

away with you, Barnes," Trimble said. "There is no doubt there was a leak. Some one tried to cut in and get that money. We'll find out who that was before we're through. Mr. Cockrane is a very generous man. But he isn't one who enjoys being robbed. He should be here most any time. Then we'll both have the responsibility of that money off our minds."

"I'm not insinuating that you have anything to do with the attempts to rob us," Bill said. "You know that, of course. I—"

"By the way," Trimble interrupted, "is the money in a safe place?"

"It's safe enough for the time being," Bill said. "I—"

"Mr. Cockrane on the telephone, sir," Leeds said to old Trimble. Trimble got to his feet, relief shown on his face.

"I want to talk to him when you are through, Mr. Trimble," Bill said. Trimble nodded his head and followed Leeds to a little alcove off the dining room. Bill followed part of the way and stood watching the turbulent little stream tearing along its bed through the lawn.

"We've been worried about you, Mr. Cockrane," Bill heard Trimble say.

"Yes," Trimble said after a moment of silence. "Mr. Barnes is here with me. I came here because of certain occurrences last night. We'll acquaint you with them when you arrive. Late in the day, you say?"

Bill moved around the corner of the little alcove and made motions at Trimble, who was facing him. Trimble nodded his head and said, "Yes, Mr. Cockrane," then hung up.

"I told you I wanted to speak to him," Bill said angrily.

"I didn't hear you, Mr. Barnes," old Trimble said suavely—too suavely, Bill thought. "I'm sorry."

"That's all right," Bill said calmly. But his brain was working with astonishing rapidity. "It's quite all right," he repeated. "He'll be along later in the day?"

"That's right," Trimble said. "You can turn the money over to me now, Barnes. In fact, you don't have to wait here if you don't want to. I mean, if you have things back at Barnes Field that need your attention. Mr. Cockrane will be sorry to have missed you. But he will understand your impatience to get away."

"I'm not impatient to get away," Bill said, and he smiled that disarming smile again. "I don't like to take the Lancer off in this wind. I might as well stay and see Barney. He'll be interested in that attack on me."

"Yes," Trimble said, "he will. He'll be more than interested. Now, if you'll get me that pigskin bag, at least you needn't worry about it any longer."

Bill got to his feet, stretched his hands above his head, yawned, then smiled.

"I think," he said, "I'll leave it where it is. It's safe there, and I don't like Barney's five-year-old servants."

The eyes that were mere slits in Trimble's lean, lined face gleamed beneath his black, bristling eyebrows. His thin, clawlike hands opened and closed convulsively, and his already-white face became even whiter. Bill watched the transition with something akin to revulsion.

"You don't understand me, Barnes," old Trimble said. "I want you to get that bag. I want to be sure it's safe."

"Safe from whom?" Bill asked, still smiling. "You told me at first not to give the bag to any one but Mr. Cockrane. And, Mr. Trimble, I'm going to follow your orders. I'm not going to give that bag to any one except Bar-

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1/2 .03 .04 .07	1/2x 1/2 16 2-5c	
1/2 .04 .06 .10	1/2x 1/2 18 2-5c	
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PINE WHEELS, .30	1/2x 1/2 24 2-5c	
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1/4 sq. 2-5c	1/2x 1/2 42 2-5c	
1/2 sq. 1-5c	1/2x 1/2 44 2-5c	
3/4 sq. 1-5c	1/2x 1/2 46 2-5c	
1 sq. 1-5c	1/2x 1/2 48 2-5c	
1 1/2 sq. 1-5c	1/2x 1/2 50 2-5c	
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RUBBER	CELLULOID	COLORADO DOPE
.045 25 ft. 5c 1/16 20 ft. 5c 1/8 flat 18 ft. 5c Skein 50c	6x8 5c 12 1/2x16 18c	1 oz. 5c; 2 oz. 9c; 4 oz. 11c; 1/2 pt. 35c; pt. 55c
WING AND TAIL LIGHTS	NOSE BLOCKS	CLEAR DOPE
12" 10c; 15" 15c; 24" 20c	1x2x1 1c 2x2x1 2c 2x2 1/2x1 3c 3x3x1 5c 3x3x2 8c 3x3x3 10c	1 oz. 5c; 2 oz. 9c; 4 oz. 11c; 1/2 pt. 25c; pt. 45c
DUMMY RAD. ENGINE	ENGINE AND COWL ATTACHED	THINNER
1 1/2" d. 10c; 2" d. 15c; 3" d. 20c	1 1/2" dia. 20c 3" dia. 35c	Same as clear dope
CELLULOID PANTS, per pair	INSIGNIA	BAMBOO
1/2" to 1" 18c 1 1/2" to 1 1/2" 35c	24 and stripes 5c	1/16 sq. x12, 20, 5c 1/16x1/4x15, dz. 10c
METAL PROPELLERS	ALUM. TUBING	DOWELS
2 blades 5 blades 1 1/2" .5c ..... .08 2 1/2" .10c ..... .10 3 1/2" .15c ..... .20 4 1/2" .20c ..... .25	1/16 or 1/8, ft. 1c 3/16 or 1/4, ft. 10c	1/16x6 doz. 5c 1/8x18 2 for 3c
SANDPAPER	ALUM. COWLINGS	WIRE
Dz. sheets 5c	1 1/2" 15c 2" 18c 3" 25c Specify whether anti-drag, closed, or open.	6-8-10-12-14 2 ft. 1c
BOMBS	REED	WOOD VENEER PAPER
3/4" .4c 1 1/4" .7c 3" .12c	1/32-1/16-1/8 2 for 1c	20x30 .1 for 10c
MODEL PINS	PROP. SHAFTS	CAMEL'S HAIR BRUSHES
pkg. 1/4" or 1" 5c	doz. 8c	Small 3c; Lge. 5c

ney Cockrane. I've already risked my life and wasted a lot of bullets defending it, and I don't like to waste bullets. Is that clear?"

"That's clear, Barnes," Trimble said. He bent forward and got to his feet. As he rose, he whipped a blue-nosed automatic out of a side coat pocket and pointed it at Bill's stomach.

"Perhaps," he said coldly, "I can change your mind. Unless you tell me where that bag is by the time I count five, Barnes, I'll shoot, and I'll shoot to kill."

"That," Bill pointed out to him, "won't get the bag for you."

"We'll find the bag," Trimble said, his finger tightening on the trigger. "I don't like to do this, Barnes, but—"

"Put that gun away and let's talk it over," Bill said. He was still smiling.

"I'll talk nothing over, Barnes," Trimble said in a voice that quivered with emotion. "I want that bag. Now! One—"

Bill saw the door to the stairway, behind Trimble, slowly opening. He shifted his eyes to the fire and back again so that Trimble would not sense what was happening.

"Two," Trimble said slowly. "I'm a desperate man, Barnes. I know about your courage. But it won't keep bullets from tearing through your stomach. Three—"

"Don't jump or turn or get nervous with that trigger, or you won't have any stomach," Sandy said as he shoved a gun into Trimble's back. "Put that gun on the table, and don't turn until you do it!"

"Nice going, kid," Bill said calmly. He reached over and dexterously removed the little blue-nosed automatic from Trimble's hand as the old man tottered toward the table. Bill put a hand under his arm and helped him into a chair.

"You'd better let younger men handle the guns, Mr. Trimble," Bill said. "Your forte is in using your brain, not your hands."

Trimble's eyes flickered for a moment. Then he bowed his head like a beaten old man.

"I was too hasty, Barnes," he said. "I owe you an apology. I pretended not to be worried when you told me of the attack on you. But I was worried. It occurred to me that you might have faked the whole story and intended using it along with another story to keep the money for yourself. That would leave me with the responsibility of accounting for a million dollars."

"I see," Bill said evenly. "You have my receipt for it."

"A clever lawyer could get around that," Trimble said. "I have looked out for the Cockrane interests for so many years it is second nature to me."

"Barney knows that," Bill said. "But

we'll just leave the money where it is until he arrives. By the way, where was he when he telephoned you?"

"At his hunting lodge in Canada," Trimble said, then looked as though he wished he hadn't said it.

"What part of Canada?"

"On Lake Copake, about fifty miles northeast of Toronto."

"Does he have any other places besides this one and his apartment in New York?" Bill asked.

"Another hunting lodge in Wisconsin and a home at Miami Beach, Florida," Trimble answered.

"Does he keep a staff of servants at all of them all the time?"

"Just a small one, such as he has here," Trimble said.

"O. K.," Bill said. "Now don't worry about that little episode of the gun. I'll just keep the gun and you can forget about it. I know how you felt about the thing. Barney will be proud of you." Bill smiled again, then turned to Sandy.

"Let's go in the kitchen and grab ourselves a glass of milk," he said. "Then we'll stroll over to Barney's airport. I want to get in touch with Tony Lamport."

After a glass of milk and two pieces of toast, which they fixed while the cook glared, Bill and Sandy asked Leeds for a couple of raincoats. Fifteen minutes later they were plowing through the two-inch mud toward Barney Cockrane's hangar.

They opened the unlocked doors and ducked inside out of the driving rain. Bill cupped his hands and called Warren's name a half dozen times. No answer came back to them.

"Mr. Warren and the mechanics seem to be taking a vacation," Bill said with a tinge of sarcasm.

"Listen, Bill," Sandy said, his blue eyes gleaming with excitement, "what's your dope on this thing now? You've got some idea in the back of your brain. I can tell by the way you act."

"The only thing I have in the back of my brain is a headache," Bill said disgustedly. "The only thing I can tell you is to keep your eyes open every minute and don't let any one get behind you. This whole thing goes back farther than I can see now. There is more to it than the million dollars we are carrying to Barney Cockrane. There are other angles we know nothing about. I haven't been able to put things together yet. I'm as much in the dark as you are."

He climbed into the forward cockpit of the Lancer, threw the key on the radio and tuned a half dozen dials. In a moment he began to chant, "Calling B. B. X. . . . Calling B. B. X. . . . Calling B. B. X."

When Tony Lamport's voice came back to him, he said, "Bill calling, Tony. Have you tried to get me? . . . No?

. . . Is Shorty around? . . . Tell him I want to talk to him. . . . O. K., I'll hang on."

"Hello, Shorty," Bill said a moment later. "Rotten static. Storm up this way. Listen, I have an errand for you. One for you, Red and Cy Hawkins. I want you to do a little checking for me. You know I'm doing a little job for Barney Cockrane. . . . Yeah, that's right. I'm up at his place in the Berkshires. He has another place, a hunting lodge, on Lake Copake, about forty or fifty miles northeast of Toronto. I want you to hop up there and look the place over. Barney is supposed to have been there. I want to know if he was there. He's supposed to be on his way back here now. You'll probably have to leave your Snorter at Toronto and hire a car to take you to the lake and Barney's place. Just nose around and find out what is what. You get what I mean? . . ."

"That's the idea," Bill said, after listening to Shorty. "And I want you to send Cy out to another hunting lodge Barney maintains in Wisconsin. You can call his office on the telephone and say you're calling for me. They'll give you information about that one. I want Cy to do the same thing you are going to do."

"Then send Red down to Miami Beach, Florida, and have him do the same thing. Either Sandy or I will hang around the Lancer most of the afternoon. If you don't get us at first, keep on trying."

"O. K., Bill," Shorty said. "We'll nose around and find out what we can, especially where Barney has been recently."

"That's the idea," Bill said. "I'm signing off. . . ."

"I don't know what that will prove," Bill said as he climbed out of the Lancer, "but maybe we'll find out something."

"Just a minute, Bill," Sandy said as he started to climb into the rear cockpit of the Lancer. "I want to get some more shells for my automatic, just in case."

Bill's blood froze in his veins as Sandy's voice came to him a moment later. He whirled and took two steps to the side of the Lancer as he gazed up at Sandy's horror-stricken face.

"It's Warren, Barney's field manager," Sandy whispered. "Look—look at him, Bill!"

Bill climbed on the step and gazed over the cowl into the cockpit where Sandy was staring. He could see the dim form of a man curled around the controls on the deck. As his eyes became accustomed to the shaded lights, he saw that the man's head was hanging back. His throat had been slit from ear to ear.

"Don't touch him, kid," Bill said quickly.

"Why is he in here, Bill?" Sandy asked in a whisper.

"Probably as a warning to us," Bill said grimly. "Or, perhaps some one is trying to frame us."

"Maybe he was the one you heard scream last night," Sandy said in a hushed voice.

"Perhaps he was," Bill answered. "They may have known he was the one who attacked us in the air and the one who clipped you on the head. He looked as though he had been flying when we landed last night. They may have known he was trying to cop the whole million for himself."

"But where was his plane when we came in?" Sandy asked.

"How the devil do I know?" Bill roared. "How do I know anything?"

IX—OFF TO CANADA

A HALF HOUR after Bill had called the sheriff on the telephone he arrived with the coroner, the medical examiner, and men from the local police force.

Bill held nothing back when he talked to the sheriff, the chief of police and his men. He told them everything that had occurred since the previous day, when old Leander Trimble had summoned him to Barney's office.

They agreed to move the body into the manager's office and keep out of sight until Bill had received reports from his men later in the day.

"Then," Bill told them, "I believe I'll have something for you. I have a hunch. It's a little fantastic, but it may work out. If it does, you can take all the credit, and there will be plenty of it. Is it a go?"

"Well," the old sheriff said, scratching his head, "it's more than a little irregular, Mr. Barnes, but we'll play along with you."

Bill cocked his head to one side for a moment, and a slight smile flashed across his bronzed face.

"This is the time for you to start," he said. "I can hear a plane a few miles off, and if I'm not surprised, Mr. Cockrane will be at the controls when it lands here in the mud. I want you fellows to duck back into the office and stay there. O. K.?"

"But this thing happened on Mr. Cockrane's property," the sheriff said. "He's a powerful man, Mr. Barnes. If he doesn't like the way things are handled, we'll all lose our jobs."

"I'll take the responsibility for everything," Bill said. "You said you'd play with me. I want you to keep out of sight and keep the death of Warren quiet. Will you or won't you play along with me?"

"We will, dang it!" the sheriff said. "You write the ticket."

"Get back in that office and keep out of sight," Bill said. He moved out to the apron with Sandy and watched the

big red-lacquered monoplane circle twice over the airport and head into the wind from the far side of the field. Its landing wheels threw up a geyser of mud and water as they skimmed the surface. For a moment Bill held his breath as the plane dipped its nose. Then the tail settled and it roared across the field to come to a stop a few feet from the apron.

The man who shoved back the overhead hatch looked tired. His face was lined and sallow; his eyes were desperate as he shook hands with Bill.

"I'm a tired man, Bill," he said in a hoarse wheeze. He shook hands with Sandy and asked them to help him roll his ship into the hangar.

"What is this all about, Barney?" Bill asked.

"I'll tell you when we get down to the house, Bill," Barney said. "I'm nearly exhausted."

While they were rolling the monoplane into the hangar, Bill studied the empty gun ports on each side of the ship.

"You got here earlier than Trimble expected, Barney," Bill said.

"Yes," Barney said. "I thought I would be delayed. I'm sorry you've had all this trouble, Bill. I wouldn't have wired you to bring that money up here if I thought there would be any trouble or danger."

"Listen, Barney," Bill said earnestly, "why the devil do you want a million in cash up here in this forsaken wilderness?"

"A business deal, Bill. I've been working on it for the past two weeks. I think, when I stick a million in cold cash under certain noses, they'll come to terms."

"I see," Bill said slowly. But he didn't see. Barney's explanation, given so casually, seemed plausible. But why hadn't he taken a million in cash on a train from New York to Toronto, with a proper guard accompanying him? "I'm going to leave Sandy here in the hangar. I'm expecting a couple of important messages from my field."

"Right," Barney said as he lifted a bag and a topcoat out of the back cockpit of the monoplane.

"There is something about him," Bill reflected, "that is different to-day. Something that has nothing to do with his worry about a million dollars and a business deal." Barney Cockrane had lost his debonair, confident attitude of a few days before. And with it, Bill noticed, had departed a great deal of his charm and natural courtesy.

As Bill passed the old dredge alongside the road, he scanned the mud for possible footsteps leading to it. Even his own had been washed out by the driving rain.

Trimble shook hands with his employer in a way that showed he was

thoroughly displeased with him. Barney chuckled as Trimble began to splutter at him and gave him a clap on the back that nearly knocked the old man's teeth down his throat.

As Barney nodded to Leeds and fumbled with the strap on his helmet, Bill stepped quickly to his side to help him with the fastener.

"Bend your head over to the right a little, Barney," he said, "so I can get at this thing."

Barney bent his head to the right, and Bill saw the same crescent-shaped birthmark on his neck that he had seen there before. As Bill unloosed the fastener on the strap, he happened to glance up and catch old Trimble's eyes with his own. He was startled by the deadly viciousness of Trimble's gaze.

A few minutes later, after Trimble had gone into the kitchen, Bill said to Barney, "Listen, old boy. The other day, when we were flying back from Nick Stewart's party, you said you thought you were going to run into some trouble. You said you wanted to talk to me about it."

"Oh, that," Barney said in a moment. "I was a little nervous that day, Bill."

"But you said you would need my help. Does it have anything to do with this mess up here?" Bill insisted.

"It's over now," Barney said shortly. "Forget it." He laughed again as he saw Trimble coming out of the kitchen. "Trimble," he went on, "whispered to me a minute ago that you had hidden that million bucks and wouldn't give it to him when he arrived. The old boy was a bit miffed, I imagine."

"He was," Bill said grimly.

"You'd better get it for me now, Bill," Barney went on casually. "Then you won't have to worry about it, either."

"I——" Bill was interrupted when the door opened and Sandy rushed in out of the rain.

"Shorty's on the radio, Bill," Sandy puffed, wiping the rain out of his eyes. "He said he'd hold on until you picked him up."

"O. K., kid. You'd better come along with me to the field. I'll have to come back here after I talk to Shorty."

When they were across the bridge and behind the first clump of trees that hid the road from the house, Bill swung around toward Sandy.

"Listen, kid," he said. "I want you to go back to the house and stay until I come back. Don't leave the place, and don't let any of them leave. If necessary, hold them with a gun, all of them! I may be back in a few minutes and I may not be back for hours. I don't know. But keep them there. And don't tell any of them where that money is. Do you understand?"

"Yes, sure; I understand," Sandy said. "But for gosh sake, don't leave me there too long."

"You do what I tell you, kid. And don't let 'em kid you into telling them where that money is hidden."

The sheriff and his men were sitting in the manager's office. Bill rushed into the hangar, his clothes dripping, and climbed into the forward cockpit of the Silver Lancer. He saw that the light on the radio panel was still burning red, so he just threw the key.

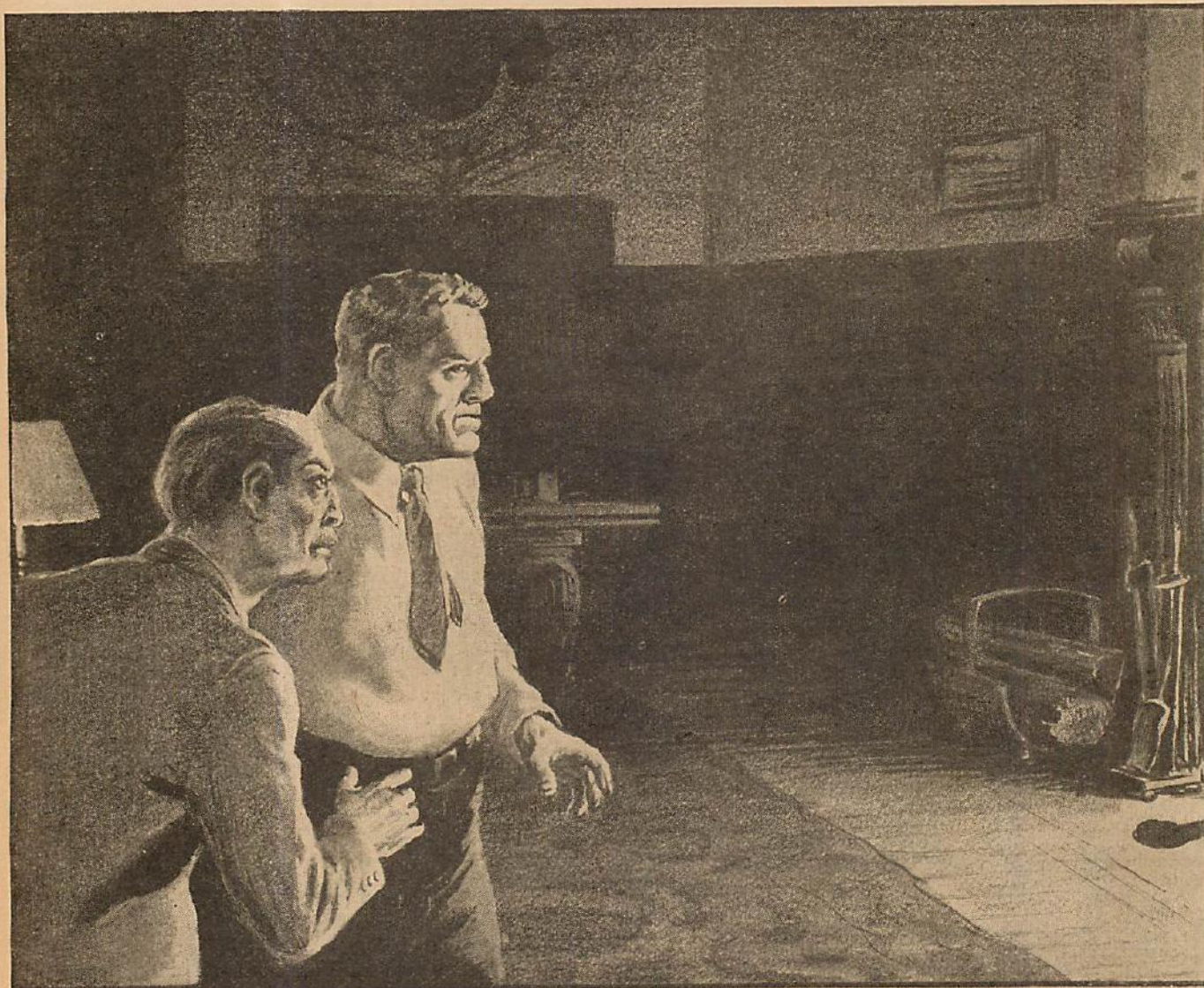
"Where are you?" Bill asked.

Bill chanted Shorty's call letters and Shorty's name into the microphone, perspiration dripping from his face, then threw the key and leaped over the side and ran to the manager's office.

"I want some of your men to help me roll my plane out on the field," he panted at the sheriff. "I'll be able to break this murder if I can get to Canada fast enough! I—" As he stopped to gulp for breath, he saw the sheriff gaz-

"Send a couple of your men down toward Mr. Cockrane's house," he said. "Have 'em stay where they can't be seen. Instruct them to prevent any one from leaving the house. *Any one!* I don't care who tries to leave. Keep 'em there. Young Sanders is down there. If you hear any shooting, rush the place. Do you understand?"

"I understand," the sheriff said. But Bill knew he didn't understand.



"Lake Copake," Shorty said. "There is a field a couple of miles from the lake. It's not far from Barney Cockrane's place. I hopped in a Snorter, opened her up and talked to Toronto on the way north. They told me about this field."

"Did you find Barney's place?" Bill asked.

"I found it," Shorty said, "and I nosed around. Something funny here, Bill. Things aren't as they should be. If it's anything important, I think you'd better come up. I don't like—"

Shorty's words were suddenly cut off, and the choking sound that came over the ether was a sound that left Bill rigid with horror.

ing at him as though the man thought him crazy.

"Mr. Barnes," the sheriff said, "I can't let you run out of here to Canada with that man lying dead on the floor."

"There will be more people lying dead on the floor if you don't let me go!" Bill shouted. "Come on! Snap into it, you men! I can't lose any time. I'll be back here within five hours, and I'll lay the murderer of Warren right in your lap. I can't stop to argue with you. Move!"

They moved. They moved as though the devil were commanding them. They helped Bill roll the Lancer out onto the apron, and the sheriff listened respectfully while Bill gave him orders.

Sandy noticed that Barney Cockrane's eyes were focused behind him. He half crouched before he whirled.

X—ONE MISTAKE

YOUNG SANDY reached under his raincoat and felt of the automatic in his pocket before he opened the door into the living room of Barney Cockrane's house. The solid feeling of the weapon gave him courage. He grinned at Barney and tried to grin at the scowling Trimble.

"Where is Barnes?" Trimble barked at him.

"He went on up to the Lancer," Sandy

said blithely. "He told me to come back and wait for him."

Barney Cockrane nodded at him and gazed into the fire.

"Did you ever do anything about having that Martinson single-seater built, Barney?" Sandy asked him in a moment.

"Martinson?" Barney said blankly. "What Martinson?"

"The one modeled after the fighter,"

"Where's he going?" Barney asked sharply.

"I don't know," Sandy said. "He said he didn't know what Shorty wanted, but he might have to leave for a couple of hours."

"Leave!" Trimble shouted. "He came up here to deliver that money to Mr. Cockrane. Why didn't he give it to him?"

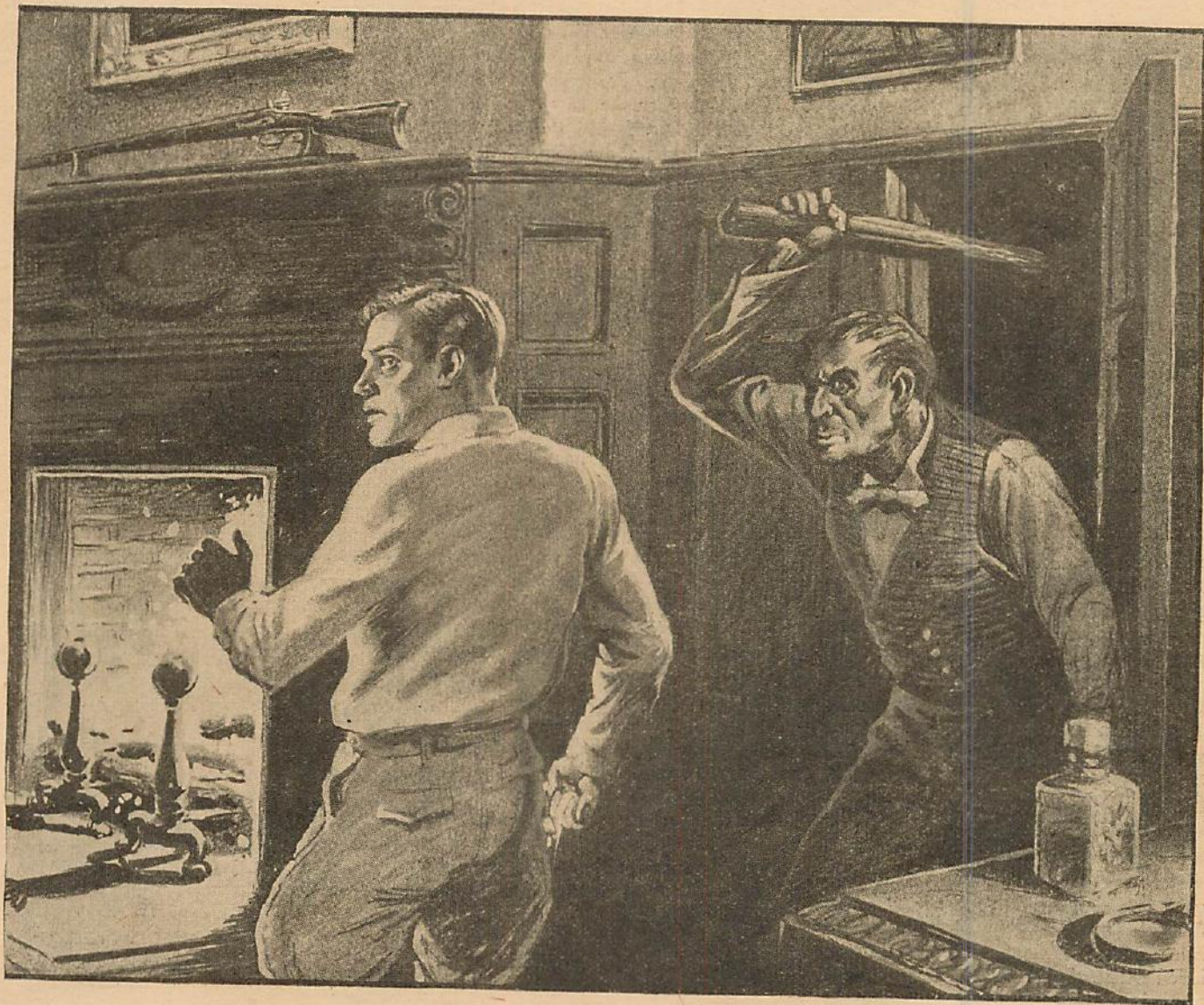
"I wouldn't know anything about

Barney said, and his expression was the expression of a man who has just been betrayed by his best friend. "He has ducked out with that million in cash and left you here to face the music."

"And you'll face it, too," Trimble shouted.

"You're screwy," Sandy said. "I know where he put the money—and it's still there!"

"Oh, you do, do you?" Barney Cock-



Sandy said. "The one we talked about that day. You said they had given you an estimate of seventy-five thousand dollars on it."

"Oh," Barney said, "that one. No, I never did anything more about it."

When the mighty growl of the twin Diesels in the Silver Lancer roared down the hill on the wind, all three of them sat bolt upright in their chairs. The faces of Barney Cockrane and old Trimble were twisted with rage.

"Is that Barnes' plane?" Trimble asked Sandy.

"Yeah," Sandy said, and he slipped his hand into the side pocket of his jacket. "She has a lot of horses in her nose," he added.

that," Sandy said blandly. He knew something was going to happen in a moment, and his heart was in his mouth.

"Listen, punk!" Barney Cockrane said to him. "Do you know where Barnes hid that money?"

"No," Sandy said, "I don't. And don't call me a punk!"

"Do you see what he's doing to you, Sandy?" Barney asked kindly. His tone and attitude had changed the way a chameleon changes its color.

"What do you mean?" Sandy asked. "He's left you here holding the bag," old Trimble cut in, his voice trembling with emotion and rage.

"Nuts!" Sandy said vehemently.

"That's what he has done, Sandy,"

Barney said. "Well, kid, unless you want to get the hide ripped off your body, you'd better tell us just where that place is."

Sandy realized before Barney had finished speaking that he had been tricked into betraying himself. A little smile played across his lips as he measured Barney and old Trimble. He had been right. Barney was trying to duck out with the million, and old Trimble was helping him. He wondered if he could argue Barney back to sanity. Certainly he was a different man than the one he had last talked to. Probably he was half crazy from worry.

"Listen, Barney," Sandy said. "You wait until Bill comes back. He'll see you

through whatever trouble you're in. He'll—"

"Shut up, punk!" Barney snarled, and he got to his feet. "I'll give you ten seconds to talk. Just ten seconds." He started to come around the end of the table toward Sandy.

Sandy's right hand came out of his pocket, and it was wrapped around the butt of his automatic. He pointed it at Barney, then swept it in a circle as Trimble made a movement to get out of his chair.

"Stay where you are, both of you!" Sandy snapped. He got to his feet and ran his hands over Barney's clothes. He took a small pistol from Barney's hip pocket.

"I don't think you have a gun," Sandy said to Trimble. "I think we got it this morning."

"A fresh punk," Barney Cockrane said. "A fresh punk who is going to be sorry he was ever fresh!"

"How much money will you take to lead us to that bag?" old Trimble asked, his face a mask of rage.

"Well," Sandy said, stalling, "how much do you think it's worth?"

"Never mind that, Trimble," Barney cut in. "He's one of Bill Barnes' high-minded young men. You can't buy them with filthy money." He shook a finger at Sandy. "I'm going to take you apart and see what makes you tick," he said.

"That'll be nice," Sandy said, "but I'll have to visit your jail to let you do it if you don't get some sense."

Sandy moved a comfortable chair over into a corner where he could not be seen from outside the room, and where any one coming into the room would be in full view. He settled down and refused to answer either Trimble or Barney.

They pleaded, coaxed and threatened him. But he regarded them much as a sphinx might have regarded them.

It was when Sandy got up and walked over to the fireplace that he made his first mistake. He had both Trimble and Barney in full sight. He could have killed either of them before they got out of their chairs. He also commanded a view of the dining room and the door leading upstairs.

But he hadn't noticed a little half door that was set in the wall to the right of the fireplace.

He stood for a moment in front of the fireplace. He didn't hear the door open. But suddenly he noticed that Barney Cockrane's eyes were focused on a spot behind him, and they were alive with interest.

Sandy half crouched before he whirled. That crouch probably saved his life, because the piece of wood that Leeds smashed against his head only knocked him unconscious instead of crushing his skull.

Leeds' imperturbable face became the

face of an animal as Sandy pitched forward like a poled ox, and he kicked him twice.

"Stop it, you fool," Barney snarled at him. "We want him alive. He knows where Barnes hid the money."

When Sandy first opened his eyes, the faces above him were mere blurs and the voices that spoke his name were incoherent. Some one jabbed a bottle of ammonia under his nose until he half strangled. He tried to struggle to a sitting position, but fell back weakly on the divan. The next time he tried it some one gave him a helping hand. He opened his eyes. He wanted to close them again when he saw the leering faces of Trimble, Leeds, the cook, and Barney Cockrane above him.

"So," Trimble snarled, "you thought you were too bright for us." He motioned to the cook, who lifted a red-hot poker out of the fire and held it within an inch of Sandy's eyes. The heat shot through his eye, his brain, and seemed to crash against the back of his skull.

"You'll talk now, damn you!" Trimble screamed at him. But Sandy didn't hear him because he had collapsed.

XI—AIR DUEL

BILL BARNES kicked his rudder and stuck the nose of the Lancer full into the northwest gale that was causing his compass needles to jiggle like dancers. The pale, phosphorescent glow from his instrument panel showed that his gyro and earth-inductor compasses were going mad as he bounced above the air pockets over the Adirondacks.

He adjusted the elevating and transverse screws on his telescopic machine gun and 37 mm. cannon sight and then threw his radio key and tuned the master control. A sound like the roar of a hungry lion sounded in his ears until he tuned out the static. Then he began to chant Tony Lamport's call number into the microphone.

"Barnes Field. . . . Tony Lamport speaking. . . . Barnes Field. . . ." Tony's voice said in his ear.

"O. K., Tony. Bill. Please get in touch with Pat Hendricks, a Transcontinental Airways pilot. He knows me. If he's in New York, send Bev Bates over to pick him up. Explain to his boss and to him that it is of great importance that he come with Bev to Barney Cockrane's summer place in the Berkshires. You can get all the dope from Barney's New York office. Tell Hendricks I'm on the trail of the men who killed Dave Reed a year ago. Do you get it?"

"I get it, Bill," Tony said. "We'll get to work immediately. Where are you?"

"I'm on my way to Canada," Bill said. "I'll be back at Barney's place by the time Bev arrives. Signing off."

As the fury of the lashing rain in-

creased, Bill had to use all his powers of concentration to keep the Lancer on its course. Air pockets were slapping him against his safety strap.

He pulled the Lancer out of a flat spin and began to check his bearings. He knew he was some place over Lake Ontario, but he wasn't sure where. And he knew that Shorty's life might depend on his getting to Lake Copake within a very few minutes.

A sharp, staccato sound came out of nowhere. It brought him straight up in his bucket seat, and his eyes became mere pin points.

Then he could feel machine-gun bullets driving into the wing and tail surfaces of the Silver Lancer; he could feel the big ship tremble under the impact. He yanked the control column of the Lancer back into his stomach as he heard a screaming prop dive beneath him.

He brought the Lancer up until he was hanging, head downward, in an inverted position. As he half rolled it, he caught a glimpse of a tiny biplane coming out of its dive. And in that one glimpse he saw that it was a thing of great speed and power. He looked down over the side as he leveled off, and saw that the little blue ship was coming back to the attack in a climb that was almost vertical. He saw it turn at almost right angles, and he knew he had an adversary with deadly punishing power.

He matched the maneuver of the biplane with a sweeping turn and stuck the nose of the Lancer upward to gain altitude. The urge for conflict was racing through his blood like fire now. This was something he understood. He was half around in a vertical bank when the little blue fighter zoomed upward beneath him. The twin guns, mounted along its engine housing, spewed out burst after burst of fire. The lead chewed through the leading edge of his left wing before he could throw the Lancer out of range.

The little biplane roared above him and chandelled back to the attack. Bill yanked his stick back and raced to meet it. The two ships roared at one another. Bill's finger tightened on his gun trips. His tracers told him that he had missed as the blue ship side-slipped out of his line of fire.

"He knows what to do with that crate, and he can shoot," Bill gasped to himself as he opened the throttles of the Lancer and stuck the nose upward to gain altitude.

The biplane came out of its dive and chandelled upward as Bill pulled the Lancer level and threw the throttle wide. The two ships roared toward one another again as Bill nosed down to meet the enemy craft. His fingers clamped down on his gun trips. His guns stuttered their song of death as fire raced

out of the wing stubs. He saw his bullets tear through the leading edge of the biplane's right wing and saw it stagger under the impact of his powerful .50-caliber bullets. Then it slid sideways, away from its center of curvature as it began to turn, and away from Bill's deadly line of fire.

Then began a vicious, slashing duel, with neither man holding an advantage. The Silver Lancer raced and tumbled through the sky, the blue biplane slipping, skidding, zooming, and diving in lightning maneuvers to escape its deadly fire.

The air above the low-hung clouds over Lake Ontario was alive with flaming lead and roaring motors. Down and down they fought—from ten thousand feet to eight, to five. Each was trying, with desperate zooms and climbing turns, to regain the altitude that would give him advantage without being killed while he gained it.

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

Minutes, which seemed like hours in air combat, ticked away. Then Bill had the blue ship's nose across his sights for that fleeting second that means death. His fingers clamped down on his gun trips. His bullets crept along the fuselage. Apparently it was unharmed, as it came slashing back in a fast Immelman, head-on.

Bill lined the ship up in his sights with the cool precision that had saved his life a thousand times. This time his finger clamped down on the trigger of the 37-mm. cannon. There were three explosions as the shells struck the engine block of the blue biplane. Then a terrific explosion and a great cloud of black smoke took the place of the little blue ship. Orange and saffron flames shot out of the mass with bits of debris.

Bill wiped the perspiration out of his eyes and watched the wreckage plunging toward the lake.

He glanced at his watch, checked his bearings again and stuck the nose of the Lancer down through a hole in the clouds ahead.

Great red stretches of woodland and flat, rolling fields appeared below him. Ten miles off to the northwest he could see the dark, choppy waters of Lake Copake. Off to the right he picked up the great white arrows that pointed to the landing field Shorty had mentioned.

He stuck the nose of the Lancer down and circled the little field twice while he confirmed the direction of the wind by the orange windsock. He saw Shorty's Snorter sitting on the ground near the apron. There were a half dozen men moving around the hangars, but no sign of Shorty.

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He taxied the Lancer across the field, rolled it up beside the Snorter and killed his engines. Before he got out he made contact with Tony Lamport on Barnes Field and told him where he was. Then he slid over the side, an automatic in each of his leg overall pockets.

Bill shouted at the first man he saw coming out of the office.

"Have you any idea where I can find the manager?" he asked.

"I'm the manager," the man said, and he stuck out his hand. "It's an honor to have you use our little field, Mr. Barnes," he added.

Bill shook the man's hand. "Do you have any idea what happened to the man who landed that amphibian—that Snorter?"

"Why," the manager said, "he went over to Mr. Cockrane's. A couple of men from Cockrane's turned up here, and I told them he had been asking about Mr. Cockrane's place. They went over and talked to him, then he went with them in their car."

"Do you have a car I can borrow for a bit?" Bill asked, trying to control his excitement. He knew only too well why Shorty had gone with them.

"I'll let you take mine," the manager said. "She's old, but she'll run."

"Where is it?" Bill asked sharply. "I don't mean to be short, but I'm in a hurry."

"There she stands," the man said. "The key's in her."

"I go which way?" Bill asked, poised like a man about to sprint.

"That road there," the manager pointed. "Straight out. First right. Next left and you'll see the driveway."

"Thanks," Bill said, and he started on a run for the little roadster.

He went out across the air field, down the dirt road and took the first right turn on two wheels. His heart was pumping in his chest, and his lips were dry as he swung around the next left turn. The little motor in the car he was driving was singing, "Too late! Too late! Too late!"

When he came to a driveway and saw a sign with Barney Cockrane's name painted on it, he killed the motor and parked the car alongside the road. Before he got out of the car he checked the two clips in the automatics.

Instead of going directly down the driveway to the long log house along the lake, he cut across the lawn. He darted from one tree to another.

He ran across the driveway to the closed front door and stood listening. Then he moved stealthily along the side of the house, pausing at each window. As he neared the end, the end that he supposed was the kitchen, he heard the rumble of two men's voices coming from inside. He moved toward a door that opened on the side lawn. He could tell by the thickness of the voices that the men inside were, or had been, drinking.

For a moment he hesitated. Then, hand on gun, he stepped round the lean-to and pushed the screen door open.

The two men who sat there stared at him for a brief second. They were both

big, powerful men, and their bloated faces were red from whisky. As Bill started to speak, the one nearest him moved as only a big, fast man can move. He glided over the floor and threw a hamlike fist at Bill's chin before he could duck. Bill rolled his head with the punch, but it drove him back against the wall and he instinctively took his right hand away from the butt of his automatic to return the blow. It landed flush on the nose of the big man and flattened it out across his red face. A second later Bill's left spun him half around, and Bill closed in on him when he saw the other man had a gun in his hand and was trying to get in a position to use it.

Bill's right arm curved around the big man's throat while his left sought and held the man's left wrist. While he half strangled the man with his right forearm, he brought his left arm up and twisted it until the man howled with pain. As the man's arm snapped, Bill threw him at the man with the gun. They both crashed against a table and sprawled on the floor.

From the floor a gun spat orange flame. Bill felt the bullet fan his cheek. Then his own gun was in his hand and he fired two shots that crashed into the shoulder of the man with the gun. The gun spun across the room. Bill picked it up.

He didn't wait to see what might happen next. He threw open a door leading from the kitchen and raced through the rooms on the first floor. They were empty.

At the end of the hallway on the second floor he found a room that was closed and locked. He smashed on it with the butt of his automatic once and heard a smothered cry from inside. Then he half tore the door from its hinges as he threw his entire weight against it.

Shorty Hassfurth's red-rimmed eyes gleamed at him from a face that was bruised and bloody. He stripped the tape off Shorty's mouth and cut the ropes that bound him.

The next instant he was bending over a man who lay on the bed. He shook him, and when his eyes opened Bill did not have to be told that the man was drugged.

"How you feelin', fella?" he asked Shorty.

"Fine," Shorty said in a voice that was a wheezy whisper. "Just fine! I never felt better. What the hell is this all about, Bill? What is Barney Cockrane doing here in his own house, drugged to the ears?"

"I don't know whether it is Barney Cockrane," Bill said. "I can't stop to tell you about things now. We've got to get this man over to the Lancer, get him in it and back to Barney's place in the Berkshires. Can you fly your Shorter?"

"Shucks, yes," Shorty said. "I just can't talk. They jumped me and almost pushed my larynx out through the back of my neck. What about those lugs downstairs?"

"They won't bother us," Bill said.

When Bill and Shorty had their planes well warmed up and ready to take off, Bill motioned the manager of the air field over to him and told him about the two wounded men at Barney Cockrane's lodge. He jazzed the twin Diesels in the nose to drown out the manager's breathless questions. Then he kicked the ship into the wind and took it off in a long, low climb.

At five thousand feet he leveled off and threw his radio key to speak to Shorty.

"We've got to go like the devil," he said. "Sandy is back there at Barney's place with a pack of murderers. If they get to him, they'll torture him until they get what they want."

"Let's go!" Shorty wheezed into his microphone.

XII—SANDY'S REQUEST

THE SILVER LANCER became a shimmering streak of light as Bill opened his throttles and sped southward. He left Shorty far behind him for a time, but when he slashed his wheels into the mud at Barcock Field, Shorty was gliding down for a landing.

As Bill rolled up to the apron, the sheriff and his men came out of the hangar. Bill motioned to them as he locked his wheel brakes. "Help me get Mr. Cockrane out of the rear cockpit. Take him in the office. He has been doped. Anything happen at the house?"

"Nothin'," the sheriff said in answer to Bill's last question. "You say that's Mr. Cockrane?"

"I don't know," Bill said. "I want your men to come with me. I may need them. They're all armed?"

They closed in on the house from all sides, their guns ready. Bill told Shorty to come with him, and they covered the doors in the driveway that led to the garage and kennels. As they rounded the corner of the house, the big man who had called himself Barney Cockrane came out the door with a gun in his hand. Behind him was Trimble.

The big man opened fire at Bill at a distance of twenty feet, and for an instant Bill did not expect to live. Then he cracked down with his own automatic and emptied it, while Shorty answered old Trimble's fire.

The man who had called himself Barney Cockrane pitched forward on his face, and when Bill rolled him over a moment later he knew he would never call himself anything again.

Then Bill was down the stairs in three leaps and into the dining room. Sandy was strapped to a chair; his face was a mass of angry welts, and his head was

matted with dried blood.

"Get a doctor," he said to the sheriff as he carried Sandy's unconscious form into the other room and laid him tenderly on the couch.

It was while he was trying to bring Sandy to consciousness that they carried old Trimble down the stairs, and the man Bill had brought from Canada in the Lancer came into the room.

"Well, Bill," the real Barney Cockrane said, "you just made it."

"I wasn't sure of you until now," Bill said. He shook Barney's hand. "But I knew there was something very peculiar happening. Maybe Trimble will tell us about it before he dies."

"Die?" Trimble said. "That's the worst of it. I don't think I'm going to die. But there isn't any use in trying to cover up any longer. The man you shot upstairs is Barney's brother. He was supposed to have been burned in a fire at the orphanage when they were both children. But he didn't die. He ran away at the time of the fire, and they thought he was dead. Old Anthony Cockrane told me about it. I never told Barney about him."

"Before that Transcontinental Airways plane was robbed a year ago, I located Barney's brother. We started to plan. I would have won, too, if it hadn't been for you, Barnes. Barney was suspicious that something was wrong, but he didn't know what. Then we kidnaped him. But we needed a million or more to fix a few people we had to send out of the country before Barney's brother could take his place as the head of North American Steel."

"But he wouldn't have been the head. I would." Old Trimble's white face twisted into an insane leer.

"Who killed Warren?" Bill asked.

"Leeds and the cook," Trimble said.

"He was trying to double-cross us."

"You had me puzzled," Bill said to Barney, "because of that birthmark. You look as much alike as two peas."

Barney looked startled for a moment, then started to speak.

"We had your brother's mark tattooed. It matches yours perfectly," Trimble interrupted.

At just that moment Sandy's eyes opened and he tried to struggle to a sitting position. As his eyes focused on old Trimble, they filled with loathing.

"It's all right, kid," Bill said.

"You're a game kid, Sandy," Barney said. "I'd like to do something for you—anything."

"You're the real Barney?" Sandy asked, a little bit dazed.

"I am," Barney said. "And don't forget, that goes. Anything—anything at all that you want—"

"Listen!" Sandy said, pointing at Trimble. "Move that old buzzard over here and let me clout him—just once. That's all I want in the world!"

TAIL SPIN

(Continued from page 35)

be separated by several miles. He broke through the clouds, found himself about five hundred feet above the ground. He based his estimate on the distant, shifting flood of automobile headlights along a road, and other twinkling lights. He guessed that the highway was a mile away. That highway would lead him into River City to make his report—

He was too late to slip to safety when he saw that he was over an orchard.

The landing shock came in a second. The webbed canvas straps and heavy buckles of the parachute harness bit into his flesh and wrenched his muscles as the silk above him snared the topmost branches of a tree. He hung, suspended by shrouds, a yard from the ground. He kicked his feet, shifted his body. This didn't work. He began jerking the shrouds one at a time. As he pulled, he could hear silk tear above him. It was slow work, but bit by bit he lowered himself.

In fifteen minutes the last snared panel of the shredded chute gave.

His feet jarred beneath him.

He unsnapped the harness buckles, dragged himself through the plowed ground of the orchard toward the firefly brightness of the highway for the next quarter of an hour. He visualized the crash. The monoplane diving in. The rush of the mob, on foot and by car, to the scene. Perhaps the growing glow of flames. Flashlights and lanterns. Gaping bystanders. The bloody body. A shapeless mass of wood, steel and wire, if the flames hadn't reduced it to hot metal and ashes.

And, soon, fifty thousand dollars for him.

He reached the road, flagged and thumbed cars. All passed him by. Then a white sedan bearing a State seal on the rear-door panel braked, skidded to a halt. A spotlight limned Middleton. He suddenly became conscious of his helmet and goggles.

"Aviator, eh?" he heard. "S'matter,

fellow? How'd you happen to drop in on us?"

"Forced landing!" Middleton snapped. "I bailed out. I want to go to the River City airport. I've got to make a report to the Department of Commerce inspector there."

"Okay. Climb in. We pass by it on the way to the city."

Middleton saw that there were two State policemen in the machine. They plied him with questions. He was cagey, evasive. Careful not to overstate himself. The trip was a short one.

"We'll go up with you," one of the patrolmen said. "We know Inspector Sargent. And we have to report all airplane accidents. State law."

MIDDLETON faced Department of Commerce Inspector Winfield Sargent across a desk in the latter's office at River City airport. He noticed that the inspector looked harassed, nervous, tense. He had to feel his way. He had a question ready.

"I suppose you know what's happened —" he said.

Sargent nodded.

"It was terrible. You've found the plane?"

Sargent inclined his head again.

"And Bentley—" This was the hard part. Middleton felt all gone inside. What if Bentley lived? Yet there wasn't a chance. "Did he—use his parachute?"

"No," revealed Sargent flatly.

"Good Lord!" Middleton gasped, inwardly approving his histrionics. "The poor devil!"

He groped for a chair, sat in it, cushioned his head in his hands.

"He was a friend of mine, too," Sargent said. "Suppose you tell me just what happened. I've got to make out a report. Your testimony is important."

"Of course." Middleton cleared his throat, spoke hoarsely.

"We were at fifteen thousand feet. Bentley was at the controls. I was lying down above the gasoline tanks, dozing. He shook me. He shouted: 'Middleton, the oil screen's clogged and the

motor's gone. Something's the matter with the controls. We're starting to spin. Bail out. I'll follow you!' I jumped—and that's all I can tell you."

"Very good."

Sargent pressed a button on his desk. A door to the office opened. Middleton turned a greenish yellow under his stubble, leaped to his feet, his hands groping foolishly.

"Good God!" he muttered. "What's this? He didn't—I didn't—"

"No, you didn't kill me," Bentley cut in, finished. "The correctional gyroscope works perfectly, Middleton. You'd know that if you hadn't been too yellow to fly tests with me in Paris. It's worth a hell of a lot more than anything I might have gotten out of this distance flight. At first you could have had a partnership in it. But you cheated me and lied to me, just as you cheated and lied to your stockholders. You double-crossed me because I trusted you—stole what might have been my share of the money from the flight. I was sure that you'd try to pirate my invention if I told you the truth about it, so I told you it didn't work. I didn't know, then, that you contemplated murder. Yes, it works, Middleton—brought the ship out of that spin and held it level until I recovered from the sock you gave me—"

Middleton, beside himself, whirled on Sargent.

"You lied, too. You tricked me into this—"

"I beg your pardon, Middleton. I merely said that I had seen the plane, which is now in the far hangar here at the field, and that Bentley hadn't used his parachute."

He turned to the State police.

"He's so smart he tricked himself. Book him on a charge of assault with intent to kill."

The men started forward. Bentley brushed them aside. His fist cracked up with the speed of a striking snake. Middleton caught the blow on the chin, folded like an accordion. Bentley looked down at him.

"Now I feel better," he said, rubbing the bump on his head.

KIWI CLIPPER

(Continued from page 28)

wanted to prove his love he would not only beat Tom Deval, but find some way to get the airport put in at Pine Notch.

Ace was so enraged and hopeless at dinner that he ate a full bowl of prunes without thinking. The result was a very sleepless, uncomfortable night. But during the hours before dawn, was born the big idea.

"Listen," Ace said, button-holing old man Foote next day, "I'm going to hijack that airport if you'll help."

"Me?" asked the old man suspiciously, wondering how to appear most broke.

"You. The engineers and army men and commission will all be at the races, won't they?"

Foote nodded. The formal assignment of the airport project to Elkton would be signed immediately after the races.

"All right. Then you've got to see that Tom Deval gives a lunch for the big shots at his own house, and that I'm present. And right before the races."

Winking mysteriously, Ace disappeared and became a man of mystery. He was all over Bald Mountain and Elkton township flying kites. He had doz-

ens of them up—in rows, triangles, formations, hodgepodge—at sunup and sunset.

Then strange packing cases and grinning, tanned men arrived at the Tighe place. The barn took on furious activity. A few overcurious souls felt the sting of rock salt and thereafter stayed clear.

There was a deep notch which cut through Bald Mountain, joining the Elkton and Pine Notch valleys. Through it, tearing in one direction or the other, or both, rushed the hot and cold drafts from the two valleys.

At this spot on a windy day appeared Ace, his tanned helpers, a roadster, and

a giant box kite. Small balloons were sent up, their course noted.

"Boy, there's no time left for you to borrow!" one of the tanned men said seriously to Ace.

Ace grinned feebly and strapped on a parachute. "I've got twenty seconds yet. Let her go."

Taking a seat in the center of the box kite set on skids at the edge of a sheer cliff, Ace waved an arm. The men in the notch road many yards beneath, much whiter than Ace, hesitated, then climbed into the roadster and poured the barrel. A long rubber tow cable stretched out side by side with a ground rope. There was a ping and a swish.

The kite catapulted from its skids, spun giddily through the air. It cleared the cliff, started to drop.

"He can't even get clear to jump!" a man muttered through clenched teeth.

But that second the kite shot up on a hot-air draft, rolling slowly on its ascent. Then it leveled off on an even keel. For a second the ground rope pulled sharply where it had looped a side. The kite tilted dangerously as Ace shifted weight to free the rope. Then the rope slipped free and the kite rode buoyantly on the swift mountain vertical and horizontal drafts.

An hour later Ace bailed out of his kite, a mischievous grin on his face.

TO ANYBODY but Ace his motor would have been a complete wreck. But Ace talked to it, joked with it and gave it mechanical jolt-downs. It began to recuperate. Finally it barked its disgust for past brutal treatment and decided to go back to work.

Precisely what Ace was doing with all his cases of supplies and workmen, nobody could find out. Tom Deval passed the state of curiosity and began to worry. Ace might have found some means of getting together a fast racing ship.

Deval set to work on the test-race rules committee to assure the exclusion of more powerful ships than his from the important race. He arranged a course and steeplechase with a fast power dive at the end where his Corsair would show to best advantage. That power dive made Deval feel safe. His Corsair was built to take it. A fast ship built for level-course racing would go to pieces on the long dive.

Deval slept soundly that night for the first time in weeks.

So did Ace. His ship was nearly ready—ready for Deval's new rules!

He had but two more worries in the world: the first was that the weather wouldn't come out the way he figured, and the fierce blasts of freak wind around Bald Mountain fall below par; the second was whether or not he would live to enjoy the lady and the airport he was winning.

It was General Tighe who let slip the first gossip that nearly caused Pine Notch heart failure the day before the race.

"What's Ace's contraption look like?" old man Foote asked the general.

"Looks like a hen house with a motor truck on front," the general admitted.

Old man Foote grew thoughtful. He had been a little confident in the love of the wild Ace Tighe for his daughter. Yes, more than a little. He had even allowed it to get noised around that he had figured out a way to get the airport switched to Pine Notch and was letting Ace help him with the plan.

"Ace said it was a crate," the general confided. "What's a kiwi?"

Old man Foote expanded importantly. That was one flying term he had picked up from Lassie. "It's an Australian bird without wings. It can't fly. A cock-eyed pilot is a kiwi."

The general turned slightly green. "He's named it the *Kiwi Clipper*," he whispered hoarsely.

The general was capable of great mixed emotions, and he thought simultaneously of nine hundred dollars and his son's funeral. No trout was worth that!

Old man Foote had a single-track mind. He could only think of the county chairmanship.

"HOWDY, ACE," said "Doc" Wilson at the apothecary's the morning of the race. "Arsenic or prussic acid?"

"Jalap," Ace said haughtily. "Pap's got dropsy."

Doc Wilson dug around in a drawer. "Thought he looked a might ailing, but just figured it was worry over a nitwit family." He slapped down the purgative.

"Got money on my race?" Ace asked.

"Practically even money," Doc confided. "I'm only giving five to one that Tom Deval will leave you in the barn."

"Don't worry about pap, then," Ace advised. "You don't know it, but it's his money you're betting against."

Doc Wilson had the uncomfortable feeling that maybe General Tighe had not given an accurate description of the contraption in the barn.

At noon the crowds assembled at Elkton. The airport commission and Colonel Cockles, regular army commissioned officer of the nearest service field, came on the scene to the blare of a brass band.

"All entry ships on hand?" the colonel asked. "Where's this *Kiwi Clipper*?"

"Probably can't get off the ground," Deval grinned.

"My hat!" the colonel gasped, his eyes riveted on the near-by mountains. "What's that?"

Everybody gaped. That was the *Kiwi Clipper*. It wallowed toward them like a drunken buzzard and landed with diffi-

culty. It wanted to go up instead of down.

"Miraculous!" the colonel said as Ace swaggered up.

"It could stand a bit more paint," Ace admitted.

No plane ever attracted more attention since the days of the Wright brothers. The *Kiwi Clipper* was all wing with giant flippers. The lifting edges rose like hills. There was enough lift for six ships.

There was a peculiar lump on the fuselage in the slip-stream line, evidently a hasty and badly made repair. There was a decidedly uncalled-for ridge at the fore end of the fuselage where the motor joined, and the wings looked very weakly attached.

"What are the odds on Deval and me?" Ace asked.

"They were five to one on Deval, but they're about thirty to one now," old man Foote said dismally.

"I'll lay another thousand," General Tighe groaned. "I'm ruined now. I might as well mortgage the homestead, too."

Old man Foote nodded and bet six hundred of his own money. Fifteen minutes later he found he had absent-mindedly bet on Ace instead of against him. The shock numbed him against the ribbing of political rivals.

"R-r-r-ph!" snorted Colonel Cockles after the inspection. "It must fly because it got here. But Heaven knows how! Stay away from over the stands."

"He'll never get over them!" Deval guffawed, but Ace's innocent smile was suddenly very disquieting to his humor.

The luncheon was what might be expected of Tom Deval, about to become the most important young man in the section.

"I've put you next to Lassie, across from the colonel," Tom said magnanimously. "A favored seat for your last supper, Ace."

Ace beamed good will. Lassie sat stony-faced, after a tearful, whispered outburst that Ace was trying to make a fool of her and Pine Notch. Ace made little clucking noises and three times leaned over to speak to somebody beyond the colonel's chair.

"When you're through leaning in my plate, I'll eat!" the colonel barked finally.

"I hope so!" Ace murmured fervently.

"Young man," the colonel said to Ace just before the start of the steeplechase, "you're not only a lunatic, but a nuisance. Just why do you think the course of this test race should be changed?"

"Well, it's this way," Ace said innocently. "It's a good race course, but it doesn't cover any true landing routes. Now the way it cuts across the valley down there, all in-bound northeast ships would have to buck tough cross winds. At times they're positively dangerous.

Even in calm weather like to-day they're bad."

Colonel Cockles scowled and snapped a look at one of his engineers.

"I have some men down the line with balloons," Ace said hurriedly. He brought out a red flag and waved it. "Watch this one released from the five-mile pylon."

A large balloon shot from the ground down the valley. At five hundred feet it jerked like a meteor toward the mountains. At seven hundred it jerked back. It went through gyrations that made barnstormers wonder if Ace was inside. Deval looked dumfounded.

"Why wasn't this reported?" the colonel asked. "That air is like a hurricane." He glared at Deval and the engineers, then signaled his own pilot and took off down the valley in his Curtiss.

Ace glanced hastily at his watch. Twenty minutes since lunch. He prayed that the colonel's stomach was not as leathery as his face and hands.

There was a bumpy cross draft where the colonel was headed, but nothing like the flight of the balloon would intimate. But Ace had seen to the balloon's erratic course by the simple process of suspending a heavy weight on a rubber band midway of the balloon's inside. Whichever way the balloon was jerked, the weight swung against it and jerked it back. A wild flight resulted.

The army ship met the cross drafts squarely, bucked through and found itself a half mile off course. This the pilot knew was not due to the drafts so much as the flood of orders suddenly coming from the colonel.

But the colonel only knew two things: that it was the most treacherous air belt he had ever passed through, and that he wanted to get back to the field buildings as quickly as possible. If the bumps on a calm day would upset an old skyhawk like himself, what would they do to passengers on a rough day?

Ace was not among those who surrounded the colonel as he climbed from his cockpit. But Deval was.

"You see, it wasn't so rough," Deval blurted.

"Not rough?" the colonel roared. "It's a cyclone path!" He turned pallid, pushed abruptly through the crowd. "Important phone call!" he snapped and headed on the double toward the temporary field buildings.

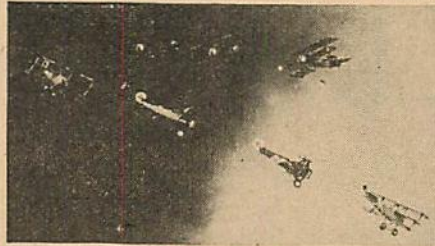
"Outrageous! Reset the course as Mr. Tighe suggested," the colonel ordered on his return. He eyed Deval malevolently. Not rough! It had nearly shaken his rugged Curtiss pursuit to pieces! To say nothing of himself.

"I hope this won't affect your decision on the airport," Deval said with sudden worry.

"Hm-m-m-ph!" grunted the colonel. "Dangerous airs. Should 'a' been in the preliminary report."

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"Matter of fact," Ace remarked, "this side of the mountains is much bumpier than the Pine Notch side. By the way, colonel, Pine Notch is in more direct line between your field and Washington. You can't cross these mountains for a hundred miles in thick weather."

"By thunder, we'll look into that! Was no truth told in that report?" the colonel roared. "What are those small balloons going up along the new course?" he snapped suddenly at Deval.

"I—uh—I'll have to find out," Deval said with a suspicious glance at Ace.

"Oh, those," Ace said cheerfully. "I had my men take them over along the mountains to show the colonel how the drafts are on that route."

The balloons shot up and gyrated as if an unseen terrier were shaking them violently. Forked lightning would be straight by comparison with their erratic course.

"Terrific drafts!" the colonel grunted. "Terrific," Ace repeated. He thought of the small containers of compressed air with alternating outlet valves which were impelling the balloons on their way. "Imagine bucking those drafts, colonel."

The colonel imagined. He felt decidedly real results taking place in his stomach. He grew white, and then green.

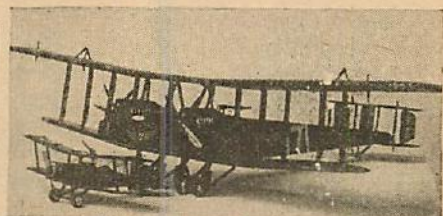
"Terrible—greatest engineering laxity — As for Deval's sworn statement on local flying conditions—" The colonel's voice became hurried. He turned a shade greener and walked sharply toward the field buildings again. "Important call to headquarters," he sang back gruffly.

Deval had a sudden acute feeling that all was not well. Studying the *Kiwi Clipper* more closely, he recalled that Ace had spent most of his boyhood flying kites around those parts. More recently, Ace had been seriously interested in kiting.

Ace's *Kiwi Clipper* was nothing more than a strange kite with a motor!

"Solomon love me, he's going to ride the air currents! And I gave him the idea!" Deval moaned.

Then Deval laughed. As the new



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CHRISTIE BATLAS

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course was set, incoming planes from the north, east and west would have to make an almost perpendicular dive onto the field. The *Kiwi Clipper* couldn't stand an ordinary dive—but just to make sure Deval called this to the colonel's attention.

The colonel eyed the notch. There was nothing to it but to give in to Deval. The dive was increased a thousand feet and made nearly perpendicular. This called for a landing rule: planes must come out of the dive under two hundred feet and stay beneath that altitude until crossing the finish line or else, in event of looping out of the dive, make one lap of the field.

Ace heard the new ruling with a sick grin. Cries of "Contact" and the snort of powerful engines were already clattering the air. Cloud-busters were raring to go. At the side of the field the army pursuit squadron was drawn up, but would not participate.

Ace noted two fast jobs of the Curtiss pursuit type, three Corsairs, two racing Gee Bees exhibiting for fuel companies. Two Travelair biplanes and a special Wedell job completed the entries. All were fast, rakish, powerful, streamlined and sturdy.

The *Kiwi Clipper* had already been rechristened *The Coffin*.

Ace suddenly rushed over to the colonel. "Stomach—cramps! You know how it is, colonel. And I don't want to miss the race."

"Hm-m-m," said the colonel. "Decidedly unregulatory. But I might delay the start four minutes. In fact, I'll walk over with you."

"I think it must have been that lunch," Ace said talkatively. "I've had cramps ever since. So have some of the other boys. Deval didn't eat his, so he wouldn't know."

"Deval didn't eat his lunch?" the colonel nearly choked. He thought of unreported wind conditions, no reference to lines of flight into proposed port—a port divided from his own field in thick weather—a man who didn't eat his own lunch—The colonel was suddenly seeing the plot. Deval had been trying to keep him from the race he was to witness by giving him some sort of pto-maine.

Out of the sympathy born of a mutual affliction, he wished luck to the flapping *Kiwi* which attained altitude fast enough, but seemed temperamental about its forward progress. The two Gee Bees were far in the lead and the rest bunched around the first pylon, while the *Kiwi* staggered along behind.

Between the first and second pylons there was a short dive and a long climb. Ace held his breath on the dive. Noises which had nothing to do with wind streams shrilled in his ear. There was a nasty vibration from the right wing.

Working outside the field his eyes picked out a landmark. He reached the bottom of his dive, worked a few yards farther out. With a thud and a jolt he was hurtled skyward on the burst of hot air from the plains beneath.

At the second pylon he was above the field and evenly handicapped with all, excepting the fast Gee Bees still out in front. The maneuvers of that leg he took easily, saving on stress. His gray eyes were covering the long last leg and studying the terrain toward Bald Mountain. It was by that sheer pile of rock that they would get full altitude and make the final dive.

Beneath Ace the Elkton plains stretched smooth and hot under the summer sun. Rolling off in piling waves, heat tumbled toward the cool, watered mountains, striking the downcoming cold drafts, bursting upward with a surge of immense force. But those perpendicular streams of air were narrow and ran side by side.

Running out from Bald Mountain and swerving sharply at the very edge of the temporary field was a deep gash in the valley floor, a black, shadowed gorge which sucked down the cold air from the high altitudes.

"Well, *Kiwi*, you can fall at least!" Ace said to his ship. It assured him it could, with several groans and lurches.

Coming onto the mountain leg, Ace shot far outfield again, caught the fast drafts rushing up the mountainside, bolted for ceiling. Deval looked back from beneath and followed suit. He was not used to riding drafts and fumbled his stick. Ace grinned grimly.

Barnstormers had seen the maneuver and headed outfield in a body. The Gee Bees put their noses in toward the mountain.

"Nice party," Ace thought. "But what a surprise you'll get!" He was far above the field.

Cutting in ahead of the field, the Gee Bees were caught in a chaos of hot and cold lateral and vertical drafts clashing against each other from an unseen notch in the mountain. Trying to kick free into the one-way streams of the hill crests, they ran into sharp inner down drafts.

For a few seconds they stuck it out. Then dropped, bucked through cross drafts again, found themselves way below altitude and hopelessly outdistanced. The two Gee Bees, built for speed and not fight, nosed for ground.

Deval had cut in front of Ace, was gaining fast. He was flying more surely now with gun on full. Ahead of them was the big pass from Pine Notch to Elkton.

Ace worked into Deval's blind spot, veered course suddenly, took a swift drop, banked and caught a hot draft coming out of the valley beyond the pass. His plane skyrocketed under the tip of Deval's wing.

Deval, sweating a grimace at Ace's laugh, banked off sharply. Too sharply. He skidded, went off on one wing, fell into the full force of the upcurrent and flipped topside.

Swearing vengeance, Deval came out of it to find he had lost altitude. The field had passed him. Barnstormers were gunning toward the last pylon from where they would swing out of the rocky drafts and get smooth diving air.

Deval looked for Ace, and his face blanched. The *Kiwi* was heading over the river gorge, going to risk diving down a fast draft almost on top the field.

The flier hesitated. A power dive down that draft, a loop out through swift, hot upcurrents, and the wings of even the sturdy Corsair might go. Then, face taut, sure that the *Kiwi* would break up beside him in mid-air, Deval headed toward the gorge.

Kicking his stick, Deval felt the swift drop, felt the swifter one and slight shock as the draft clutched him. The air was filled with a deafening jumble of screams as birdmen put their noses into power dives. But Deval had eyes only for the fantastic *Kiwi* now above and behind him. At least he had eliminated Ace Tighe!

But the next second the air beside him was filled with the *Kiwi* hurtling

under full gun in a dead perpendicular. It screamed. It roared. Then it barked.

Deval shut his eyes. Ace had overstressed, was cracking up on his dive!

Deval went ice-cold, banked to get clearance, felt himself skid and wobble. The *Kiwi* went beneath him. One wing snapped clear. The ship jerked violently with a sickening whine. The other wing ripped, bore back slowly, snapped in twenty pieces.

In that moment Tom Deval felt like a murderer. He had known even before the race that the wabby *Kiwi* could not stand the stress of a power dive. But his eyes were glued, fascinated, to the fuselage of the *Kiwi* beneath him. Never before had he seen a wingless ship hurtling earthward under power. It dropped like a meteor.

"The saints forgive me!" Deval choked. He felt sick and giddy and nearly kicked into a falling leaf in sudden nausea. Pieces of wood and canvas still tore loose from the *Kiwi*.

Then something large whirled off. It was the motor, prop still whirling in a shining dive toward earth. It left a pocket in the head of the *Kiwi* which caught wind, threw the ship into mad gyrations. Deval pulled off into an updraft to be clear. He lost speed, but stared entranced at the dancing thing going through the air beneath him.

Ace's ship tore downward in a drunken, crazy rush, a chicken of the air with its head cut off. It was almost atop the field now. White-faced men and women arose shrieking in their seats. The colonel was scarlet. Why in the devil didn't the madman bail out?

Suddenly something white billowed out behind the *Kiwi*. There was a deafening report as a giant chute snapped open. The *Kiwi* stopped dead in mid-flight, snapped to the top of the chute, fell back and spun madly. Its flippers and rudder wiggled wildly, throwing off glints of sun.

"He's mad, utterly nuts! He's parachuting his ship!" the colonel bellowed.

But Ace had only one terrifying thought. If his chute held and he was swinging, suppose he landed short of the finish or swung across the line at the top of a loop—and over the two-hundred-foot altitude mark?

He knew the next instant. The *Kiwi* swung down on a great loop, hit the ground with a thud, bounced, sailed under the very noses of the judges, and crashed in a heap fifty feet beyond. The gondola had come down after the chute.

This was hard on Ace, but much harder on Colonel Cockles, who had been feeling pains in his stomach for a full five minutes. Ace collected himself from the wreckage in a daze and staggered into the colonel's arms.

"Oh-h-h-h-h—darling!" cried Lassie, running up.

"Don't bother me—I've got to phone," Ace gasped.

With a look of commiserate relief, the colonel signaled a field car and personally rushed Ace Tighe toward the field buildings. In that moment the colonel felt that here was the sort of stuff of which heroes are made.

"I'M DANGED," said old man Foote that night, "if I see how you got that old army bulldog to fly you over here in his own ship and then pass on the rec-

ommendation for an airport in this valley, Ace."

Ace gave a comprehensive gesture. "We had much in common. At least the colonel thought so."

"I think he would have shot Deval if poor Tom hadn't landed and fainted from fright," Foote rambled on. "Say, what was that stuff you sprinkled in the colonel's food at lunch?"

"Oh, that," Ace said innocently. "That was just some medicine for dropsy. Jalap they call it. Try it sometime."

"I won an election campaign with it once," Foote chuckled. "Well, I hear Lassie up now. You better talk soft, Ace, and make up for making her faint that way. Remember now, you got to be reliable and careful with women-folk—"

"Like you," Ace said, and stood up to grin at a very mad-looking young lady.

"Call me Kiwi," he said.

"Only Ace Tighe could do it!" said the local paper next day. It showed a picture of the new Mrs. Tighe.

CHRISTMAS

(Continued from page 20)

They sat in the gloomy little room at the Three Widows for an hour, while Braid poured out his soul and Manders listened to a man take off the clothing that covered his brain.

"So you can't take it?" Manders said, at last.

"I've taken enough," Braid said, as quietly. "I can't go on. I'll go mad, Pete."

"If you'd leave that stuff alone," Manders said, pointing at the bottle before them, "it might help."

"It's the only thing that lets me escape from myself," Braid said.

"You hide behind it," Manders sneered. "O. K. It's your life, fellah. But wait until after to-morrow. It won't make it any easier for Gwen to know you picked the day before, or Christmas day, to get rid of yourself. I'm not going to try to stop you. I won't tell any one you told me about it. It's your business if you find you're too yellow to stand the gaff."

"Don't talk to me like that, Pete," Braid said, half rising from his chair. "I'll see Gwen to-morrow, to wish her a merry Christmas. She won't know for a couple of days. I'll just drop out of sight. I have it all planned. You'll take care of things for me?"

"I'll take care of things, old kid," Manders said, and put out his hand. Braid took it. "I won't see you again," Manders went on. "To-night I play Santa Claus for Gwen. Two big bags of stuff to drop over the side to the lepers on St. Helena. They have guts, Braid. They know they'll go on dying day after day, perhaps in agony at the end, but they play the game the way life handed it to them. They don't try to cheat."

"To hell with all that, Pete," Braid said. "You can't get me sore now. I'm all through. You go along and play Santa Claus to the lepers."

"It's really very kind of you to do this thing, Dean," Manders grinned. "I mean from my standpoint. Now Gwen will have a little time for me."

"I hope so, Pete," Braid answered. "Look me up in hell, in case you make it some day."

"I'll be glad to, old bean," Manders said, grinning again. He put his pith helmet on his head and went out into the glare of the afternoon sun.

Braid hunched a little farther over his sixth drink.

THAT IS where Gwen Huntley found him at nine o'clock that night. He was sitting at a table in a corner with his head on his arms, asleep. The half-caste blacks in the room were making jokes about him in high-pitched patois when she appeared in the doorway. She swept the room with her eyes without appearing to see any of the men or women at the tables. When her eyes settled on Braid she started toward him.

Braid's eyes were bloodshot and blank, his hair frowzy when he lifted his head. For a moment, while the room watched him, he stared at her like a man who doubts his own eyes. He rubbed a hand across his face and blinked at her again. Then he realized that it was Gwen Huntley who stood beside him. He saw the whiteness of her face and the agony in her eyes.

He did what many another man would have been unable to do. He ran his hand through his hair and tried to straighten his unkempt clothes as he got to his feet. For an instant he swayed unsteadily.

Then, he stepped from behind the table and smiled at her. He took her arm and escorted her out of the place, as though it was no unusual thing for a girl to shake a white man out of a drunken stupor in such a place.

Braid saw two or three dark forms slink out the back door of the Widows and he knew the grapevine would have the gossip within a few seconds. Gwen Huntley's name would be dragged through the dry volcanic dust of the island.

He swung to the left as they stepped out the door and started toward the water front. The hurricane windows of the stone business houses were grim and ominous in the bright moonlight. They didn't speak until they had reached the street that ran along the

sea. Then Braid whirled. Words hissed through his teeth.

"Why did you do such a thing, Gwen?" he asked. "Your reputation won't be worth a tinker's dam."

She didn't answer him for a moment. Then she turned, and the light from a flickering street lamp lighted her white, tense features. Her angry eyes sparkled in their sunken wells.

"You ask me *why*!" she blazed. Then her spirit seemed to ooze away and a dry sob escaped her. "It's Christmas eve, Dean," she said, in a moment. "I—I came to get you because Pete Manders has something wrong with him. He collapsed at dinner to-night, in terrible pain. He may be rushed to the hospital at any moment. Father and Dr. Hamilton are both working on him. They haven't made a decision yet."

"I'll go and see if I can help," Braid said weakly.

"Help! *You*, help!" Gwen said, and the contempt in her voice stung Braid like a lash.

"Listen to me, Dean Braid," she said. "You can't help Pete Manders. You can't even help yourself. Pete can fight his own battles. No girl will ever put a white feather in his hatband."

"But you've got to help me. I haven't much to keep me going. I have watched you disintegrate before my very eyes. This is Christmas eve, Dean. It's a night I work for the whole year round. It may seem trivial to you. Lots of people laugh because I've been playing Santa Claus to three or four hundred lepers on St. Helena for five years. But they haven't read the letters I've received from there after Christmas day. It takes all of my own money and all the money I can raise to make those people a little happy one day of the year. It may be an obsession, but it's a worthy one."

"But, Gwen——" Braid began.

"But, nothing," Gwen snapped. "Pete Manders can't fly my packages over St. Helena to-night and drop them for those people. They live from one year's end to the next for the newspapers, the magazines, the little delicacies and presents I send them. They have nothing else to live for."

"You," Gwen went on, her voice rising a trifle, "have nothing to live for. That's the reason you're going to fly Pete's plane over St. Helena to-night and drop those packages."

Braid heard her voice going on and on, but he didn't hear what she was saying. He could feel cold perspiration coming out on his forehead as she talked. He could feel his whole body twitching at the thought of trying to take a plane into the air.

Then he began to laugh, as a thought flashed through his mind. The humor of the thing appealed to him. He laughed until tears ran down his cheeks. Gwen Huntley brought him back to his senses when she slapped him sharply across the face.

"But, Gwen," he protested, "I never learned navigation. It was just coming into practice when the War ended. I couldn't find St. Helena in the night. I know nothing about aerial navigation."

"They burn great bonfires to guide the plane," Gwen answered. "It is only fifty miles away. Once you get into the air and headed in the right direction you can't miss it."

He didn't ask her how he would find his way back to Torrigua. He had no intention of trying to find his way back. He would stick the nose of the little amphibian due east and hold her there until she ran out of petrol. That would be easier than the great cliffs along the shore of Torrigua.

"Is the stuff aboard the plane?" he asked, quietly.

"It's down on the jetty," she told him. "Two of my black boys and a policeman are watching it. You'll have to taxi the plane in close to the jetty and they will load the stuff aboard. All you have to do is release the stuff when you get over St. Helena, over the colony. The parachutes will take the things down. I—I—"

Gwen Huntley stopped talking and began to sob. Dean Braid might have taken her in his arms then. But he didn't. He tried to straighten his shoulders and stand the way he had been taught to stand twenty years before.

"Well," he said, as casually as a man might suggest going for a stroll in the moonlight, "let's get going." He knew those few steps he would take out to the end of the jetty would be the last ones he would ever take. A smile flashed across his face as she fell in step beside him. He touched her hand for an instant as they walked side by side. If she felt it, she gave no sign.

He rowed the little dinghy out to the amphibian. Its black surface shone brightly in the path of the moon. He climbed in and fumbled around until he found a light. He stared at the twenty or thirty dials on the instrument panel as a child might stare at a book on higher mathematics.

He fitted his feet into the rudder stirrups and wagged the stick back and forth and to the right and left. When he found the starter he primed the radial engine. The blast of the motor after it caught frightened him. His hands were trembling so that he could hardly control them. His body was hot and cold in turn as he gradually warmed up the motor with his eyes on the tachometer.

It took him a quarter of an hour to accustom himself to the thousand things he didn't know about modern planes. He had to experiment until he found out how to work the amphibian gear. Then he wasn't sure.

At last he kicked the rudder and taxied slowly over toward the jetty. In a few minutes they had wedged him into his seat with packages all around him. One of the black boys showed him how to work the little parachutes attached to the packages.

"Get right over the town before you release them," Gwen shrieked at him. "Get down low. Be careful of the sides of the crater."

He waved a hand over his head and pushed his throttle open. The little ship leaped ahead on the calm waters of the roads. He wondered whether he would know when to take it into the air. He had never taken a plane off the water before. He wondered if the tail would lift in the same way the tail of a land plane lifted. The geysers of water leaping skyward on each side blinded him. He eased back on the stick as he felt the tail lifting.

He took the roaring ship into the air in a long, low climb that would have done credit to Pete Manders. But as soon as he tried to level off, he found that the little ship was a hundred times more sensitive than the planes he had flown during the War. He kept telling himself that flying a plane was like riding a bicycle. Once you knew how, you always had a sense of balance. But he found himself trying too hard. He wiped the damp perspiration from his face while he fought his way out of a flat spin.

He circled upward and studied the three compasses in front of him. Three compasses! He gave that up and began to scan what he thought was the horizon for some sign of the great bonfire Gwen told him he would see on St. Helena. When he couldn't find it he laid the nose of the ship on a NE course and opened the throttle.

He was just about to gain a little confidence in himself when the storm hit him. It was kicked up out of nowhere, in the way of tropical storms. One minute the moon was a golden pathway across the sea below him and the next minute the storm was on him. He felt the nose of the ship drop and knew it had taken him into a dive. He jerked the stick back and held his

breath. For a moment he thought the wings were going to be torn from the fuselage. He felt the nose coming up and up, and he knew that he must level off. He mustn't come over on his back. He laughed madly as he thought of Gwen's packages tumbling around him.

He kicked his rudder ever so lightly as he brought the nose up in a climbing turn. Then he leveled off and knew that he was flying away from St. Helena.

He brought the ship around as the whole sky was ripped open by terrific streaks of lightning and deafening claps of thunder. The ship dropped four hundred feet.

He studied his compass while he fought the controls. Then he shrugged his shoulders. He didn't know where he was and he didn't give a damn. His whole body was beginning to ache. His head was ringing from the beating he had been taking.

Then he found himself singing. He found himself improvising songs about the little black ship as it rode that storm. He sang about its courage and its durability, and about his own courage and what he could do with a ship like this one.

He found that his old touch had come back to him. He stretched one hand in front of him in the dim light and saw that his fingers were not trembling. He breathed deeply of the rain-cooled air and bellowed at the top of his voice.

He was fighting the storm when it ended, as abruptly as it had come. He scanned the sea again for the fire on St. Helena. He brought the plane around in a sweeping turn.

Far off to his right he could see a faint glow. He stuck the nose of the ship on it and opened his throttle again. As he got nearer and nearer, the glow became a leaping flame that stretched its tongue toward the heavens in long licks.

He knew that the island of St. Helena was only the mouth of an extinct volcano. It was one huge rocky formation rising out of the sea. Ships dropped their anchors a quarter of a mile from its shores and people were landed in small boats. When they had gained access to the rocky land they had to climb up the side for three hundred feet. A stairway was the only means of reaching the peak. And once there, a person had to go down another stairway into the mouth of the crater. At the bottom was the leper colony. There was only one small town and it was called Bottom.

The first time Braid took the ship over the mouth of the extinct volcano he had two thousand feet under him. He knew the downward currents of air over such a place might grab him and slap him into the side of the crater.

As he circled back he experimented at a thousand feet. He could see the three

or four hundred people who inhabited the island around the great fire. He eased the ship lower and lower until he skimmed the peak of the crater.

Then he decided to give the lepers on St. Helena a real Christmas eve. Sliding open a window, he decided he would give them something to talk about besides the newspapers and magazines and little presents that had to keep them contented for a year.

He got a little altitude and he dived the black amphibian straight at that great, leaping flame. At the bottom of his dive he yanked back on the stick and threw a half dozen of his packages overboard. The nose of the little ship came up, hung there for a moment and cleared the peak of the crater by inches.

Twelve times he dived that ship into the very mouth of hell. He laughed while he did it when he remembered that he had told Pete Manders to look him up in hell. The blood raced through his body as it had not done in eighteen years. He did things with that little ship he would never have dreamed of trying during his maddest days in France, during the War.

He could hear the voices of the screaming, cheering people below him even above the roar of his motor. Something about those voices, rising and falling, made him understand why Gwen Huntley attached so much importance to her Christmas-eve party for the lepers.

He circled above the crater and waved his arms as he banked around. It seemed to him that a thousand hands reached into the air below to wave him good-bye.

He saw Gwen Huntley and another figure standing in the moonlight on the end of the jetty when he set the little amphibian down on the water in the roads and taxied in.

His fight to stick the nose of the little ship toward the open sea had only lasted for a few minutes. He found that he was back in his youth again.

FLYING FUN

(Continued from page 24)

maneuvering the ship around the sky in an apparently erratic and entirely unplanned fashion. To an onlooker it would seem that the pilot was simply pitching the plane around pointlessly. A passenger, however, would probably catch the point if he should shut his eyes and realize that he would hardly be aware of movement if he didn't know he was being carried through a zigzag sky path. That is, if the pilot is almost impossibly good—if his sense of balance and his skill are very highly developed. For the point is, of course, in keeping the plane perfectly balanced, through shallow banks and steep ones, zooms, dives, chandelles, horizon eights, whatever he does. If the execution were per-

And in those days the orders were to bring back your ship. It didn't matter whether you came back with it or whether you were full of bullet holes. They could get another man to take your place, but it took a long time to build new airplanes.

He taxied the amphibian up until he was only a few feet away from the jetty. He didn't wait for them to bring the little dinghy to him. He killed his motor, climbed out on the nose, threw out the sea anchor and dived into the black water. A dozen strokes brought him to the steps. He was laughing when he pulled himself up the steps. And he was babbling like a baby.

"I found it, Gwen!" he was saying. "I found it! I could feel life coming back to me as I fought that storm. It gave me new life. It did something to me. You know the last time I flew before the Armistice I was shot down. I never went up again. I have had that fear in my mind all these years. Tonight I—"

He stopped then because Gwen was in his arms and he had to use his lips for something else than talking. When he lifted his head he was looking into the grinning eyes of Pete Manders. He looked down at the sobbing Gwen and then he looked at Manders again.

"I thought you were about to be rushed to the hospital," he said. "Gwen told me you might not live until morning."

"Who can tell?" Pete Manders grinned. "You—you framed me!" Dean Braid stuttered.

"We knew it would kill you or cure you," Pete said. "Let's go up to my place and have a drink. I need it."

Dean Braid touched Gwen's fingers again, and this time she let him know that she knew it. She wrapped both her hands around his and smiled into his eyes.

"A very merry Christmas to you, sir," she said.

fect (as it never is), the only sensations noticeable at all to one with closed eyes would be the increases and decreases in weight due to centrifugal force.

In all kinds of acrobatic maneuvers, it is presumed, of course, that parachutes are used, that the plane is built for such use, and that all is done according to regulations.

The pilot with a feeling for the mature joys of flying looks at acrobatics differently from the novice, who is hunting for thrills, wants snap rolls done faster and more violently, upside-down flying, tremendous dives and quick pull-outs, loops and rolls close to the ground—in other words, violent motion and the sensation of danger. The mature pilot of gentlemanly instincts who enjoys acrobatics does so for entirely different reasons. Instead of seeking violence he tries to achieve the opposite—grace,



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smoothness, rhythm. A loop close to the ground could not possibly be more attractive to him than one at 3,000 feet, for it is the excellence of the loop, not the danger of the spectacular aspect of it, that he is interested in. He is very anxious not to drop into his safety belt at the top (even though it does cause a funny feeling) because it means he went into the loop too slowly, or pulled up too slowly, or so fast that he squashed and lost speed. As to snap rolls, the chances are he doesn't particularly care for them. It does require a lot of skill to stop the roll just exactly right every time, but the snap, like the spin, is not naturally a smooth or graceful maneuver. It involves being, for an instant at least, out of control. A pilot who likes perfection of control may not care for it.

Upside-down flying, too, is more or less graceless, more of a stunt than a skillful maneuver, though I have seen pilots in Diesel-powered planes do quite remarkable upside-down flying. The slow roll is a maneuver through which balance and smoothness can be maintained most of the way—and definitely more satisfying than the snap roll. The Immelmann is a military pursuit maneuver, more useful when needed than gratifying from the pilot's standpoint, though one in which control, if not balance, is

maintained throughout. The chandelle, the good old chandelle, on which military students often stick or wash out, is one of the most satisfying of all maneuvers for the pilot interested in good flying and not in showing off. Perfectly done, it requires a fine sense of balance and careful judgment throughout. (The chandelle is simply a steep climbing turn of 180 degrees in which the plane is almost but never stalled at the top. It involves keeping the plane balanced perfectly throughout a short dive, swift turn and climb, with the speed, and the degree of control required, changing very quickly from fairly high to very low.)

One could go on valuing various maneuvers according to his own ideas by these standards, but each flier, once he learns how pleasurable acrobatics from the standpoint of skill rather than thrill can be, will rate them for himself. However, I want to point out that one fine thing about any phase of flying, approached with the grown-up attitude, is this: as you go on, flying becomes more interesting rather than less so. If you go diving for thrills, you have to keep diving closer to get the same thrill. It's like drinking hard liquor or taking dope. The thrills are always decreasing. But

when you are seeking perfection of skill, the ultimate is always ahead of you, beckoning you on with renewed enthusiasm, and each new advance gives you more enjoyment than the last. An airplane is like a violin; it can never be absolutely mastered.

I have barely touched the vast subject of the "grown-up" joys of flying. There is the sense of calm exaltation that comes from merely being high and lifted up above all the earth. There are the pleasures of really looking, with open eyes, at the awe-inspiring panorama of mountain, plain and river spread out below; the wonder of flying in sunlight and seeing three thunder showers at once, and knowing that each one, to the people on the earth in the center of it, is a whole world of rain.

But it is not necessary to point out all these things. The important thing is to cultivate the grown-up viewpoint among the fliers of the present and future, so they will look for and find these genuine pleasures for themselves, and let the cheap and dangerous thrills of aviation's salad days slip away, together with the coughing OX-5 and the synthetic hero with boots, taper wings, 400 horsepower and no brains, into the well-lost past where they belong.

RUSSIA'S WINGS

(Continued from page 31)

efficient. The new motors will all be mounted in the leading edge of the wing and will develop 1,200 h.p. each.

And now at last we reach the plane on the cover. The A. N. T. 25 is a single-engined, all-metal, low-wing monoplane with which Soviet aviation enthusiasts hope to capture the world long-distance flight record. It was built in 1933, and now incorporates most of the latest developments in Russian aeronautical design. Its maiden effort was a record endurance flight in September, 1934, when it covered 7,700 miles in 75 hours over a triangular course. During an attempt last fall to fly from Leningrad to San Francisco via the north pole, the oil system failed and the flight had to be abandoned. Various alterations were made, including a reduction in the size of the radiator and the substitution of a three-bladed metal propeller for the old wooden one.

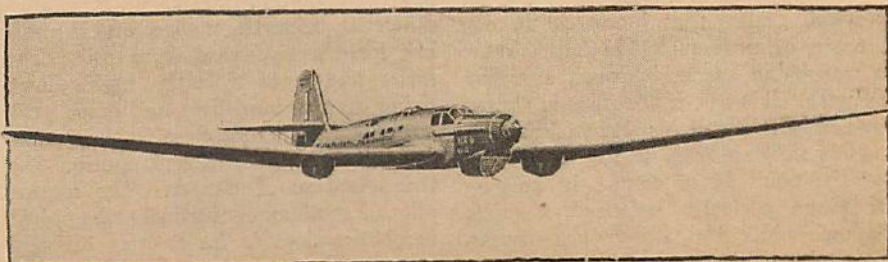
On July 20th of this year, the rebuilt A. N. T. 25 took off from the airport at Moscow, headed north into the arctic, then east toward the Siberian coast, over Siberia to the Kamchatka Peninsula, turned west toward the Asiatic mainland again, and after a hazardous, stormy flight, landed during the night of July 22nd on the beach of the tiny island of Udd, near the city of Nikolaevsk.

The distance traversed has been variously computed as between 5,460 and 5,753 miles. (The official world record made by Rossi and Codos, August 5-7, 1933, New York to Raiyak, Syria, is 5,657.38 miles.) During this perilous flight the Russian ship ran into an arctic cyclone near North Land, and for more than five hours the intrepid pilots flew by instrument through the blinding storm at an altitude of 12,000 feet. During that time they were bucking headwinds that frequently reached a velocity of 45 m.p.h. Learning from radio reports of subsequent impossible weather conditions and considering that the A. N. T. 25 had fulfilled her mission, Ordjonikidze, chief of the aviation administration, radioed pilot Chkaloff to land. At the conclusion of this brilliant flight, the fuel tanks of the plane still contained upward of a ton of gasoline, sufficient to cover another 1,550 miles.

Let's take a look at this remarkable plane. The A. N. T. 25 has been described by its designer, Tupolev, as a

conventional monoplane with low-placed wings. The Russian motor, carrying the designation M-34-R, was especially adapted by the Frunze factory to meet the conditions of long-distance flight at wide variations in temperature. It is of the V type, is liquid-cooled and features a longitudinal rigidity that results in extreme strength. It is adjusted to run on an unusually thin fuel mixture to add to its economy. It develops 950 h.p. at 1,950 revolutions and weighs 1,430 pounds. The propeller, a three-bladed, fixed-pitch metal air screw, was especially designed to lift the plane's gross weight of 11 tons off the ground at the take-off and yet work efficiently during all phases of the flight.

Probably the most interesting feature of the ship is the unusually high aspect ratio of the wings. They measure 111.52 feet across, with a ratio between the span and chord of about 13. In designing the wings of the A. N. T. 25, the engineers were confronted with a number of interesting technical contradic-



The A.N.T. 25 in flight, showing landing gear retracted.

tions. The wing must be large in area and yet light. The problem demanded extensive research. Finally a faultless theoretical calculation was evolved and a successful wing built. One unusual feature of the design is the manner in which the large fuel tanks, 21 feet in length, have been incorporated into the wing structure. Their position and weight neutralizes to a large degree the upward forces working on the wing during flight, thus permitting a considerable lighter structure.

The A. N. T. 25 is the first Soviet

machine to be provided with retractable landing wheels and oleo shock absorbers. The gear is retracted electrically—another innovation for Russia. In order to provide for the safety of both ship and crew on long over-water hops, a flotation system consisting of balloons of light, rubberized fabric is concealed in the wings and under the opening of the motor cowling. Tests on a model one twenty-fifth actual size demonstrated the efficiency of this arrangement. The wings were painted red for visibility in case of a forced landing on ice or snow.

The A. N. T. 25 is probably the most efficient airplane as yet produced by the Soviets. The unusual and yet practical features embodied in the design reflect the utmost credit upon Professor Tupolev and his assistants. In record-breaking flights under the most difficult and hazardous conditions, their sturdy and beautiful monoplane has demonstrated anew that in the fields of mechanical efficiency and human courage, Russian planes and Russian pilots are second to none.

INDOOR PROPS

(Continued from page 59)

(2) the area, (3) the rubber size you prefer to use. This last condition may be clarified as follows: you may take a plane of a certain area and fly it with $\frac{3}{32}$ " rubber and a prop of 28" pitch, or you might fly the same plane with $\frac{7}{64}$ " rubber and a prop of 33" pitch. Which ever way you fly it is a matter of personal preference.

Next in consideration is the blade shape. This is an important point, and all experts are in accord in placing the widest portion of the blade at about 35 to 45 per cent of length from the tips. However, the width at the tips and the hub is, at present, also a matter of personal prejudice. Most modelers cut back the leading edge at the hub, the purpose of which is to increase the pitch by "flailing" the blades out at the start. This cuts down the sudden burst of power.

The final decision in making a propeller is the construction method to be used. That is, is the propeller to be built up, or is it to be solid? Built-up props are, of course, between one half and one third the weight of solid ones. However, they are much harder to balance, they are harder to make run smoothly, and they are much more difficult to handle. It is worth your effort to build one, but you must be painstaking and patient.

CARVING THE PROPELLER

If you have to use a wood propeller, the block from which the prop is to be carved must be selected with the utmost care. It is useless even to consider a block of balsa of over 5½-lb. grade, as a prop carved from it will be too heavy. The wood must also be straight-grained and free from knots and worm holes. Mineral spots (discolorations) harm only the appearance of the finished prop and do not detract materially from its quality.

The block may be cut into a prop blank (cut to the diagonals for the helical type, etc.) with any sharp knife, but make sure that the leading and trailing edges of the blank are true and sharp.

This is important. The concave part of the blades is carved first. A sharp knife may be used until the edges are reached, then a sharp razor blade must be used. Cut the camber in with a razor and, with rough sandpaper, take out ridges caused by it. Sand progressively with finer and finer grades of sandpaper and then polish the face with #10-0.

After finishing the concave sides of both blades, turn the prop over and "hack" away at the convex side till the blades are about $\frac{1}{4}$ " thick. A razor should then be used to bring the blades down to $\frac{3}{32}$ " thickness at the hub and $\frac{3}{64}$ " thickness at the tip, followed by rough sandpaper to smooth the blades to almost the required thickness and to take out all the ripples of carving. Draw the blade shape on one of the blades, cut the shape out with a razor, smooth the edges with fine sandpaper, and transfer that shape to a sheet of paper. Cut out a template of the blade and transfer the shape to the other blade. Cut off the excess balsa and then, with rough sandpaper, cut down the thick edges of tips and the hub. Finish the blade with finer and finer degrees of sandpaper and then polish the blades with #10-0.

When sanding, *never* put the blade down on a surface and sand, but support the blade with the fingers of one hand while sanding with the other. Never sand more than two inches at a time, unless you want to carve a new prop.

Push a pin through the exact center and insert the shaft. Balance the prop by allowing it to revolve freely on the

shaft. If one blade is heavier than the other, sand it with #10-0 until the prop is perfectly balanced. Cement the shaft in place and put on two flat washers, one of which should be cemented to the hub.

MAKING A MICROFILM PROP

The most successful prop—one of microfilm—takes only one hour to build. An accurate scale capable of weighing to .0001 of an ounce must be employed, because in order that a propeller be perfectly balanced, the material which goes to make both blades must weigh the same.

A microfilm propeller is made on a former. The former is merely a piece of wood of proper dimensions, carved in such a way that the microfilm prop blade made on it has the proper angle at any position along its radius. A typical 15" prop might be made on a block $7\frac{1}{2} \times 1 \times 1\frac{5}{8}$ ". The former should be made by drawing a diagonal on the wide face and carving the convex side of the blade up to the diagonal line. Draw the blade shape on $\frac{1}{16}$ " sheet balsa and cement it on the former. Cut slots and V's on the leading and trailing edges of the $\frac{1}{16}$ " sheet at about every inch, perpendicular to the leading edge. These slots are merely spacers for the ribs and hold them perpendicularly.

The leading edge should be sliced from $\frac{1}{16}$ " sheet balsa, $\frac{3}{32}$ " wide at the hub to $\frac{1}{32}$ " at the tip. The trailing edge is stripped from $\frac{1}{32}$ " sheet balsa, $\frac{3}{32}$ " tapered to $\frac{1}{64}$ ". This strip should be long enough so that it can be bent completely around the tip to meet the leading edge. Wet the trailing edge strip and pin it flat to the former. Heat the trailing edge (still pinned to the former) until it just begins to turn brown. Pin the leading edge in place and cement the ribs, which have been cut from $\frac{1}{64}$ " sheet balsa, in position. The ribs can be made all the same length; where a smaller rib is necessary, one-third of the excess can be cut from the leading edge and two-thirds from the trailing edge. Two blades exactly the same should be made in this way.

Cut $\frac{1}{4}$ " off at the hub end of each blade and cement them to a hub made of $\frac{1}{16}$ " balsa, $\frac{1}{2}$ " long, trimmed in

The August Contest

The following readers were winners in the August "Gullible's Travels" contest with the indicated number of allowable, correctly picked errors:

First prize, \$5—William L. Jackson, Reading, Pa., 115.

Five prizes of \$2—F. Bidwell, U. S. S. Buchanan, Mare Island, Calif., 99; Charles Hussey, Jr., Greenland, N. H., 94; Anselm Kickbush, Owosso, Mich., 80; Philip W. Shew, Grand Rapids, Mich., 78; Frank Drugos, New Brunswick, N. J., 74.

Five prizes of \$1—James Hetlinger, Huron, S. D., 64; William Tuerck, Jr., Laurelton, N. Y., 63; Richard Mow, Manatee, Fla., 57; Thomas Stewart, Hewlett, N. Y., 54; Jack London, Sioux City, Ia., 53.

thickness to the depth of the blade at the hub. The grain of the hub should be parallel to the length of the blade. After cementing the blades to the hub, the shaft should be inserted and cemented into place, and the blades covered.

In covering, make a frame of $\frac{1}{16}$ " square balsa about 10" long and 3" wide and cover it with film. Wet the leading and trailing edge of one blade and place

it on the former. Twist the balsa-covered microfilm frame to the same angle as the prop, lay it on the blade and leave it to dry completely so that the blade angles remain correct. Cut the excess film off with acetone. Treat the other blade similarly.

Balance the prop, if necessary, by putting a drop of cement on the lighter blade. In order to have a successful prop, it must run smoothly. If the

angle of one blade must be changed, it can be done by holding the blade at the required angle about one foot above a gas stove whose flame has been turned so low that it almost goes out.

Your first microfilm and carved props are likely to be pretty crude. Don't be discouraged, however, by your first attempts. Remember that old adage, "Practice makes perfect," holds in this as well as in other things.

BIRD WING

(Continued from page 54)

When balanced for flying, the leading edge of the wing was about $8\frac{1}{2}$ " back from the front tip of the fuselage.

SPECIFICATIONS

Span	.....	43 $\frac{1}{2}$ "
Wing area	.....	186 square inches
Elevator area	.....	58 " "
Rudder area	.....	22 " "
Propeller pitch	.....	20 inches
Wing incidence	.....	$\frac{1}{4}$ "
(tips washed out to zero incidence)		
Elevator incidence	.....	zero degrees

WEIGHTS

Wing and center section	....	.70 ounces
Stick, 14 strands $\frac{1}{8} \times \frac{1}{30}$ "		
rubber, propeller	.....	1.50 " "
Elevator	.....	.25 " "
Fuselage, landing gear, rudder	.....	.75 " "
Total R. T. F.	.....	3.20 " "

MATERIAL

FUSELAGE

- 4 longerons $\frac{1}{8} \times \frac{1}{8} \times 30$ "
- 4 pieces $\frac{1}{8} \times \frac{1}{8} \times 24$ " for bracing
- 1 nose block $1\frac{1}{8} \times \frac{1}{8} \times 2\frac{3}{16}$ "
- 1 motor stick $\frac{1}{4} \times \frac{3}{8} \times 23$ "
- 1 piece $\frac{7}{16} \times 1\frac{1}{16} \times 1\frac{1}{4}$ " for fuselage rear tip
- 1 strip bamboo $7\frac{1}{2}$ " length
- 1 pair $1\frac{3}{4}$ " diameter x $\frac{3}{8}$ " balsa wheels
- 1 foot #14 wire for tail skid, shaft, axles, rear hook
- 2 pieces $\frac{1}{16} \times 1 \times 5$ " for balsa rear of fuselage
- 1 piece $\frac{3}{32} \times 1\frac{1}{4} \times 5$ " for rear stick support

WING

- 4 spars $\frac{1}{8} \times \frac{1}{8} \times 20\frac{1}{2}$ "
- 2 leading edges $\frac{1}{8} \times \frac{1}{8} \times 17\frac{3}{4}$ "
- 2 trailing edges $\frac{1}{8} \times \frac{3}{8} \times 8$ "
- $\frac{1}{16}$ " sheet balsa for ribs
- $\frac{1}{8}$ " flat balsa for trailing edge and tips

- 1 strip of bamboo
- Several inches of light wire for wing hooks
- Center section $\frac{3}{8} \times 2\frac{3}{8} \times 2\frac{3}{4}$ "

ELEVATOR AND RUDDER

- 2 spars $\frac{3}{32} \times \frac{3}{32} \times 18\frac{1}{2}$ "
- 2 spars $\frac{3}{32} \times \frac{3}{32} \times 7\frac{1}{2}$ "
- $\frac{1}{8}$ " flat balsa for outline
- $\frac{1}{16}$ " sheet for rib

PROPELLER

- 1 block $1\frac{3}{8} \times 1\frac{5}{8} \times 15$ "
- Several cup washers and flat washers
- 1 free-wheeling device or $\frac{7}{8}$ " length of brass tubing

MISCELLANEOUS

- 30 feet of $\frac{1}{8}$ " flat rubber
- 4 large sheets of tissue
- 2 ounces of cement
- 2 ounces of banana oil.

—G. S. L.

THE DART

(Continued from page 60)

TAIL

The elevator is cut in one piece. In the drawing, however, only half the elevator is shown. After tracing out the shape of one half, turn over the pattern and complete the other side.

The elevator is cemented to the top of the fuselage, and the rudder is cemented on top of the elevator. The rear edge of the rudder should be flush with the rear tip of the fuselage. The elevator is cemented about $\frac{3}{8}$ " forward of the rudder.

CABANE SECTION

The wing is mounted above the fuselage on a cabane section. In this position the glider seems to show better recovery after the initial climb. This is especially noticeable after hard launchings, when quick recovery at the top of the climb is necessary for long flights.

The cabane section should be cut to a streamlined shape and cemented in the notch in the top of the fuselage. The wing is then cemented to the top of the cabane section. Naturally the two halves of the wing should be firmly joined before attaching them.

SURFACING

For championship flying a highly polished surface is necessary. However, all that is necessary for every-day flying is a rub-down with fine sandpaper, followed by a coat or two of banana oil or dope and then a second treatment with fine sandpaper.

FLYING

The wing and the elevator should be mounted flat. That is, a straight edge laid flat along the bottom of the wing should also fit flat against the bottom of the elevator. When trimmed for flying, the glider should balance at the point indicated on the wing pattern—about $2\frac{3}{8}$ " back from the leading edge of the wing, measured along the fuselage. You can balance the model by inserting pins into the front of the fuselage or by wrapping pieces of solder wire around the nose.

In any airplane, the effect of the rudder, elevator, and wing are so closely related that any change in the setting of one will affect the action of the other two surfaces. For example, suppose you warp the wings until the model goes into a steep bank. It's likely that the model will not hold the bank and will go into a spin, unless you change the rudder and elevator settings. When the model is steeply banked, the rudder acts partly as an elevator, and the elevator

itself influences the flight in much the same way as the rudder.

Changes in the setting of any of the three surfaces will definitely affect the flight of the model. Getting the glider adjusted so it recovers at the top of the climb is a tricky job. There are no definite rules to be observed. The success you'll have is largely dependent on your own perseverance rather than following any definite procedure. But adjusting the model for simple straightaway gliding is easy. The finished glider is certain to deliver flights, a condition that does not hold for any other type of model.

MATERIAL

- Fuselage—1 piece medium balsa $\frac{1}{4} \times 1 \times 18$ "
- Wing—2 pieces $\frac{3}{16} \times 3 \times 11$ "
- Elevator—1 piece $\frac{1}{8} \times 2\frac{1}{2} \times 10$ "
- Rudder—1 piece $\frac{1}{16} \times 2\frac{1}{2} \times 2\frac{3}{4}$ "
- Cabane Section—1 piece $\frac{1}{4} \times 1\frac{1}{4} \times 3$ "
- Construction material—sandpaper, knife, small brush, pins, cement, banana oil.

Cost of material: \$.20.

Construction time: 30 minutes.

DATA

Wing area	.....	52 square inches
Elevator area	.....	18.5 " "
Rudder area	.....	7 " "
Wing incidence	.....	zero degrees
Elevator incidence	.....	" "

—G. S. L.

MODEL MATTERS

(Continued from page 63)

Practically perfect weather produced some high times. Cups, trophies, plaques, medals, and model kits made up the prize list.

Stick Model Event

Junior		
1. George DeLaMater, Oneonta	3:27.4	
2. Patsy Fiumano, Syracuse	3:01.5	
3. Robert Dillman, Syracuse	2:43.6	
4. Charles Brennan, Syracuse	1:44.3	
5. Bill Rogers, Syracuse	1:42.5	

Senior		
1. Leonard Zeldow, Binghamton	22:10.6	
2. Ed Guth, Syracuse	10:50.2	
3. Ira Fralick, Syracuse	7:17.0	
4. Joseph Calio, Albany	7:00.0	
5. Martin Dotsko, Binghamton	6:27.0	

Fuselage Model Event

Junior		
1. Carl Moody, Hornell	7:45.0	
2. George DeLaMater, Oneonta	2:48.0	
3. George Kessel, Liverpool	2:20.3	
4. Robert Nicholson, Geneva	1:53.4	
5. Richard Oldem, Syracuse	1:52.0	

Senior		
1. Ira Fralick, Syracuse	33:10.2	
2. Joseph Calio, Albany	18:30.4	
3. Martin Dotsko, Binghamton	10:00.0	
4. Bruno Marchi, Medford, Mass.	4:37.0	
5. Leighton Webb, Hornell	2:39.6	

Glider Event

Junior		
1. Raymond Wells, Auburn	4:44	
2. Patsy Fiumano, Syracuse	38.0	
3. George DeLaMater, Oneonta	32.2	
4. Carl Moody, Hornell	27.6	

Senior		
1. Colin Edwards, Oswego	6:30.4	
2. Bruno Marchi, Medford, Mass.	1:27.0	
3. Richard Barber, Utica	1:22.0	
4. James Zimmer, Syracuse	1:00.0	
5. Charles Quimby, Rome	54.2	

Gasoline Powered Event

1. Ed Guth, Syracuse	42:30
2. Joseph Calio, Albany	23:49
3. James Young, Williamston	18:45
4. Alfred Towle, Syracuse	18:39

Exhibition Scale Models

1. Louis Casale, Syracuse	99 points
2. Max Sokol, Ramtrampack, Mich.	97 "
3. Charles Cole, Liverpool	94 "
4. Jean Chadwick, Syracuse	90 "
5. Harold Debolt, Geneva	87 "

Senior Point Winner

Joseph Calio

Junior Point Winner

George DeLaMater

HYDROPLANE RECORD TRIALS

Drizzling, gusty weather made an appropriate setting for hydroplane-record trials held in Van Cortlandt Park, New York City, Aug. 29 by the New York Junior N. A. A. Chapter. The times made are listed below.

The hydro tank was made by laying out a 4x12-foot rectangle of 3/4x2" boards. This framework was covered with oilcloth nailed at the edges and patted down inside the boards to form a shallow tank. Water was transported with steel wheelbarrows. The models had no trouble taking off.

Class C Stick

1. Larry Low	2:00
2. Malcolm Abzug	1:48
3. George Brown	1:07.5

Class D Stick

1. Malcolm Abzug	1:12
2. Larry Low	1:12
3. George Brown	1:05

Class C Fuselage

1. Alan Orthoff	1:07
2. Louis Milowitz	1:01.5

Class D Fuselage

1. Louis Milowitz	1:14.3
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T. A. M. B. E. MEET

Henry Struck, 19, of Jackson Heights, was high-point winner at the third annual meet of the Airplane Model Builders Exchange of New York City, held at Marine Park, Brooklyn, Sept. 6. He won the speed event with a ship that was clocked at 48 m.p.h. over the 88-foot course. He took the cabin fuselage event with 3:41. And to clinch the title of champion, he took fourth place in the stick event and third in the glider event. Morton Kaufman of Brooklyn won the hand-launched glider event with 4:18. Earl Glanz, also of Brooklyn, won the stick event with a flight of 2:54.

The 300 contestants were hampered by a strong wind which crashed many models, but the attractive prize list stimulated competition. Stop watches, gold trophies, medals, and merchandise orders were the prizes. Judges were Irwin S. Polk of the Metropolitan Model League, David Lynn, director of the exchange, Arthur Lesselbaum, president, and others.

JACKSONVILLE CONTEST

Milton Myers won first place in the annual summer meeting of the Jacksonville Model Airplane Club. His gas model disappeared after traveling four miles. Contestants were entered from Georgia and Florida. The contest was arranged and directed by William L. Timpone, N. A. A. contest director and director of the Jacksonville Club.

Myers' winning model weighed 3 3/4 pounds, had a 6-foot span and was powered with a Baby Cyclone. It is a high-wing job and followed closely the design of Joe Kovel, present record holder.

This club was organized about two years ago and has been active in advancing model building in Florida. Pulaski Broward, Jr., represented the club at the last national meet in Detroit.

NEW RECORDS AT J. A. L.

Two new open-age records were set up at the summer contest of the Junior Aviation League of Boston, held Aug. 29. Captain Brown, club director, set a new outdoor record for Class B hand-launched gliders of :33.1. Everett Tasker flew his Class C tow-line glider for 4:25. Other results:

Glanders

1. Woodman (class B, h. l.)	6:39
2. Phillips (class C, t. l.)	1:24
3. Durup (class B, h. l.)	24.8

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Stick H. L.

1. Cape (class D)	2:34
2. Wallerstein (class D)	2:25.4
3. Sulkin (class C)	1:32

Fuselage (R.O.G.)

1. Sulkin (class C)	6:56
2. Wallerstein (class D)	4:17
3. Phillips (class C)	2:09

The third and final 1936 summer outdoor meet attracted a large audience and many contestants on Sept. 5. Frank Barrett, Jr., was the meet champion, winning a first and two seconds. Results:

Gliders

1. Barrett (class B)	38.4
2. Maze (class B)	20.2
3. Sulkin (class B)	18.6

Stick H. L.

1. Sulkin (class C)	2:47
2. Barrett (class C)	2:31
3. Sebring (class C)	1:03

Fuselage (R. O. G.)

1. Sampson (class C)	3:55
2. Barrett (class C)	3:07
3. Googin (class C)	2:29.6

SAN DIEGO

The aviation Advancement Club of San Diego, Cal., held a meet Aug. 23, with events open to Class C stick and fuselage models. Fog blanketed the flying field until about 7:30, when the flying actually began. The weather was fair, but only two thermal flights were turned in. Summaries:

Stick

1. Locton Park	8:17
2. Robert Holland	2:31
3. Alan Hems	1:40

Fuselage

1. Daniel Halary	8:01.6
2. Robert Holland	3:16.4
3. Alan Hems	2:57.4

The A. A. C. is an active club in model and real aviation. It has sponsored two gas-model contests, and a third is on deck for the near future. The fol-

lowing club records have been recognized:

Fuselage (R. O. G.)

Junior	Locton Park	10:24
Senior	Daniel Halary	8:01.6

Stick H. L.

Junior	Locton Park	22:30
Senior	Robert Holland	2:31

Glider T. L.

Junior	Robert Carlson	6:55
Senior	Daniel Halary	13:54

Glider H. L.

Junior	William Moser	45
Senior	Daniel Halary	51

Flying Scale

Junior	George Kelly	36
Senior	Frank Walther	55

Gas Models

Senior	Elbert Weathers	16:20
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Indoor Stick

Junior	William Moser	50
Senior	Daniel Halary	1:13

ARCTIC FLIER

(Continued from page 42)

with the fuselage. Make the center-section spar, the trailing edge, and the two leading-edge parts and mark the rib spacing on them before cementing them to the fuselage.

Cut six of the whole center-section ribs and two of the partial ribs. Cement the two outer ribs on first to line the spar and edges up, and then add the other ribs.

The landing gear must be attached at this time. Fit the parts as shown between the outer ribs and then attach the $\frac{1}{8}$ " aluminum tube and braces. Dowel rods, bearing the double-wheel axles, are trimmed to slide *tightly* in the aluminum tube. When the flying propeller is used, the dowels can be extended to allow for the long blades, and forced back when the scale propeller is desired. The metal fenders or fairings are made from .550 sheet aluminum as per drawing #4.

Cover the center section from outer to inner ribs with $\frac{1}{64}$ " sheet and add the rear fairings for the wheel trucks. Carve the dummy tail wheel and fairing assembly and cement in place. Cement the celluloid windshield patterns on the cockpit and over the relief pilot enclosure. Make the exhaust stack and heater units from $\frac{1}{8}$ " dowel rod and cement them in place. The cabin windows may be cut out and fitted with celluloid, or just painted black when coloring the model.

WING AND TAIL

The wing panels and tail surfaces are of unusual construction. On drawing #1 the cover patterns and ribs are complete. Cut a pair of each rib and cover. Mark the rib spacing on the lower cover patterns and on the $\frac{1}{16} \times \frac{1}{8}$ " leading edges. Cement the ribs to the leading

edges first and then to the lower pattern with cement on a $\frac{1}{2}$ " space at the rear of each rib, because the pattern will only touch the ribs at the rear while pinned to the board. Pin the rear of each rib firmly to the lower pattern. Be sure the first rib has the right angle to obtain the 2" dihedral.

Now cement the remaining portions of the ribs toward the front and along the leading edges. The scraps that remained from the rib cutting will come in handy to wedge the bottom pattern up to the raised leading edges and rib bottoms. Note that the first rib leading edges are high, while those at the tips are low. The wash-out is essential in this model to prevent the addition of weight to the nose.

Trim the lower pattern along the center of the $\frac{1}{16} \times \frac{1}{8}$ " strip when dry. To apply the top cover pattern, cement its trailing edge to the lower trailing edge, sparingly. When dry, apply cement to all ribs and leading edges and press the covers on firmly, using pins where necessary. When dry, remove from the board and true up with fine sandpaper.

Assemble the tail surfaces in the same manner as the wings.

PROPELLERS

Two views of the scale prop blade are shown on drawing #3. Three are inserted in the scale spinner.

The flying propeller is also three-bladed, and very wide to provide sufficient thrust. Blank the blocks as per front view and cement them together, then carve to obtain the spinner and diminished hub. Insert the shaft in the usual manner, and provide several washers to cut down friction.

COMPLETING THE MODEL

Cement the wing panels and tail surfaces in position on the fuselage.

When coloring the model, do not use dopes, because they are apt to warp the

thin balsa covering. Thinned lacquer is recommended; use a coat of thin, clear lacquer first.

The fuselage, tail surfaces, and propellers are gray or aluminum. The cowl, landing gear, tires, cabin windows, and small lettering, black. The wings are red from fillets to tips, with aluminum or gray URSS letters $1\frac{1}{2}$ " high on the top of the left wing and bottom of the right, and NO25 on top of the right and bottom of the left. Trim the pilot's cockpit shield with gray or aluminum. Fit the model with the remaining detail.

FLYING THE MODEL

Power the model with 8 strands of $\frac{1}{8}$ " flat, lubricated rubber. To get the rubber into the model, bind the rear end of the motor and insert an "S" hook. Hold the nose of the model upright, and drop the rear of the motor into the fuselage and fish for the rear hook. Glide the model in tall grass, or wind the motor just enough for it to take off. If the model has a tendency to stall, especially on a glide, add incidence to the stabilizer.

MATERIALS

- 1 $1\frac{5}{8} \times 2 \times 3\frac{1}{6}$ " cowl block
- 3 $\frac{3}{4} \times 1\frac{1}{2} \times 4$ " prop blocks
- 1 $\frac{1}{4} \times 1\frac{1}{8} \times 1\frac{1}{8}$ " nose block
- 14 sheets $\frac{1}{64} \times 2 \times 18$ "
- 1 " $\frac{1}{32} \times 2 \times 18$ "
- 2 " $\frac{1}{16} \times 2 \times 18$ "
- 4 $\frac{1}{16}$ sq. $\times 18$ "
- 2 $\frac{1}{16} \times \frac{1}{8} \times 18$ "
- 1 oz. cement
- $\frac{1}{2}$ " gray lacquer
- $\frac{1}{2}$ " red "
- 1 " clear "
- 2 drams black lacquer
- 2 oz. thinner
- 4" $\frac{1}{8}$ alum. tube, 1x3 .005 sheet alum., 1x3 celluloid bamboo, 4" $\frac{1}{8}$ dowel rod, thread, #12 music wire, $\frac{1}{16}$ " alum. tube, 80" flat rubber.

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