FLYING ACES

DEMONS IN THE NULLAHS

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OOGH—OUCH-MERCY I JUST C-CAN'T SEEM TO STAND UP ON THESE SKATES

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OH—I ER I COULDN'TTHAT IS YOU SEE—I'M ER—NO GO AT SOCIAL STUFF.

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CHAPTER I

KAWANISHI CORPSE

"WAR is youth—and if it were not for youth, there would be no wars," argued the elder Cressford, attempting to point out a moral. "Look at Lonny, here. He wants to stay aboard this carrier just to see a war."

"So what?" prodded Billy "Buzz" Benson.

"Well, that's youth. There's a few hundred men aboard this ship, and though they are loyal and willing to sacrifice their lives for a national cause, they'd much sooner be out of it. Only those surging with the spirit of youth actually seek wars."

"But while I am this close to it," Lonny Cressford argued, "there's no reason why I should not see it. It will be something I shall always remember. Besides, how are they going to get me off?"

"That's what's worrying me," Benson said quietly.

They were sitting in the shelter of the massive control tower of the U.S.S. Yorktown, Uncle Sam's latest and most efficient aircraft carrier. It was comfortable in the deck chairs where they were resting after their amazing experiences in subduing the mysterious character known now as the Viper.

"You belong in school. You've been battting around for weeks now, risking your fool young neck on all sorts of crazy gags and I'm getting sick of it. Besides, you're having more fun than I am," the elder Cressford added as an afterthought.

"There you are! You see, Mr. Benson, he's jealous of me. He just wants to get rid of me so that he can have all the fun."

"Fun?" cracked Lonny's father. "Say, if this sort of thing is your idea of fun, you can have it. It's not my idea. It's all right for guys like Benson, here. But he likes it. I don't."

"No," laughed Buzz. "You'd sooner try to fly the Pacific alone and gamble your life on a device which you hope will conserve your fuel so that you can make it."

"It worked, didn't it?"

"Sure, but you had to do it to find out for certain—and if it hadn't worked you wouldn't be here. Maybe that's your idea of fun."

"That's no argument," frowned the elder Cressford. "If it had failed, I was the only one to lose."

"What about Lonny? What would have happened to him?" prodded Buzz.

"Well, I don't know. But after seeing the things he's gotten into during the last few weeks—"

"Don't forget," broke in Lonny, "if it wasn't for your getting shot down on the Pacific flight, none of this would have ever happened, at least as far as I am concerned. You started all this, remember."

"I suppose so," moaned Lauren Cressford. Then he looked up. "Hello, here's old spit and polish again. What's the bad news this time?"

EAR-ADMIRAL BLANCHARD, commanding officer of the Yorktown, stalked down the companionway from the control bridge, with a frown a foot thick and a message form in his hand.

"I'm sorry to inform you gentlemen, and you Lonny," he half bowed, "that we are going into action."

"Hooray!" cheered Lonny, visioning the excitement. [4]
“Shut up!” snapped the elder Cressford. “Let’s hear the rest of it, Admiral. What do we have to do?”
“Nothing—except go ashore at once.”
“How? Swim? Or do we rate a row-boat?”
“Unfortunately this is no time for humor, Mr. Cressford. The situation is very grave. We expect to contact the enemy this evening, and in all probability one of the greatest naval battles in history will be fought.”
“Swell! And all we have to do is to row home through it in a dory, eh?”

The Rear-Admiral continued: “The cruiser Monticello, moving westward with the main fleet, was mysteriously sunk early this morning. No one seems to know how it happened, for there was absolutely no indication of enemy submarines or aircraft in the area.”

“Just a few Japanese fishing boats, I suppose,” broke in Benson.

“There was no mention of fishing boats. But be that as it may, you will have to get the Cressfords ashore at once.”


“Please be serious. You will take my three-seater Seversky and put the Cressfords ashore at San Diego.
Lonny’s face fell, but the elder Cressford seemed glad.

“Let’s see,” said Buzz reflecting, “That’s the Seversky Sev-3, isn’t it? Okay, when do we start? You ready, Cress?”

“If they’re going to start shooting again, I’m ready now.”

“Aaw Gee!” groaned Lonny, “Just when things were getting interesting again.”

“But the Admiral’s Seversky, Lonny,” joggled Buzz.

“Think of the show we’ll make at San Diego when we land with that boiler. They’ll fire cannons, run up flags, turn out the guard, and pipe us over the side.”

The Rear-Admiral was slowly going a gray purple.

“You must understand, Mr. Benson, that this whole situation is serious. You must get these people ashore safely . . . and then . . .”

“Then what?” gurgled Lonny, quickly looking up.

“Then he must return to the Yorktown—in short, bring my plane back,” the crusty Rear-Admiral growled.

“Oh, the Admiral wants his ship back, eh? Now no hiding in the back seat this time, Lonny,” Buzz grinned.

“Leave that to me,” Laurie Cressford snorted. “This is going to be one flight that won’t end up in a fight!”

“Yes,” the Admiral frowned at Buzz. “Be sure that you get them there safely and get back the same way—and no tricks either way.”

“You know,” Buzz reflected, “the Admiral, somehow, does not trust us.”

“Shut up, he may still decide on a dory,” added Lauren Cressford. “How soon can we get off this floating crate shack?”

The Admiral almost exploded, but he finally managed to say: “At once. I will order my plane on deck.”

“Aaw Gee!” Lonny growled again.

They went down to the ready-room and gathered kits, coveralls, parachutes, and personal effects—or at least what was left of them after their recent hair-raising adventures. The Navy pilots gathered around them and offered their condolences to Lonny and their best wishes to Cressford. To Buzz they bumbled jovial jeers concerning the “null” he must have to be able to fly the Admiral’s personal bus.

“Boy, if you scratch it,” one yelled.

“He’ll hang you from a seaplane derrick,” cracked another.

“I’ll bet you ten bucks—ten bucks Mex—he brings it back looking like something they strain vegetables through,” grinned Cressford.

“Not tonight, Graham,” quoted Buzz. “This time, it’s going to be different.”

“Yeh? Well, no one on this carrier is taking that bet—even in Mex,” a young two ringer jeered.

Then they horseplayed their way up the companionway to the flight deck where Rear-Admiral Blanchard stood by the purring Seversky. When they climbed in, the Rear-Admiral gave Buzz a small white card.

“Here’s your course to San Diego,” he muttered. “You can take fifteen minutes there for a check, and then use the other figures for your return. That last position is secret, of course, so take care of it.”

“Yeah, sir!” replied Buzz. “Don’t worry, I’ll be back— sometime.”

“You’d better be back within three hours.”

“Will you settle for three weeks, Admiral?” taunted Buzz with a sly grin at the Rear-Admiral.

“Go on. Buzz off,” snorted Blanchard. And they buzzed!

Down the lurching flight deck they raced, hell-for-leather, the trim black guide line sweeping under their amphibian wheel gear like a racing ribbon through a fantastic machine. Buzz held her nose dead on the lip, then let her fly herself off gently. He curled away gradually, made sure the J-6-9E motor was pounding out her revs, then with a zoom, he hopped for the sky and headed due east. Behind him in the somewhat luxurious two-place cockpit sat the two Cressfords. They were finally getting away from all this aerial madness.

For about twenty minutes they flew a routine flight, checking their course and making sure the ship was in first class order. Having left the Yorktown with her long black plume of smoke, they now wondered what lay ahead of the carrier. Somewhere out there on the broad expanse of the Pacific the remaining ships of the combined Pacific and Atlantic fleets were attempting to form a first line of defense against the mysterious Asiatic fleet that was steaming—or believed to be steaming—toward the American mainland.

Buzz had had more than a few words with the Admiral prior to the aircraft commander’s order to get the Cressfords ashore. While Buzz had attempted to be cheerful for effect, he knew that a new grim mystery was spreading its long talons across the waters of the Pacific. They knew a great fleet was approaching; but no one had seen it. They knew it was heading for the West Coast, but no one knew from what point. They knew that a great cruiser had been sunk—but how? That was the greatest mystery of all.

He pondered on these things as they headed for the Naval base at San Diego. Then, as he scanned the waters ahead, Buzz suddenly noticed something bobbing on the rollers below. The weather was getting more brisk, and the Seversky had to fight its way through a heavy cross wind that was choppy and uncomfortable to fly in.

“Get out the glasses and see what that is down there,” Buzz said to the elder Cressford.

They raced on toward the bobbing “something,” and as they closed in, they suddenly realized it was a fair-sized motor boat with a racing cowled deck and a sheltered control cabin. It looked somewhat like a Gold Cup racer, but the engine well was covered over. It may have been a racing type craft built for some wealthy young sportsman.

“What the deuce is that thing doing away out here in this weather?” said Buzz.

“It’s not so small,” Lauren Cressford said, peering through the glasses. “She’s well over fifty feet. Trim craft, too.”

“Anyone aboard?”

“Not that I can see.”

“Let’s go down and have a look at her. She may be adrift.”

“Maybe? She is. There’s no one aboard her at all. That’s queer, isn’t it?” said Cressford.

Buzz eased back on the throttle, started to circle down. Almost at once, something began to thump somewhere about their tail. Then before Buzz could turn, a gun started its insane chant in their own back cockpit.

Lonny was at it again!

“Hello! What’s up now?” cried the elder Cressford.

The glasses fell from his hands, and he twisted around from the small folding table that was set against the wall and stared at Lonny. The youngster was huddled over a Browning gun. Somehow he had ripped the rear section of the cowling back, and had lugged the gun from under the combing, and had brought it into action
BUZZ whipped the speedy Seversky out of its dive and hammered the juice to her. She lolled hard and came around, and he saw that it was a three-place Kawanishi. Its two rear pits, however, were covered over so that she appeared to be carrying only a pilot.

The Kawanishi pilot with power to burn, flipped around in a tight curl and poured another burst at the Seversky, and Lonny hammered back, made him turn. Buzz saw this, flipped around tight himself, and got his nose on the tail of the Jap machine. He clicked his gun trips, and splashed lead hard into her elevators. But the Jap hoiked a trifle, luggered his stick back harder, and turned tighter.

Lonny waited again, then slapped a burst full into her nose. Then she wobbled out of her climbing turn, side-slipped badly, and fell off. Buzz watched, then went down headlong after her and let two forward guns chatter hard. The Kawanishi took the lot and staggered again. She fell fast, pulling out just in time to make a landing.

"So that boat was a decy, eh?" growled the elder Crossford. "Good thing you were alert, Lonny. But where is that boat now?"

Buzz was circling to get an idea what really had happened. He stared around, but owing to the deep troughs of water that were now being thrown up by the roughness of the sea, the motorcraft was hard to find. "Going down?" called the elder Crossford.

"Want to take a chance?" asked Buzz. "The water's pretty gay down there."

"Let's find out what it's all about, anyway."

"Okay. Hang on!"

Buzz steadied the Seversky, made sure the landing gear was set for a water landing, and let her drift gently across the top of two large rollers. Then he eased down a wide beer-foam trough and slipped dangerously near the Kawanishi. But no gun was levelled upon them from the other plane. It only swayed wildly in the rough sea.

"Taking an awful chance," growled Buzz, realizing now how really dangerous the surface of the water was. He slipped the Whirlwind and let her gently slide closer to the Jap ship, making sure that Lonny was covering the seaplane.

He had come to appreciate the fact that he could depend on young Lonny for many things. He was so much a part of his life now that he wondered what it would be like not to have him on hand ready for action.

"You hold her," he barked to Crossford over his shoulder. "I'll crawl out there and have a look."

"I'll do my best," Lauren Crossford said, "but this sea is swinging badly. I'll let her ease off, then come back. Right?"

"Okay. Take her."

Buzz shoved the cowling back, climbed up and let the elder Crossford take his place. Then he crawled out along the wing and let Crossford whip her around so that the wing-tip slid between the wings of the Jap biplane. The wind howled. But the Niponese flyer made no move to dispute the Americans.

There was a quick move, and Buzz had changed to the Eastern plane. He wound his way along the Kawanishi wing, then dropped to the pontoon and peered into the cockpit.

The Jap pilot was stone dead!
not realize that they were approaching to save an American. On recognizing him as an enemy, they stood up and yelled back to the conning tower before coming any closer.

Then they got an order, and while one sailor held a gun on Buzz the other maneuvered the boat up so that he could get in. There was no mistaking their intentions. He was expected to get aboard and be rowed back to the submarine.

With one last glance about, Buzz tried to find the Seversky. But there was now no trace of it anywhere.

What had happened to them?

They hustled Benson out of the folding boat onto the greasy deck of the submarine, held him there in the shelter of the conning tower. A two-and-a-half ringer Sho-sa (Lieutenant-Commander) came down from the tower, glared at Buzz. He had on a reasonably neat jacket and a cap bearing the Japanese naval insignia of an anchor surrounded by cherry leaves.

"I am afraid we have caught you in a very embarrassing position," the commander said. "Can you explain the situation?"

"You saw all that we saw," Buzz replied, without batting an eye. "We found this plane bobbing around and went down to see if we could give any assistance."

"A very bland story," the Commander replied with an oily smile. "You, in civilian dress flying a plane bearing the flag, or markings, of an American admiral, go down to give aid to a mere Japanese Navy pilot. You expect me to accept that as an explanation?"

"I don't care what you accept," snorted Buzz. "That's my story, and I'm sticking to it."

"My men here declare that the plane shows undeniable marks of enemy gunfire."

"Your men are very clever if on such a meager examination they can tell that we're responsible for those bullet marks," Buzz smirked.

"But you admit the plane was shot down?"

"I suppose so."

"And of course you do not expect us to believe that it was shot down by another Japanese plane, do you?"

Buzz was hardly listening. He was trying to make out what had happened to the Seversky. It was not in the air and it was nowhere to be seen on the surface of the sea. He wondered whether the Cressfords were in trouble and required assistance. He pondered whether he should ask the commander to cruise around and look for them.

While the submarine rolled in the trough of the waves, the little boat returned to the plane and one of the men clambered aboard and hailed out the body of the pilot. Buzz watched all this with mingled feelings of fear and uncertainty.

Suddenly a bell clanged somewhere inside the conning tower and the Jap commander went to a water-tight panel, opened a small door, and took out a telephone. He barked into it, then listened intently for several moments. Finally, with a leering smile over toward Buzz, he gave several sharp orders to members of the deck crew. The men aboard the seaplane were ordered back. They hurriedly dropped the Jap pilot's body into the boat and began their haul back to the undersea boat.

"They're leaving the seaplane," said Buzz to himself. "I wonder why?"

But it was not long before he got the idea. "Ah, so you are a very important character, Meester Benson?" the little commander breathed, "yes, and I have important news for you. An old friend of yours requests the pleasure of, let us say, an interview."

"Hello, here it comes," Buzz mumbled under his breath. "Who is it this time?" he said aloud.

"Have you ever heard of a gentleman by the name of Mangu Khan?" the commander said with a grin.

"The Viper?" gasped Buzz. "I thought he was killed off..."

"Yes," interrupted the Japanese. "I heard about that affair. But nevertheless Mangu Khan is very much alive. You seem to forget that one M.T.B. machine got away. The Viper, as you chose to call him, is more than interested in your welfare, and we have been ordered to do everything to facilitate your presentation to him. You will kindly wait here a moment," he concluded crisply.

So that was it. The Viper was still alive—and waiting to get his hands on Buzz Benson!

Meanwhile the Yorktown and the companion ships of the American Pacific fleet headed west to meet the enemy.

But where was the enemy?

So far, only mysterious rumors prevailed. No scout from any of the surface vessels had been able to contact anything that looked like a Japanese battleship. The flotilla leaders were completely in the dark. They received only vague ideas from intercepted messages between neutral merchant vessels. These reports hinted at large bodies of aircraft, destroyers, battle cruisers, and submarines—but there was no actual indication as to where they were or where they were heading.

Admiral Kincaid, commander of the American Pacific Fleet—or at least what was left of it—was at his wits end. He sent out every patrol boat available and worked his radio men to jabbering, exhausted maniacs attempting to get a cross bearing on something that might be a Japanese plane.

Had he known that at least one Japanese submarine was within ten miles of San Diego, he would have torn out every hair of his graying scalp in his anxiety. Had he known that Mangu Khan was still alive and hidden away somewhere in the Pacific, he would probably have withdrawn his forces closer to the mainland.

Already he had lost one battle cruiser in a mysterious manner. It had happened during the darkness while a commander's barge was transferring two special gunnery officers from the Monticello to the Colorado. No one could figure out how it happened—but it did. There was a low boom, a tremendous flash, as the Monticello took that torpedo square below the waterline. The explosion had found her magazine, and the effect was disastrous. Ripped wide open, the Monticello sank in fourteen fathoms within ten minutes.

All that the fleet observers could detect through their micro-oscillators was the even beat of the Thornycroft motor aboard the Admiral's own barge. The tell-tale engine sounds of a submarine, destroyer—or any other form of naval craft that could have discharged that torpedo—would surely have been recorded on those oscillators.

What form of weapon was the enemy using, to strike so sudden and so accurate a blow?

Under this pall of uncertainty, the American ships were steaming out to grapple with a ghost fleet. Furtively, they scanned the seas, checked the horizon for the answer to the mystery. They were the hope of the nation to block out this menace—but they could not find the menace, nor did they know what it was.

(Continued on page 72)
They Had What It Takes

I—CHARLES A. LINDBERGH—THE LONE EAGLE

1—As a boy, Lindbergh was devoted to mechanics. One of his first contrivances was an ice boat run by an airplane prop turned by a motorcycle engine. After college, he learned flying, "barnstormed," and flew the air mail. Four times he qualified for the Caterpillar Club, his closest brush with death coming when his plane went out of control and he bailed out at 300 ft. His 'chute barely opened in time.

2—On the eve of his famed flight to Paris (May 20-21, 1927), Lindy remained at the field until midnight superintending the servicing of his Ryan, then retired to his hotel for two hours' rest. Returning to the field in a drenching rain, he checked the weather reports, then ordered the ship on the line at 4:15 a.m. As a misty dawn broke, the tanks were filled. He was ready to leave.

3—At 7:52 a.m. (May 20th) came the take-off—Lindbergh was on his way! He passed Halifax at 1:50 p.m., St. John's, Newfoundland, at 7:15 p.m. Out over the ocean he roared into the fog and darkness of night. Morning brought dreaded sleet squalls, but at last he "raised" Ireland at 10:00 a.m., May 21st. Then came England, the French Coast, and finally LeBourget at 8:21 p.m. His history making flight was ended.

4—Numerous other famed flights were logged by Lindy, his daring Lockheed sky journey with his wife to the Arctic, Alaska, Russia, Japan, and China being outstanding. Arriving at Nan-king during a terrible flood, they cruised about rendering assistance. Lindbergh also blazed South American air routes for P.A.A., then climaxed his work by laying out the great Trans-Pacific Clipper run.

5—To commemorate the tenth anniversary of Colonel Lindbergh's memorable New York-Paris flight, the French Aero Club is sponsoring a thrilling race over the same route to start this May 20th. More than $100,000 in prizes are offered, and many renowned pilots have announced they will enter. Will American flyers retains the honors for this grueling run?

6—Colonel Charles A. Lindbergh, the Lone Eagle, has long been the idol of American youth, and a more worthy hero could not be found. His intrepid flight to France was the spark which launched our modern aviation industry on the way to its present heights. "Lucky Lindy" was a gross misnomer—for it was his superb flying ability that put him on top.
Here on location, we see one of the sleek S.E.-5's that "saw time" in that great epic of the air, "Hell's Angels." It was a sister ship of this fighting job that figured in the dramatic story of Clement Philips, related in this gripping article.

**Wings**! "Hell's Angels"! Those breathtaking films certainly set the movie-goers on the edges of their seats when Hollywood re-fought the war in the air. But there was a lot more to those exciting pictures than appeared on the silver screen, as you will learn in this thrilling feature dealing with the real story behind the reel sky wars. For Death often took a leading role when the camera men ground out those—

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**Dog Fights of the Films**

UNGESSER turned his helmeted head, caught a glimpse of a diving ship. Roaring down upon him was a Thomas-Morse Scout. Twin Marlin guns upon its cowl quivered as its pilot fired a short burst at the Frenchman's Nieuport. The diving ship overshot its mark—and now it was Nungesser's turn. Banking upon his left wing, the Tri-Color ace followed close upon the tail of the Thomas-Morse.

Nungesser's eyes narrowed as he caught the trim Scout in his sights—his thumb pressed the Bowden release. The single Lewis gun mounted upon his top wing came to life, as a pencil of flame sprang from its muzzle. Slowly the Thomas-Morse Scout fell off on one wing and headed for the earth, its dive becoming ever swifter as it neared the ground. Lieut. Charles Nungesser, the great French ace with forty-five official victories, had won again!

Now you ask, "Since when did Nungesser ever have a combat with an American Thomas-Morse Scout?" Well, to be exact, it was sometime in the latter part of the year 1925, when he took part in one of the earliest war-flying films to be made, The Sky Raider. Due to the fact that there were very few, if any, German aircraft to be had in the United States at that time, it was necessary to produce the picture wholly with Allied aircraft—hence, the combat between the Thomas-Morse Scout and Nungesser's Nieuport.

It was in late 1924 that Nungesser came to this country to make a tour—presumably to form an air circus. Such outfits at that time were in great demand. He brought with him a Hannriot scout, a modified Nieuport 12, and several other aircraft. Induced by several friends, he consented to take part in The Sky Raider, a motion picture which was to be filmed at Roosevelt Field.

The Nieuport 12 was decorated with a huge Indian head insignia, to represent a machine of the Lafayette Escadrille. For a time, Nungesser was an unofficial member of the Lafayette, and he won many friendships—and victories—while flying with it. His Nieuport 12 is now in the Roosevelt Aero Museum, on Long Island, Nungesser having since headed out over "the long, long trail." You will recall that early in 1927, just before Lindbergh made his historic flight across the Atlantic, Nungesser and Coli hopped off from Paris to attempt a non-stop flight across the Atlantic to New York. The two completely disappeared, and theirs is another chapter in the mysteries of the air.

**MOVIE** studios soon found that the public was more interested in pictures dealing with wartime aviation than in films concerned with the aviation exploits of the "barnstorming" period. The War had made pilots knights of the air—combatants who fought hand to hand, high above the earth in the clean blue sky. To the victor went glory; to the vanquished—death. And so, it was readily understandable that the public was thrilled by the war in the air and what sort of men these were who daily jousted
with death high above mother earth.

But not until 1928 did there appear an extensive and authentic wartime aviation picture. All of you must surely remember Wings. It was directed by William Wellman, a former member of the Lafayette Escadrille, and written by John Monk Saunders, another ex-war pilot. Many aircraft were rounded up from flying fields in the United States and some were imported from Europe. But a good many were just rebuilt and decorated so as to appear as wartime aircraft. There were two hundred and twenty aircraft in this production, most of which had to be rebuilt to put them into flying condition. Wings was filmed at Kelly Field, Texas, with arrangements made to secure the cooperation of the U. S. Army Air Service.

Among the three hundred pilots who took part in this picture was a young fellow named Dick Grace, who was well started even then toward making a name for himself as a crack-up artist. Dick Grace performed four crashes for Wings, and the last of the four proved quite an event in his life. In crashing a Fokker D-7—he came in at about 110 miles per hour—Dick Grace suffered a broken neck. Even so he was lucky enough to recover after several months in a hospital.

Here we shall skip a year and move on to 1928. In this year, Lilac Time was produced, with Colleen Moore as star. Lilac Time was a much smaller undertaking than Wings; all in all, only about fifty miscellaneous aircraft took part in this picture. The chief pilots of the picture were organized into a special squadron led by Dick Grace. Among them were many well known flyers—and sad to say the majority have since "gone west." The special squadron was made up of: Dick Grace, Lonnie Hay, Rose Cook, Clement Phillips, E. D. Baxter, Frank Baker, a Spencer and a Stoffer.

AND now let us go back to 1927—the same year that Lindbergh made his famous flight. In this year the greatest World War aviation, epic motion picture of all time was made. This was Hell's Angels. It certainly was the most authentic motion picture dealing with war in the air ever made. Howard Hughes produced and directed this picture, although he was only twenty-two years old at the time—the same Hughes who is now breaking most of the speed records in this country with his famous low-wing monoplanes.

In the spring of 1927 the work of locating actual wartime aircraft was begun. Director Hughes and a staff of aeronautical experts conducted the search all over the world. They collected, all told, over fifty actual wartime aircraft, most of which had seen actual war service in France. The Allied aircraft included: S.E.5's, Sopwith Camels, Sopwith Snipes, Sopwith one-and-a-half strutters, Avro 504's, and a number of other wartime types. The German aircraft were composed of Fokker D-7's, which were obtained through the efforts of Anthony Fokker, who at the time still had a number of these famed craft in his factory in Holland. These had been smuggled out of Germany at the time of the Armistice—to prevent them from being destroyed by the Allies. Some of these famous Fokker D-7's had actually been used in the Richthofen Jagdstaffel during the latter part of the War. Finally, a large Sikorsky biplane was purchased and rebuilt as a reproduction of a World War German Gotha Bomber.

Under the direction of J. B. Alexander, these machines were brought from all parts of the world and rebuilt so as to withstand the severe flying maneuvers they were to take part in. Hell's Angels, you see, was one of the very few films in which there were no faked shots.

Over one hundred pilots were obtained, many of whom were ex-war pilots. Frank Clark served as chief pilot, and he had on his staff the following experts: Col. Roscoe Turner, Roy Wilson, Frank Tomick, Earl Gordon, and Harry Crandall. Frank Clark flew one of the Fokker D-7's which had formerly been used in the Richthofen Jagdstaffel—flew it over four hundred hours and burned up five motors before the picture was completed! He used the same Fokker in a spectacular 10,000 foot dive—which certainly proves that the Fokker D-7 was no weakening.

Near Van Nuys, California, in the San Fernando Valley was established the main base of operations—a complete flying field and the base of the Allied air squadrons taking part in the picture. It was known as Caddo Field. A few miles up the Valley was built another flying field—the headquarters of the famed Richthofen Jagdstaffel. This was an exact reproduction of the original in France. Ninety-eight machines took

When you saw this Spandau-bristling Fokker D-7 plunge out of the clouds in "Hell's Angels," it was the real McCoy! For this ship was actually flown in Richthofen's Jagdstaffel during the war. It was one of the few ferry craft smuggled into Holland after the Armistice to evade consignment to the scrap heap under terms of the Versailles Treaty. Frank Clark is piloting the D-7 in the movie "shot" above. The wings of another plane may be seen in the background.

This Nieuport 28 Scout is one of the rare original wartime planes still left in Hollywood. It has but few modern modifications, and it's seen service in nearly every wartime aviation picture filmed. That insignia of the rampant skeleton wielding the scythe would send a shiver up anybody's spine. (Photo by courtesy of Jos. Aiken.)
part in Hell's Angels, and the cost of production amounted to $4,000,000. Quite a sum in any man's language!

However, there were many more thrills in Hell's Angels than appeared on the screen before the movie audiences. Miraculous escapes occurred time and again during the filming of the picture, and there were several lives lost in furnishing those film thrills.

CLEMENT PHILIPS, who had worked in Wings, and Lilac Time, took off in a British S.E.-5 scout for some air sequences. Phillips gave him the gun and he roared upward. At a very low altitude he banked, climbed steeply. Suddenly, without warning, the motor missed and cut out.

Phillips found himself in a fine mess—no power, only about five hundred feet altitude, and just one tiny field in the vicinity. The nose of the S.E. scout dropped toward the ground and he was just barely able to make the field.

Phillips hauled his long body out of the cockpit as a mechanic ran up. The mechanic's first words were, "Whew! That was a close one, you don't need a rabbit's feet with the luck you have!"

The pilot smiled, "Well I guess my number isn’t up yet if I can get away with a landing like that."

The mechanic turned his attention to the motor, and after a few minutes turned and grunted, "Why it’s only a loose ignition wire."

He repaired it and Phillips climbed back into the cockpit. "Ignition on!" the mechanic spun the propeller and the Hispano caught.

A few minutes later the S.E.-5 scout rose from the grass covered field and climbed steeply. At four hundred feet Phillips was still climbing — then the motor again coughed and died!

The sudden silence was ominous. Phillips banked, tried desperately to make the small field. But he was too low—he couldn’t make it! The S.E.-5 came in fast, for it is a wicked ship in a forced landing. Barely missing several trees, Phillips struck the ground at a high speed. But the fuselage did not crack and the cockpit was intact—there was a slim chance that he was still alive.

They carried him from the wreckage—to find that his injuries amounted to one cut on the cheek. But when the doctor examined him he was dead. Yes, he had a slight cut on the cheek—and a broken neck!

Now let's change the scene. We find Al Wilson seated in the cockpit of a Fokker D-7, returning with twenty other planes from a dogfight over the ocean, near Redondo. He is on his way home and is thinking of how hungry he is. Suddenly, there is a terrific vibration throughout the ship followed by a loud explosion from the nose of his Fokker. The motor runs wild.

In that uncalled for scene, Wilson cut the switch and looked over the side of the fuselage to see what had happened. His propeller was gone! Wilson felt the ship nose down and he was barely able to keep the plane in a level glide. It would be impossible to land, for the Fokker was over the Hollywood Mountains. Wilson stood up in his cockpit, dived over the side, pulled his rip cord.

But Wilson was a bit mistaken as to his whereabouts. Actually, instead of being over the mountains, he was over the heart of Hollywood and the densely populated residential section lay just below him. Diving past him, his nose heavy Fokker landed with a terrific crash in the backyard of none other than Joseph M. Schenck's home. His propeller fell on a sidewalk narrowly missing several pedestrians, and Al, himself, landed on top of a roof.

All of you readers, who saw Hell's Angels must surely remember the large free-for-all combat scene—the one in which fifty machines took part. It was, in fact, the greatest number of aircraft ever to take part in any movie scene. Six months were spent in training and practice for this particular scene before the filming was attempted. Despite this, during the final filming there were many narrow escapes and several times collisions were barely avoided.

We find ourselves in the midst of this combat of combats. Planes are to be seen wherever one looks and the noise and excitement are breathtaking. Pilot Ira Reed in a Fokker D-7, at 5,000 feet, has just "shot down" an Allied plane and is looking about for another "victim."

To his left he spots his quarry. It is Pilot Stuart Murphy flying a British Sopwith Camel.

Reed, in the German ship, banks and fires a short burst at the Sopwith Camel. The Fokker D-7 passes the Camel very closely—Reed can clearly see the features of Murphy's face. Zooming upward, the Fokker fires a second burst; Murphy circles and roars directly at the Fokker. At the last moment, the Fokker pulls its nose upward, and the two machines just miss each other—the left wheel of the Fokker, spinning after lightly touching the upper wing of the Camel—a close one that! But each circle back and they are at it again.

Murphy, in the Camel, is a bit higher than the Fokker and dives upon his enemy. This one is too close! The tips of the wings seem barely to touch for an instant. The two (Cont. on page 91)
Snapshots of the War

Left: Here's Mr. Apg's back yard over in wartime Germany where he made the App airplanes and one or two of these C-4 biplanes. Powered with a 160-h.p., Mercedes set as a pusher, this 1916 crate was probably designed to frighten the old "Fries." Note the unusual tail booms—streamlined box structures running from between the wings and carrying double fins and rudders.

Below: Now this ought to settle a question hundreds have asked us—to wit, "What is a balanced rudder?" Well, here's a close-up of one on a Halberstadt CL-2. Observe how a section of the rudder is forward of the hinge line. When moved, the airstream pushes back on that protruding tip, making the rudder easier to operate at high speeds.

No, the Germans were hardly the bloodthirsty killer types often portrayed in fiction. Here we see Oberleutnant Erick Thomaen (left) and Oberleutnant Joachim Kirschstein (right) about to take off in their L.V.G. Judging by those smiles they must have been pretty decent fellows. Note the gravity tank in the top wing and the radiator fitted along the side of the fuselage.

The Benz-powered Aviatik D-3 of 1917, which was a very fast diver. You will note that in this ship the lower wing is fitted somewhat below the belly of the fuselage.

This is the airship shed at Lamur, Germany, used by the Zeppelins during the Big Scrap. Its "chicken-house" design contrasts sharply with modern dirigible hangars. But you will see that they had much the same arrangement as was used for opening the weighty doors. Building such mammoth structures has always been a tough job for the engineers. (Puglisi photo.)

Believe it or not, this is one of the "fighting planes" that the British took to France in 1914 to defend "brave little Belgium." Too, is right! They had to be taken across the Channel on a ferry and then assembled again—because no one would attempt to fly 'em across. Yes, it's a Farman "long-horn" using a 50 h.p. Gnome rotary engine. (Puglisi photo.)
P.D.Q-Boat

“Buckshot! Haw-w-w-w-w-w!” Phineas yipped.

Phineas Pinkham, ex-colonel of the A.E.F., sat in a lazily rocking Spad in the scraposphere high above Verdun and wondered why any patriot from the U.S.A. would be crazy enough to swap a bucket seat in a battle bus for a swivel chair in a war office. The trickster from Boonetown, Iowa, still tasted brass in his mouth, and his homely face became even more warped as he reviewed his brief career as an armchair jockey at Wing headquarters.

“It was no use tryin’ to make a silk sock out of a fish net,” he soliloquized as he kept his eyes peeled for flying Dutchmen. “It sure feels good to be flyin’ with Howell and the other bums again.”

Deeds of extraordinary valor had made Phineas Pinkham a colonel. But one potent punch to the proud bosom of a brigadier had amended that over zealous act on the part of the high cockalorums of the A.E.F. Everybody on the jittery front from the Channel to the Italian border breathed easier.

Lieutenant Pinkham had not forgotten a certain von Spieler. He was one von whom Phineas had not been able to wash up completely and the Heinie’s name was written on the intrepid Yank’s books under the heading of “Unfinished Business.”

“Von Spieler is one fathead I’m going to get if I have to keep on lookin’ for him after the guerre is all over,” Phineas muttered as he stuck to the circling flight rebelliously. “He is flies in my soup, that big hunk of limburger! I’ll—ugh, there’s a Boche!”

Yes, Phineas was right. Eight Albatross scouts went slicing through the ether below Major Garry’s quintet of aerial headliners. Captain Howell, leader of “A Flight,” spotted them through a big hole in the fleecy ceiling and waved a flipper. Immediately thereafter he fell off on one wing. Bump Gillis swallowed his gum and did likewise. Lieutenant Pinkham, a length of heavy cord tied around his instep, jerked the stick to the left and let out a howl . . .

“Hit ‘em when they ain’t lookin’!” the jokemaster yipped. “Then they’re a pushover afterwards. Take that—and that—and that!” Phineas had never been a sky nitrod, however. Only one burst from his gun reached the Albatross he had singled out and that shot merely caressed the empennage of the twisting, stunting Kraut battle wagon.

The Boche that Howell had picked on was going down to the linoleum with a wing and a half, no rudder post, and very little future ahead of him. Bump Gillis, whose forebear had mopped up many a scene in the suburbs of Dundee, had made his shots count. The lineal Scot was no spendthrift even with the taxpayers’ money. His first burst burned a Heinie pilot’s pants and his second knocked a Mercedes engine decker than a sardine in a tin kimono.

In less time than Phineas could say “smell” the warring busses were swrewn all over the firmament and one persistent Boche buzzard was sticking to the Pinkham wake as if he were on the end of a tow rope. Phineas’ scalp twitched and threatened to creep right out from under his helmet and fall into his lap. He had a sneaky suspicion that no ordinary Boche was going to his precious neck and he had to do something about it. Spandau lead was getting hotter and closer with each beat of the Hisso up ahead. Von Spieler! It had to be the big bologna eater. The intrepid Yank dropped the nose of his Spad in a hurry after a quick glance around. He had seen the Heinies’ bugged eyes and a flash of white teeth that told him the Von was getting set to let a haymaker loose. Phineas jerked his foot viciously. Bla-a-a-a-am! Bo-o-o-o-o-o-o-o-o!

The Spad shivered and did a two-step. The Boonetown trickster checked the plane’s momentary fit and shot a glance around. But the Albatross was wobbling and steaming like a Christmas plum pudding. A wing was fighting to keep a strangle hold on a splintered strut, and in the pit a Von was thrashing around in a vain attempt to unwind a wire that had broken loose and encircled his neck like an affectionate python.

“Buckshot, haw-w-w-w-w!” yipped Phineas. “That shot-gun under the good ol’ Spad fooled the bum. Well, I—well, what is that bum, Gillis, doin’ pointin’ like that, huh? It was April Fool’s day last week”—Phineas could not figure it out.

Another Garry bus sliced by and the pilot also stabbed ainger at Phineas’ Spad just after a burst of Spandau lead sideswiped the concentric circle that adorned it. Mystified, the master of practical jokers raised himself in his pit and twisted his head around. Smoke was streaming out from under his air chariot and his speckled war map became the color of the inside of a grapefruit.

“Aw nuts,” he wailed, “that shot-gun hit my Spad on fire! I might just as well throw a rock in the ocean and not let go. Oh well, down with Phineas Pinkham. If I can duck the Heinies who are left—”

But before he got out of the area of Spandau skullduggery, Phineas took a fine banging around. Oil spurted into his mouth and lubri-
cated his tonsils. The steel arrow of an altimeter imbedded itself in his nose and a big piece of wing fabric slapped against his face like a hot towel after a shave. He was only three hundred feet up when he ripped the piece of cloth from in front of his vision. Next he engaged in a tug-of-war with the stick, managing to get the Spad's nose up just enough to keep it from ploughing up a field for a Frog peasant.

In his whole career of crashing Spads, Phineas could not recall when he had hit the ground harder. A wing went flying and one wheel snapped off. The Spad remained spun around in a dizzy circle before it came to rest.

A dozen Yank doughs surrounded the wreck. Various expressions of amazement masked their faces as the pilot they thought was extinct climbed out of the crumpled cockpit and staggered toward them.

"Who owns this merry-go-round?" Phineas inquired deliriously, his eyes crossed. "I knew it wasn't safe! Where's the owner? I will git my lawyer to sue the bum. I . . . it . . . . he . . . . hoo—where am I?"

"You should be having a spade pitting you down," a private volunteered awesomely. "You fell harder than Joe Beckett when he was tagged by Carpenter. What're you made of, huh?"

"Haw-w-w-w," chuckled Phineas, feeling of his bones, "did I git here in that wreck?"

"Naw, ya come on a street car," sniffed another Yank.

"They just tossed ya off for not payin' your fare."

"My man, I'm an officer I'll have you know," Phineas bristled. "Have care or I will have you tossed into a klink. Don't anybody teach you discipline? Take his name, sergeant?"

"Ha! ha! You take it! It's Wachisowski!"

"Oh, you want to git broke, too, huh?" Phineas said indignantly. "Awright, I'll—why look! What's that over in the field there? Why, it's a Heinie! Gimme that motor bike. Let me through here—it's the Kraut I bopped. It is von Spieler, haw-w-w-w!"

A few moments later loose-jawed doughs watched Phineas ride the mechanical bug across a pasture pocked with hummocks. They saw him ditch it near a fence which he leaped in one hop.

"There is only one shavetail like that one," a dough said. "It is that crackpot, Phineas Pinkham. Come on let's git a look at the Heinie."

When he reached the crumpled Albatross, Phineas found that the pit of the bus had been bashed in and that the Von was held as tightly as if he had been wrapped in a cocoon. The irate Teuton physiognomy that glared up at him, however, did not belong to von Spieler. Phineas was disappointed. But he was comforted when he saw the big hooked nose well inoculated with buckshot.
"Wee gates!" he greeted the vanished Kraut. "Meet the winter, haw-w-w-w! What's your name, mein Freund?"

"Bah!" growled the fallen Heinie. "By you'self you should find out already, Yangkee Schwein!"

"What's in a name anyways, as o' Bill Shakespeare said?" the Yankee pilot grinned. Phineas then began to help the Boche extricate himself. He yanked and pulled and hauled and finally got his captive into the clear, tattered and torn. The Von's right pant leg was ripped wide open and a big portion of his skivvies showed. On the silken cloth was an embroidered coat of arms that tickled the Pinkham risibilities.

"Boys, you're a Boche swell huh?" Phineas shot out.

"The family crest on your pancreas, huh? I would sew up them flyin' trousers, if I were you, before you come to our drome or the bums'll call you a sissy. Haw-w-w-w! I bet you're mighty important where you come from. Well, let's allez, as Goomer hates to have the chops git cold. Stir your stumps, von X, or I'll have to bat you one."

CONJECTURES were flying thick and fast on the drome of the Ninth Pursuit Squadron. Major Rufus Garrity stood in the doorway of the Frog farmhouse, his avid eyes fixed on the strip of road that was visible beyond the hangar that housed "B" Flight's Spads. How- ell's assurance that he had seen Phineas Pinkham walk away from the crack-up failed to pierce the shroud of gloom that was wrapped about the Old Man like an Indian blanket.

"Yeah," Bump Gillis said, "maybe when he got a little ways from the crate he sneezed an' fell apart. When I seen the crack—er—him goin' down, he was droppin' faster than the thermometers at the Poles. Huh, you can take a pitcher to the well once too—"

"You can't make apple sauce without mashing up some apples," Howell paraphrased Bump's axiom to arrive at the same conclusion—namely that Phineas was no more. "Huh, I know how you feel, sir."

Garrity stiffened and let loose. "Oh yeah? You ever own a shotgun like that one he stole? The big, spotted-faced brother of a zebra! It was worth at least a couple of hundred bucks and used to belong to the Prince of Wales. I won it from a red tab in—oh, if I ever get hold of Pinkham!"

"I shudder to think of you grave—robbin'," Bump Gillis said. "Well, I must go and see Babette and break the news to—er—listen! Do you hear what I hear? It's—it's—spirits—"

A voice came from the deepening gloom, a very familiar voice that froze everybody on the drome so that it looked like a petrified forest. "Hurry up, ya Heinie bum! Didn't I tell you once to get the lead out of your dogs as I am hungry? Oh, you want to try an' escape, huh? Why you?—"

"That is Pinkham!" howled Major Garrity. "If he didn't bring back that shotgun, I'll skin the fresh ape alive! I'll!—"

But nobody heard the Old Man. Bump Gillis, Howell, Goomer, and a dozen others were running. Sergeant Casey and a flock of groundmen joined them in the stampede. Finally they came upon Phineas Pinkham and his captive. The prodigal son of the Ninth was in the middle of a Frog pond and he was in the act of putting the Boche pilot to sleep with a whistling lead hook when Bump Gillis yelled at him.

"Haw-w-w-w!" guffawed Phineas jubilantly. "The bum resisted me an' I had to soak him, Boys, I—"

"You don't look sunburnt to me," Howell yipped. "Where did you get the Kraut?"


When the Von was able to navigate, his captor went on his way, with a flock of wondering squadron mates at his heels. Old Man Garrity stood in the doorway of headquarters, arms akimbo, a bonfire blazing in each eye.

"Bon swar," trilled Phineas airily. "I have brought company for dinner, so tell Goomer it's all right to use the good silver, sir. The Von is bashful and will not talk."

"Where's that shotgun, Pinkham?" Garrity ground out on an infection that was rising to a bellow. "Who told you to take that gun and put it over your Spad, huh? If you've lost it, you—"

"Nuthin' is lost when you know where it is," Phineas told the C.O., quite unabashed. "Like the guy said on the ship when he dropped the compass overboard. Anyhow, it is behind the lines some place, Major, haw-w-w-w! Here I come back from the dead an' you ask for a shotgun! That is a pal for you."

"Look here, you half-baked, dog-eared—"

"You forget who you're talkin' to," the culprit sniffed. "I am a colonel, your superior—er—haw—well, I was one. Anyways, I am an officer and I know my rights. If you will just let me pass, sir, I will make my report."

The Old Man let Phineas pass. Then he whirled suddenly and planted a boot against the Pinkham empannage. Major Garrity let out a warwhoop promptly and limped to a chair where he raised up the foot and hung on as if he were afraid it would drop off. Phineas grinned complacently and removed a big wrench from his back pocket.

"It is a caution the foresight the Pinkhams have always had," he observed blandly. "Where will I put the Von, Major?"

W H I L E Phineas was eating and the Old Man fumed and ground his teeth, the pilot of the Ninth strove to make the Kraut prisoner open up. But the grounded hirpling of Kaiser Bill remained as mute as a clam with lockjaw.

"He's a high mucky-muck," Phineas contributed between gulps of stew. "I bet when we find out who he is, we'll be some surprised. When I knock 'em down, it is not small fry. It is the little ones I take back, haw-w-w-w-w! Hey, Goomer, what did you make this slum out of—old mules? Huh, it's as awful as what ordinary doughs must eat. Come on, Heinie, tell the bums who ya are as how can we notify your folks? I bet he swallowed his tag an' maybe we should cut him open."

"Ach Gott!" groaned the captive. "Nein, nein—"
"Goomer," Phineas said solemnly, "git a bread knife an' a bottle of grog to knock him out with. Once I had an uncle who operated on himself for gall stones while he was hunting, and it was a hundred miles to a doctor. He just used a razor an' a boy scout knife an' sewed himself up with—"

"Vait—vait," pleaded the Kraut. "Himmel! Mein name ist—"

The door opened. Three brass hats came in. One eyed Glad Tidings Goomer who was coming out of the kitchen with a huge carving knife. They took a look at the buck-shot wounds on the Von's bugle and at the pasty veil that shrouded his Teuton face.

"Torturing prisoners, that it, Garrity?" barked a big colonel. "Well, I'll report this damnable—"

"Aw somethin' always has to spoil my fun," complained Phineas. Grumbling under his breath, he dished into his stew again.

"Ja, ja," sputtered the Von. "Cudt me oben ists what they say yedt. Mit der breadt knife, mein Freund," he added. "You safe me, kein?"

"Help out," Garrity grumbled. "We were just kidding the squarehead. Well, if you gentlemen have something on your minds—"

"Haw-w-w-w-w!" Lieutenant Pinkham exploded. "Only dandruff," he added in an undertone, "I bet they've come to tell us some more boats have been sunk in the Channel. If they were in China right now, they would start worryin' about the tidal waves in—"

"What did you say?" cracked a brass hat. "If what I think you said—"

"Huh?" grunted Phineas innocently. "Why I was sayin' to Lieutenant Gillis here that it's a caution the latest styles in Paris. Look at this skypiece in the magazine. Haw-w-w-w-w!"

Major Rufus Garrity led the sputtering brass hats into the Operations office. Ten minutes later he led them out again. When the door had closed behind them, the Old Man told the flying officers of the Ninth Pursuit that Chaumont and other places were worrying about the morale of the Allies. The sea pirate had struck again. Count von Kluckmer, the rampantous Raider of Rugenwalde, had sunk a Limei boat in the Channel. It had been loaded to the gunwales with British red tabs and an assortment of lesser officers returning from France leave. The raider had let a few, who had not been taken aboard his mystery tug, get away in open boats.

"Raising hell, that Kraut," Garrity stomped. "They can't tag him. He apparently has one of those fake-front Q-boats. One day it's got one funnel, and next day it's got two funnels. One week he's been spotted on a boat painted white, then they report having seen him on one all plastered with camouflage. Got 'em on the run, the big squarehead. No boat is safe crossing the Channel. The colonel told me a Limei sub sank a packet last night. That looked like his—and what do you think?"

"Somebody got wet," Phineas guessed promptly.

"Shut up!" thundered the Major. "It was a Frog boat out of Bordeaux," he explained to the pilots. "Pinkham, one more smart crack—and—" Garrity grabbed up a platter, thought better of it and put it down again. He told the pilots that the Heinnie sea rover had a collection of flags of every country in the world and that he had sunk over a half million tons of Allied shipping.

"Somebody should let the Navy know about it," Phineas declared. "Haw-w-w-w! Well, if that's all, I have a date with Babette in Barley Duck. Adoo for awhile, bums. He can't sink us—von Kluckmer."

"What?" The prisoner looked up quizzically. "Who was speakin' to you, you Heidelberg bum?"

Phineas tossed at the Kraut pilot who was wolfing stew at the mess table. "Ub—er—eat hearty, mein Froind. The chow they give you in the A.E.F. klinks is not filly mig-nons. Bon sour."

As Phineas went out he felt something stir in his always active gray matter. It was a small edition of an idea that grew to mammoth proportions with each step he took across the tarmac. Even if he was right about what he was thinking, what good would it do him, he asked himself. Still, Phineas mused, he would keep his idea to himself. His thoughts began to be monopolized by Babette. He must buy her a bauble to please her big flashing dark eyes before he dared to knock on the portals of her bailiwick. For Phineas had been neglecting Babette of late and he knew that a woman scorned holds more fury than Satan's operations shock. Therefore, upon his arrival in Bar-Le-Duc, the miracle man from Boonetown, Iowa, sought to pick up a trinket in a Frog shop. The merchant of the establishment was about to close his shop when Phineas entered. All kinds of cajolery failed to change the vendor's mind. In broken English he told the would-be customer that he had a wife who would beat out his brains if he dared to be late two nights in succession.

"Demain," yipped the merchant, "you come ici an' je suis ici."

"It's a fine business man you are," Phineas sniffed disgustedly. "Awright, if you don't want my argent, I will tell the Chamber of Commerce that—"

He strode away indignantly and headed for the domicile of his light of love. He knocked on the door. It opened and a feminine head was thrust cut into the night. Babette was in fine voice.

"So—you, on? Hab, j'ai attendez pour vous an' now vous are ici, I say what ees thee's I tseekn of you. Voila! When you air ze colonel, Babette she n'est pas ze ver' swell dame pour vous, non? Bah! Un soldat he tells to me thees theeng. Colonel Peenkham he ees wan ladies' man, oui. You have come to see Babette when zey mak' you bust! Peeg! Chien—rache—chat! Voila, sacre bien! Play ze double-cross avec mois, n'est ce pas? Bah, Pheenyas, vous ctes—"

Phineas stammered, choked, stuttered "Bong soor," and about-faced. As he walked down the street his ears rang. "Dames, huh!" he muttered. "I don't understand 'em. If I'd have brought a present—"

Just at this time, Fate stood in a narrow darkened street and flared two doughnuts on the shoulder. She pointed her finger at a tall, gangly figure that was tread ing the pavement. The doughnuts licked their chaps as they gazed upon the oncoming Phineas Pinkham.

"Here comes an orfiser, Spike," said one. "Maybe we kin git us a frame or two. He looks like a dumb cluck. Git out them watches."

Phineas paused as a dough saluted. The private lost no time. "Sir—er—beg pardon, sir. We—er—thought you'd like ta buy a little trinket or two we picked up on the battlefield, sir. Uh—er—they look like swell watches, sir. One is solid silver, or I never made three straight passes with—er—look at 'em, sir. Me an' me friend is broke an'—"

"Why—er—how dare you—er—nice watches, aren't they?" Phineas observed. "Why only must be solid gold. How much for the whole three?"

(Continued on page 82)
Giant fighter-bombers versus speedy single-seaters! Daily, that “show” is being staged in Spain, the bloody “proving ground of Mars.” And more strongly than ever it is being demonstrated that the gunner is finally coming into his own—that his training is as important as that of the pilot.

Sky Gun Practice Today
AND THE SPANISH WAR SIDELIGHTS

By David Martin
Author of “Modern M. G. Marvels,” “The Genesis of Sky Guns,” etc.

NEWS coming out of war-torn Spain during the past few weeks seem to sound the knell of the single-seat fighter. His day appears to be over and there is nothing much he can do about it.

From the start, aerial hostilities over fair Iberia have naturally commanded our attention. We watched the progress with painful interest. Madrid was bombed and single-seaters went up to defend the city. We do not know what type ships were used in this defense, or the caliber of the pilots; but most certainly, judging the results as we go to press, the bombers, or the gunners aboard the bombers, have done just what we of FLYING ACES have figured they would do. They have out-gunned the high speed single-seaters.

From what we can make out, the Loyalist defense squadrons have been using French Dewoitines and possibly a few British Hawker Fury machines. These two types are considered among the finest fighter or pursuit ships in the world. They are fast, maneuverable, and have plenty of modern armament. In proper hands they should be able to defeat any equal number of single-seat fighters.

On the other hand, the Rebel forces have concentrated their aerial activity on multi-place bombers of various makes and types. Actually, only a few of these multi-place jobs have been stopped or brought down, at this writing. The damage inflicted on the ground defenses by the Rebel bombers indicates that they are facing little opposition, and what losses the raiders have sustained came as the result of damage inflicted by anti-aircraft fire from the ground and fool-hardy low flying by overzealous pilots. The few reports of single-seat victories over raiding bombers do not appear to have been verified in the more reliable reports from the scene of action.

The Rebels, if we can believe the dispatches, are using the German-built Heinkel fighter. This is the machine we have described so many times in this magazine as the possible mainstay of the newly formed German air service. Originally, it was built as a high-speed mail and passenger plane over certain routes of the German air line system; but to those who understand this type of ship, it was obvious that this was a machine that could be quickly converted into a military craft. We of FLYING ACES were among the first to announce this assumption.

This Heinkel, He70 is a low-wing monoplane with a retractable landing gear. It uses the 630 h.p. B.M.W. V1 engine and has a top speed with a full load of 222 m.p.h. As a commercial plane, it carried one pilot, one wireless officer, and a co-pilot who might become the bomber-officer. The cabin has accommodations for four passengers—or their equal weight. This, we presume, means that in addition to a full military crew they could carry

With blister-type gun turrets on top, side, bottom, and front, that impressive sky weapon, the Boeing 299 bomber, features all-are firing. “The gunners aboard that magnificent machine,” says David Martin, “don’t know what a blind spot is.”
Gunner Positions, A Japanese Weapon, And the V-A 37m.m. Cannon

The rear gun positions aboard the French Breguet 413 M4 Multi-Seater Fighter—The lower gun turret is moved by the gunner who simply shifts his body while seated in a metal saddle.

The Japanese Mitsubishi gun—Evidently a copy of the American Light Browning. It uses a flexible belt run off a light drum fitted to the left side of the gun—The box on the right catches the empty shells.

To-day's King of the Clouds
The first consideration in designing a modern fighter-bomber, is the position for the gunner—his training is almost as complicated as that of a pilot.

This shows modern American practice in mounting the 30-caliber Browning machine gun for the observer.

The Vickers-Armstrong 37 m.m. Cannon
A quick firing gun designed for anti-submarine work—capable of 100 rounds a minute.

Comparative size of 37 m.m. shell and a .30 caliber bullet.

Length, 7 ft. 6 in. Weight with mounting, 200 lbs. Weight of shell, 1½ lbs. Effective range, 2,000 yards. Shells use fabric-contact fuse for action against hostile aircraft or high explosive against subs.
500 lbs. of bombs and considerable machine-gun armament. So, while the Devoitines and the Hawkers with their 200 to 250 m.p.h. top speed, may attempt to stop these Heinkels, it is easy to see that if the bombers are suitably armed, they can at least equal the speed of the defense single-seaters, and surely out-gun them.

The Rebels are also supposed to be using Italian Caproni 101 bombers and Savoia-Marchetti S.81s. Here we find the same armament problem and practically the same speed. The S.81 is said to do 267 m.p.h., with a load of nearly 3,000 lbs.

Is it any wonder then that the United States, Great Britain, and France appear to be giving far more attention to their fighter-bomber planes than to the speed of their single-seat fighters? Yes, all we hear about today is high-speed two-seaters and racy multi-place bombers.

It all adds up to one thing: The much abused and little-considered aerial gunner is coming into his own at last. He is getting the consideration he deserves. He fights and dies just as "hard" as does the pilot. But he seldom has drawn the pay or the glory that comes to the pilot.

It was that way during the World War. They turned out machines by the thousands with all the attention focussed on the convenience of the pilot, the power of the engine, and the layout of the instrument board. The gunner or observer was simply something to be put up with. His cockpit and gun mounting was stuck anywhere, regardless of his angles of fire or his chances to use a dual control and save his own life in case the pilot were killed.

Today it is different. The gunner is a real power, and they now consult him before they cut out a hole for his cockpit. He is given the best in equipment, and in many cases he is also a pilot as well as a skilled observer and gunner. He uses the camera, works the signalling key, and draws maps. He fights skillfully and he generally takes command of the ship in action. He knows the weakness of the opposition, recognizes the blind spots, and can figure in advance every move the enemy is going to make—when he's a good man and knows the variations of their attacking strategy.

The gunner, or observer—call him what you will—is the big power in aviation today.

And with all these changes in machine construction, comes the improvement in armament. He requires special gun turrets to work from at high speed. He requires better guns and more powerful ammunition. He is getting it. Take for instance the gun turrets aboard the new Boeing 299 bomber. The gunners aboard that magnificent machine do not know what a blind spot is. They can deliver a terrific stream of bullets on an attacking ship, no matter from what angle it comes. This machine is particularly impressive sky weapon, and it is getting considerable attention abroad. British experts loudly praise the all-arc firing feature of the Boeing 299.

A glance through the many types of front-gun turrets that are being shown on many of the high class foreign machines, such as the British Overstrand, the French Breguet 413 M4 multi-seat fighter, the Marcel Bloch 200, and the new Amiot 142-M, will give an excellent idea of the amazing trend in automatic turrets in which the gunner, by simply aiming his gun and shifting his body slightly, whirls the sheltered gun turret around with a minimum of effort. He no longer has to clear stoppages or draw a fine-angled sight on the enemy while experiencing the high pressure of slipstream or the bitter cold of high altitudes.

Only his sights seem to have resisted specific changes; for the old war-time wind-vane sight seems still to be in evidence. One of these is shown in Mr. Whitehouse's illustration this month, and the reader will readily gather the general idea. It is composed of a fixed standard and a pivoted sight which moves the bead around to "lay-off" for direction.

For instance, if the gunner in question is situated in the cockpit behind the pilot of the orthodox two-seater and is firing directly over the side at a plane going in the same general direction, the wind or slipstream running from nose to tail swings the brass vane backward toward the tail, this brings the bead sight toward the nose of the ship and thus automatically "lays-off" and allows for the forward speed of the ship from which the gun is being fired. To allow for the direction of the target ship, the gunner uses the ring of the rear sight.

A further explanation may help. In the drawing, we see the gunner sighting over his spade grip, through (Continued on page 88)
Here we have the neat retractable gear of the Keith Rider Racer. This close-up shows how the wheel and stub-axle axle are drawn up into the wing. The mechanism is operated by a hydraulic system, and should it jam, the pilot can wind down the flaps and land at a speed of 90 m.p.h. on the smooth belly of the fuselage.

Another landing gear close-up—this time a swell view of the "well" that takes the retracted wheel on the Curtiss Hawk fighter. This gear also works hydraulically, the wheel being drawn in flush with the side of the body.

Above: This is the business end of the catapult aboard H.M.S. Sussex. Note the staunch construction of the device. The plane is a Hawker Osprey many observation ship, the sea-going version of the Hawker Demon. Just aft you'll see a naval gun that's ready to back up the argument. Right: Still another form of retractable carriage is seen on this Vultee transport. The wheels fold upward and inward, completely out of sight, and those axle flaps fill in the wing apertures.

This T.W.A. mechanic is seen ripping down a motor for a complete overhaul. Each engine gets an average of fourteen man-hours of inspection and repair for every hour of flight—which means Precaution with a capital "P." You have to know your stuff to handle jobs like this.

A close-up of the cockpits and center-section of a Curtiss Navy Fighter, showing how the units of the transparent pit-covering fit together. Note the gun sight on the cowling.

Automobile springs on a light racing plane? Sure thing! S. J. Wittman, of Oshkosh, uses 'em on legs for his tiny speedster, as shown above. He can put his job down at 90 m.p.h. on them. They streamline well, too.
Gold Flies the Gauntlet

A GRIPPING WESTERN AIR YARN

By Orlando Rigoni

Author of “Design for Killing,” “Suicide Spadaus,” etc.

Illustrated by Lee Marshall

Before the planes had been put into operation, the gold used to be carried out on pack trains. Many of those trains never reached their destination—for they had been set upon by bandits, all the men and animals killed, and the gold taken away.

With the planes it was much safer. But lately, since the company had struck the rich dirt on the eight hundred level of the mine, there were vague rumors of another gang in the hills which was intent upon stealing part of the treasure.

So Tom refused to take the kid as guard. “There’s killers in those hills just aching to drop my plane,” he told Max. “A lucky shot and it would be all over. It’s no job for a green man. We need a man who knows how to use a gun . . . .”

Big Max slapped his leg. He jerked his head toward the bar. “There’s just the man you need, Tom. They call him Gunner Sloane. Ain’t been here long, but he can draw a gun and shoot faster than a fuse can spit. I wouldn’t want to meet him in a tight place.”

“I don’t take much to having strangers chaperon that pay dirt,” Tom complained.

Max scowled, “You won’t be takin’ no chances. When you get him in the air, he can’t harm you none, ’cause he’ll need you to bring him down.”

And so the thing was arranged, and Tom, Andy, Gunner Sloane, and a man by the name of Mellenthin, who had taken up with Gunner, all headed for the landing field.

The company planes were sadly dissimilar in design. Tom’s ship was a four-place Stinson Reliant, equipped with a Lycoming engine—a sleek, swift job. The other ship that Andy used was an old Douglas mail plane with single pit and covered express compartment. It had one feature the Stinson lacked, and that was a synchronized machine gun shooting through the prop. The weapon crouched like a watchdog on the cowling of the old ship.

Tom climbed into the Stinson and soon Andy had the inertia starter screeching. The Lycoming caught with a blast of thunder that drowned out the racket even of the stamp mill on the opposite hill. Tom gunned the engine and jerked the throttle half way back to warm the engine quickly.

He then turned to inspect the boxes of gold that were fastened in a special compartment built where a rear seat had been removed. Then he stepped out and around to the rear to inspect his empennage.

The Stinson lurched suddenly! There was a wild cry! Tom leaped back toward the cabin. The left hand brake had slipped. The Stinson was moving in a slow circle—and in the path of the churning prop—his back to the menace, stood Gunner Sloane!

Tom couldn’t reach the switch in time to save Gunner. He knew that,
Defiant of the fate he knew to be his, Gunner Sloane fearlessly flung his speeding plane directly into that narrow gap between the diving Waco and its prey. A split second later, those hurtling wings crashed in a rending, tearing screech.

and he added his fierce cry of warning to that of the kid. Then the kid hurled his lean body at Gunner like a catapulted thing! He hit him below the knees. Down they went in a cloud of dust as the death blade swung above them! The shadow of a wing crawled across their backs.

Tom reached the switch, cut the mighty engine. The two men scrambled from the dirt. There was a scowl on Gunner's heavy face.

"Thanks, kid," Gunner growled, "you saved my life and I won't forget it."

The kid shrugged. "Wasn't anything much, Gunner. Maybe you can teach me to shoot sometime," he said, taking the man's big thick hand in his own slim, white one.

Tom was mad. The accident was uncalled for. "Listen, you," he addressed Gunner, "if you're working with me, you've got to learn to keep away from the nose of a plane when the engine's gunning!"

Mellenthin, red faced and grinning, broke in: "Do you want me to fix that brake, Liston? You two'll have to get along—at least for this trip."

"What do you know about brakes?" Tom's eyes squinted.

Mellenthin cocked his head. "Not much—but it slipped, didn't it?"

"I'll tighten it myself," Tom growled.

Then he turned on Andy Haines. "Listen, kid, you came close to getting your head knocked off. Better stay away from here until you're asked to come around."

"Baloney!" Andy flung at him, "I can fly as good as you can—and some day I'll prove it!"

Tom glared at him. "As long as you keep that notion in your head, you'd better stay on the ground," he warned him. And he wasn't bragging.

Tom tightened the brake, then gave Gunner his final instructions. "Keep your hands off the controls. We probably won't have any trouble. But if for any reason we do, don't do any killing unless you have to."

Gunner nodded grimly. Tom was a little puzzled by that face. It was pugnacious enough, but there was a hint of frankness about it that contrasted strangely
with the man's gruff and decidedly blunt manner.

He started the engine again. Jabbed the throttle wide. For five minutes he let this craft of wood and wire and cloth tremble to the mighty blast of power. Then he kicked off the brakes. The Stinson leaped down the narrow field. Lifted! He swung down the canyon until he cleared the high ledges, then he circled south.

Beneath his trucks washed a wild, jagged country. A forced landing anywhere there would be fatal. He cast a furtive look at Gunner. The big man didn't have the usual tense, alert attitude of the novice flyer.

"Have you been up before?" Tom asked casually.

Gunner shook his head. He didn't look at Tom. His eyes were searching the terrain below them. Tom pulled the stick and sent the Stinson up to ten thousand. He jerked another look at Gunner.

"You can try those controls if you want to," he grinned.

Gunner stared at him. "No—no—that's, I haven't got a handker’in' to put us down in these hills."

They roared along for twenty miles—thirty. In half an hour they had covered more ground than the old pack trains used to cover in a day. And the pack trains had a man on them. Here in the air they and their gold were as safe as.

The Stinson gave a sharp lurch. Its left wing tip swung high and the tail sloughed down! Tom cursed, fought with the wheel. The turn and bank indicator did a loop. The rev counter built up as the ship suddenly nosed over!

Tom jerked a wild look at Gunner. "Let go that wheel!" he screamed. Had the man gone suddenly mad! There had been cases like that.

Gunner's face was set like stone. Tom cried at him again, but the only answer was a slow, thin grin. Tom snatched for his gun, but the Stinson suddenly screamed out of the dive on one wingtop, causing Tom's head to hammer against the cabin braces. Flame was snorting from the ports of the roaring radial engine.

"I'm gettin' off here," Gunner cried in a steady voice.

Tom fought for control of the ship. "You'll wreck us both! There isn't a chance of landing. Get your hands off that wheel before I—I—"

Tom now had his gun out. He whipped it up. But before he could fire a shot, Gunner's big arm swung across and brought a black-jack down upon Tom's unsuspecting head.

The instrument panel seemed to burst into stars! Tom fought madly to keep his senses. It meant life and death—life and death! He could feel the plane screaming down—down—down! Darkness struck across his numbed mind like a stone . . . .

WHEN Tom came to, his head was splitting. He blinked his eyes, was surprised to find himself still sitting in the Stinson. He was in a small clearing in a flat canyon. He looked around slowly. Gunner was out of the plane. Three faces were glaring at him through the open door of the cabin.

"What's the meaning of this?" Tom cried, jerking a look back at the gold box.

Gunner grinned, but there was no humor in his voice. "I've been waiting a long time for this break. I told you I was getting off here. Now scrambl—quick!"

Tom gritted his teeth. He spoke fiercely: "And what got off with you? Not by any chance that $20,000 ship-
“You could have had confederates in the hills. I don’t want to be hard on you, my boy, but your explanation doesn’t satisfy me. I happen to be from Missouri,” Brooks said coldly.

Tom felt the anger consuming him. All right, if they needed proof, he’d get it. But how?

“Radio Max, up at the mine, that I won’t be in tonight,” he snapped. “He might be worried.” Then he strode out of the room.

Next day, as he flew back to the Roaring Buck, his mind worked swiftly. Whoever had stopped him had played into luck. Gunner never would have gotten the plane with that trick if Kelly hadn’t gone and gotten drunk.

Flying low over the meadow in the hills where he had been forced down the day before, he could find no sign of the men who had robbed him. But they had a well-equipped camp somewhere, he was sure of that. They were certainly modern, these road agents—men who worked in the air. Grimly he continued his flight, finally roaring to a landing on the Roaring Buck field.

He legged out of the Stinson stiffly and went to the saloon. The robber crew of top men hadn’t yet arrived for their glass of beer. He ordered whiskey and gulped it. The raw liquor burned through his blood. He poured himself another drink.

Men began to filter into the place, talking jovially. When they saw Tom, they hushed. He could feel their eyes upon him. Let them gawp, damn them! They had heard of the missing gold. They thought that he was a thief, eh? Next they’d be accusing him of lifting their pay money!

He gulped another drink and the room swam about him. He wasn’t used to liquor. Then Big Max came in and put his gnarled hand upon Tom’s shoulder in a fatherly caress.

“Buck up, lad. It was a tough break. I don’t believe you took that gold. It don’t make sense that way. Get a hold on yourself so you can fly the afternoon millings out. We’re putting some rich dirt through the old mill these days. I don’t like the idea of holding the bullion here at the hills, and by the way, lad, that liquor ain’t a goin’ to help you much in the handling of the plane.”

Tom whirled on him, brushing the hand away. “Let me go, Max. I’m done—through—finished! They can’t call me a thief and expect me to work for them. Right now they’ve got the sheriff shadowing me—got the hills full of man hunters looking for my friends—my friends! That’s what Brooks called them.”

“Brooks is a hard man at times, Tom,” Max said slowly, “but you can’t blame him none. He’s responsible for that gold.”

“I’m done, I tell you,” Tom cried hotly, “carry the gold out in your pockets!”

Andy came over. “Let me fly it out, dad. I can make the trip easy. Give me a chance . . .

“Sure,” Tom laughed dryly. “Fly it out, if you think you’re so damned bright. You’ll make a nice tender gosling for those buzzards to sink their claws into!”

With that he pushed his way out of the saloon. He walked mechanically up to the bunkhouse that was built against the side of the cliff like a horns’ nest. He locked the door of his room, tried to rest. The thing had struck him so suddenly that he didn’t know which way to turn. He’d never been questioned before—his record was clean.

But if he could find Gunner and those other crooks, the business would be solved. But they weren’t dumb. They’d probably worked such schemes before. They were probably the remnants of some gang the federal men had broken up in some city.

Who had sent that message to Bradley saying he would be late? Mellenthin? Mellenthin had worked at the mine a long time. He hadn’t come up with Gunner, he had met Gunner after Gunner had arrived there.

There was a rough knock on his door. Tom didn’t move. He didn’t want to see anybody. Then the voice of Kelly growled, “Let a fellow in, you loon. I’ve got something to be a tellin’ you, lad.”

Reluctantly Tom opened the lock. Kelly sidled in. “I want to make an apology, Tom. I wasn’t exactly drunk yesterday.”

“No,” Tom snapped, “you were polluted!”

“I tell you I took one drink, no more. But that one hit me just like that!” He hammered his flat fist into his open hand.

“So what?”

“Don’t you see? I was doped! I just want you to be knowing that I didn’t let you down personal.”

“Get out,” Tom said impatiently, feeling a little twinge at his own anger. “You still look a little dopey. Go sleep it off.”

The next morning, Big Max cornered Tom in the mess hall. He dragged him to one side.

“Listen, fellow, you’ve got to take out the pay dirt. We’ve got two days’ heavy run. I don’t feel too safe here in camp with $50,000 laying around. It’s a dead to mortal cinch them thugs that robbed you ain’t goin’ to let this stuff lie idle.”

“What’s that got to do with me?” Tom asked evenly.

“Nothing, you stubborn jackass. I’m asking you to do it for me—as a special favor. I’ll get you a good guard—I’ll even go with you myself, or—or let Andy go.”

Andy Haines came over at the mention of his name.

“Sure, Tom, let me go. I’ll guarantee—”

“I’m not asking for guarantees,” Tom snapped. “I’ll go on one condition.”

“Anything reasonable,” Big Max promised.

“All right. I’m going alone. I’ll take the Douglas because it’s got a machine gun mounted. I’ll get that gold safely to Bradley if I have to fight every foot of the way!”

Max protested, “I’ve had them loading the Stinson and—”

“Change the load to the Douglas,” Tom interrupted. Then he stalked out. The kid followed, protesting that he had a right to go along. Tom refused to relent.

He went to his room and jerked on his flying togs. He took his time. Carefully, he cleaned and loaded his automatic. He felt eager and impatient now that he was again facing trouble. His face was a grim mask as he left the bunkhouse. He expected trouble this trip—and he’d be ready for it!

When he reached the field, the men had just completed the transfer of the bullion. Mellenthin was crawling down from the nose of the ship, having just helped fasten the metal hood over the express compartment. The engine of the Douglas was throbbing.

Tom squinted. The kid had started that engine. He stopped at the radio shack for his goggles. Then he marched over to the Douglas.

“What’s the idea, Andy? I told you to keep off that ship!”

The kid flushed. “You think you’re the only guy in the world who can run a plane, eh?” he said. “I was (Continued on page 89)
A THUNDEROUS scream forces our gaze heavenward. Against the blue blanket of the sky a winged projectile roars into view, streaming oily, black billows of smoke in its wake. Then suddenly the strange ship twists about, heads earthward! Down . . . down—The anxious aircraft designer alongside of us breathing heavily. It looks like his sky speedster will crash. But at the last moment the rocket plane—for such it is—recovers from its dive and settles easily on the tarmac almost at our feet.

We have indeed been lucky. We have seen the first rocket air mail flight in the world successfully accomplished!

Eagerly we ply the elderly engineer beside us with questions. "What propels a rocket ship? What kind of fuels do you use? What's the future of the rocket aircraft?"

Smiling happily with his initial success, the designer listens patiently to our outburst.

"One at a time," he laughs pleasantly. "Now, you see, to start at the beginning, the rocket engine—or as technical men term it, the jet propulsion engine—derives its power from the burning of explosive fuels exactly as in your automobile engine. However, an important difference occurs from this point onward. The combustion gases, instead of being directed against a cylinder piston, are blown out through the rear opening of a nozzle-shaped tube at high velocity."

"But how—" we excitedly interrupt.

The old gentleman raises a slim hand. "Very simple," he smiles. "The reaction, or interior recoil, produced by the explosively expanding gases forces the craft forward. In other words the rocket plane might be said to kick itself along."

We are now beginning to get a clearer idea of this mystery. "But," we hasten to add, "you scientists must have developed some mysterious kind of fuel to make this performance possible."

Our technician shakes his head. "No, we don't use anything that hasn't been known of for many years. You see, the rocket engine is of such design that either solid or liquid fuels can be used with it. Now, for instance, take the flight we just witnessed."

We follow his glance past the curious, milling crowd to the fragile wings and the still gently smoking nozzles of the rocket ship which we have just seen careen to earth.

"There we used a mixture of hydrogen with ordinary oxygen. But many other standard materials are available; for instance, alcohol combined with oxygen, liquid oxygen, or hydrogen—plus acetylene."

To us, those mixtures sound like something worth keeping away from, and we start to say as much.

"Wait a bit," he laugh, "I think I know what's on your mind. Yes, these fuel combinations are deadly dangerous. Flaring out at a high velocity from the open nozzles, and placed so close to the pilot, they represent one of our greatest problems."

We have one more important question and we hasten to put it to the designer before the pressmen and aero officials swarm in on him.

"Will the present types of airplanes," we ask, "give way to the rocket ship?"

Our host thinks quietly for some seconds before he answers that one. "Yes," he finally replies, "I really believe that some day the true rocket ship will replace the conventional airplane—but that day is still distant. The future of the rocket aircraft," he goes on, "depends greatly upon the supply of suitable metals. These materials must be light in weight, yet strong enough to withstand the terrific temperatures and pressures met with in the operation of rocket aircraft. Still, maybe our airplanes of the comparatively near future may utilize the power of an auxiliary rocket engine to effect quicker and safer take-offs with heavy loads. And then radio-controlled rockets will probably be used for long-range bombing opera-
tions. By this means a great deal of damage could be done to a hostile force without risking the lives of an operating crew.”

* * * *

AND now let us journey down to the desert wilderness near Roswell, New Mexico. Here we’ll “buttonhole” Doctor R. H. Goddard, famed rocket pioneer, in his well-equipped laboratory.

We find him clad in an oily smock, bending eagerly over his latest creation. His face lights up as we exhibit interest in his sleek rocket ship. We run our hands over the burnished skin of the twelve-foot torpedolike craft, smooth as glistening glass. But wait; the Doctor is speaking—

“We use a fuel combination consisting of sixty pounds of gasoline and liquid air mixed in separate chambers. Nitrogen gas then forces this fuel into the combustion space. With this arrangement we have already attained speeds of 700 miles per hour!”

“But how can you control the craft at such terrific speeds?” we inquire.

Doctor Goddard points out the rakish fin assembly on the ship’s tail. “A gyroscope controls these vanes. They act like the tail surfaces on an airplane and keep the rocket plane on its course.”

We go out to the cleared field beyond the laboratory to watch a test flight. The ship is hoisted sixty feet on a tall tower which looks to us very much like an oil derrick. We stand with a group of observers about a quarter of a mile away. From this safe distance the Doctor will ignite the charge.

“All clear!” calls an assistant. “Let’s go!” answers the operator.

WHOO—OM!

We feel as if our eardrums have been burst. With a deafening roar the ship—a flaming, screaming bullet trailing cotton smoke—zooms skyward.

“What do you assume your ultimate ceiling to be,” we ask the business-like assistant after this exciting show is over.

“Your guess is as good as ours,” he grins, “some of our early calculations indicated a final altitude of fifty miles. But recent estimates are more promising. In fact, our best calculations give us one hundred and fifty miles!”

* * * *

NOW, let’s look around and see what other busy rocket inventors have done. That strange looking ship in Figure 1 seems like an interesting specimen. The designer appears here to have gone the plain torpedo rocket one better! This job is a combination rocket and turbine rotor. The combustion gases are directed against the turbines vanes. In this manner they give a rotary motion to the finned, barrel-shaped tubes which serve as propellers. Then the gases are exhausted through the rear end of the rotors to provide the rocket action.

Just suppose we could step up into the cockpit and wiggle the joy-stick of such a craft when it is completed. See how it tilts those rotors! They work just like regular control surfaces so that the pilot can climb, dive, and land this ship. It is a clever piece of work—but will it fly? The inventor seems to think so. But only time will tell.

A French design is shown in Figure 2. Yes, this one looks more like a present-day airplane—say, a twin-motored transport like a Boeing or a Douglas. But instead of two great Wasp engines flanking the cabin fuselage we see streamlined combustion chambers. Let’s imagine we could climb up into the cabin of the (Continued on page 91)
Demons in the Nullahs

STARTLING STORY BEHIND OUR COVER PAINTING

With the exception of the civil strife involving air warfare in the Spanish revolution, the only government air service actually at war today is the British Royal Air Force.

"But where are they fighting?" you ask.

In that portion of India called the North West Frontier, is the answer to that—in other words that far-away corner of the globe located in the north west of British India and lying between British Baluchistan on the south-west and Kashmir on the north. Along the north-western border of this land lies Afghanistan, while to the southeast is the loyal province of Punjab.

Yes, those are romantic names to conjure with when we think of thrilling adventure.

Perhaps Ireland, Arabia, or Egypt first come to your mind when you ponder on the troublesome quarters that worry the heads of the British Empire. Or maybe the Gandhi regions of India. But few outside of the British Foreign Office realize what a troublesome sore is the North West Frontier.

Here roam the wild and crafty Afriidis who are tougher than the renowned Ghurkas, and who bear more nerve than Sioux Indians. They are keener than steel and wickeder than any offspring of Genghis Khan. They live in the nullahs—mountain passes of the Hindu Kush range that creeps out of Afghanistan. They are as wiley as Bedouins, cruel as Head-hunters, as agile as the chamois, and deadly shots with anything from a pierced Lee Enfield to a Moslem muzzle-loader.

The Afriidi is a strange combination of warrior and agriculturalist. When things slow up in the fields he goes on the war-path, provided he can lay his hands on some ammunition. There is plenty of opportunity for him to ply his pirate trade—the game he goes in for when he gets the bullets he's after. The narrow trails, passes, and defiles where native Indian bearers lug heavy merchandise from British distributing stations in Karachi to the Kashmir bazaars, are perfect shooting galleries for the work-weary Afriidi.

First off, the badmash (rogues) who having no flocks to tend, help themselves to the litters of goods that are being trundled across North West India. There is usually a sharp engagement in which Pathan daggers are drawn and blooded. A few quivering natives are rolled over the ledges into the headwaters of the Kabul River and a few burlap bundles are slat and relieved of anything worth taking. After that the mullicks (Afriidi chiefs) collect their rampageous tribesmen and put them back to work in the fields or on their all-important water aqueducts—as though nothing had happened.

Then after about a week or so, a pink-cheeked young British subaltern only a few weeks out of Sandhurst, leads a troop of native Ghurkas into the suspected village and tries to discover who was responsible. Failing in that, he usually allows a couple of Ghurkas to un-sheath their knives, which according to Ghurka tradition are never returned to their curved leather sheaths until they have been bathed in blood. And so a village or two is knocked down and a few crops destroyed as a penalty. But even this seldom stops the Afridi.

You may fire his villages, and he will move off a few yards and build another. You may separate him from a few of his wives, but women are cheap and plentiful. You may scatter his flocks and destroy his crops, but he usually gets over all that and starts anew again.

To really get under his skin you must destroy his aqueducts, which provide life-giving water for himself and his meager acres.

And that's where the Royal Air Force comes in.

At Landi Kotal, near the Afghan border, is usually to be found one or two R.A.F. two-seater squadrons, using Hawker Demons or Armstrong-Whitworth Wapitis. These are the lads who are called upon to fly through the nullahs and get at the Afridi villages perched on the nullah ledges. First of all, they're faced with the job of taking off from a parched aerodrome that usually lies several thousands of feet above sea level; and it takes rare flying skill to nurse a gasping motor into satisfactory horse-power, hoik broad wings up into rarefied air, and get altitude with a suitable fighting load. Then there is the job of actually getting there. The Afridi "hunting-ground" is about seventy miles away from Landi Kotal; and to get anywhere near the ledges and their aqueducts, the lads of the R.A.F. have to "shoot the nullahs."

This interesting but unpalatable manoeuvre simply means flying through long narrow passes, surging with dangerous air currents and infested with vipers which situate on slim ledges from where Afridi tribesmen aided by their own Tirah troops pick off the darting Hawker airmen as they attempt to race through the gorge.

Sometimes the big two-seaters get through and begin blowing the aqueducts and villages into the next mountain range. When this happens the Afridi simply waves a dirty white flag, throws his musket away, and saunters down to the District Commissioner's office in Peshawar to talk it all over—and he usually manages to swipe some more rifles and ammunition on the way back.

Of course, if an Afridi bullet happens to hit a motor in a vital spot, or plugs a pilot, there inevitably is a crash; for there are no landing grounds in the nullahs. If the pilot or observer manages to survive such a crash, he is usually captured, tortured for a few weeks, then "sold" back to the British for a few more rifles and ammunition. Of course, if the "deal" somehow goes amiss, the unfortunate airmen are turned over to the Afridi women, who are past masters at the art of torture.

There are various "rites" to the subsequent "ceremony." Generally they start off by lighting a fire on the airman's stomach. But enough of this sort of thing.

Our cover painting this month shows in dramatic fashion just what it means to "shoot the nullahs." Down one of the rugged tortuous gorges, we see three sleek (Continued on page 44)
Taxi in on this runway and pick up a plane load of laughs! In this department, we present a collection of jokes, cartoons, and humorous verse. For all original contributions which we can use here, FLYING ACES will pay $1. Contributions cannot be returned. Address all letters to WISECRACK-UPS.

CONFUSING SITUATION
Mechanic: That bum, Jones, has taken my monkey-wrench. Say, does he borrow much from you?
Pilot: Borrow much? Why I feel more at home in his plane than I do in mine.

BIG GAME
A woman, obviously in a great hurry to get her shopping done, rushed into a New York City ten-cent store on a recent Saturday morning. Barging up to a clerk and fumbling in her pocket book as she came, she cried: “Give me one of those five-cent mouse traps—and please hurry because I have to catch a plane.”

TERSE RETORT
An irate flyer had been working on the broken-down motor of his second-hand plane for upwards of an hour. And he grew more irate as a farmand, who had strolled up, continued to gape at him. Finally fed up, he turned upon the rustic.
“Say,” he said sarcastically, “is this the very first airplane you ever saw?”
“No, ’tain’t,” drawled the farmand.
“But it’s very much like it.”

SLIGHT ERROR
Two balloonists were floating at an altitude of 20,000 feet over Lakehurst, N. J., when the first, somewhat perturbed, turned to his companion.
“Look, Jones,” he said, pointing earthward. “That special fifteen-cent cigar of yours dropped down there.”
“Cigar, my eye!” retorted the other.
“That’s the Hindenburg!”

THE WRONG PERSPECTIVE
Whozis: I hear that new sky writer was killed. What happened to him?
Whatzis: Well, you see he was an artist. And after his first job in the air he stepped back from his pit to admire his work.

NO PLACE FOR SATAN
Deacon (visiting wartime airdrome): I trust that all you fine young men attend the preacher’s sermons each Sunday night.
Hard-boiled pilot: Naw, we don’t need preachers. These crates shake the hell out of us.

CALL THE KEEPER
Chumley: I say, who was Rickenbacker with during the War?
Bumley: Why, he was with the Yanks, old chap.
Chumley: Dear me, how odd! So he was in the United States playing baseball—and I’d thought all along he was fighting over in France.

PHOEY!
Son (looking up from book): Those early Navy Vought pilots must have had a heck of a time shaving!
Pop: How so, son?
Son: Well, it says here that they all had Corsairs.
Stratosphere Death

Higher and higher go the fighting planes of our Navy. For experts are constantly perfecting new and more efficient oxygen apparatus both for our pilots and for the engines which fly them. What this will mean in event of war is dramatically told in this article.

By Lt. H. Latané Lewis II
Author of "Menace of the Sub Planes," "Those Startling Robot Pilots," etc.

Two man-made birds of prey speeding above the clouds! A Curtiss Hawk and Curtiss Falcon on high altitude duty.

THE East is turning gray as a United States Navy aircraft carrier steams steadily toward mid-ocean. All fifty of her planes are safely stowed in the large hangar below deck. The ship's clock jangles eight bells. The men on the middle watch prepare to come off duty.

Suddenly the radio operator leans forward, listens intently through his headphones. A message is coming through from a scouting plane attached to one of the cruisers operating in the advance zone. The operator takes down a jumbled series of letters and numbers. It is a coded report telling that the enemy fleet has been sighted.

The operator instantly informs the Captain. The latter pulls on his uniform, begins barking orders: "Prepare planes for launching! Order all pilots to stand-by ready for take-off!"

Bells ring and over the loud-speaker system, which has outlets in every part of the ship, comes a curt command: "All pilots report immediately to the ready room."

Swinging themselves adroitly down the maze of ladders, the flying officers assemble with the speed of veteran firemen answering an alarm. The Captain is giving orders to the squadron commanders:

"The enemy fleet is now reported at latitude 30 degrees, 15 seconds North; longitude, 165 degrees, 30 seconds West. They are following a true course of 79 degrees at an estimated speed of 22 knots. Strength reported at 30 ships. You will get underway immediately and attack. Are there any questions?"

Already the squadron commanders are plotting on the chart table the course they will have to follow to intercept the enemy, allowing for relative positions and speeds.

As the pilots get into flying togs they present an odd spectacle. They look for all the world like men from Mars—like characters out of an H. G. Wells futuristic novel. They are covered from head to foot with a series of heavy leather garments. Only their eyes are visible, peering weirdly through narrow glass slits in their face masks. From their mouths dangle long tubes ready to be plugged into oxygen flasks.

A huge elevator has been carrying the planes from the hangar to the flight deck. The fighters are placed nearest the bow with the big bombers, which need a longer take-off run, back near the stern. All planes have been fueled, and bombs are in place.

Each pilot goes to his machine, climbs into the cockpit. At the engine of every plane a mechanic winds an inertia starter. There is a whine increasing to a mighty crescendo, then a deafening scream. Abruptly, fifty engines explode into life, fifty propellers begin to spin. The airplanes
vibrate, strain at their chocks.

The carrier swings around, heads into the wind. A siren shrieks as the Captain shouts the order, "Launch planes!" A bugler blows lustily, and two men, looking like pygmies, grasp the wings of the first plane and sprint along beside it as it taxies out.

The deck officer drops a white flag and the pilot gives the engine full gun. The ship races forward, lifts its spinning wheels into the air, swaying slightly as it passes over the bow. At intervals of a few seconds the other planes shove off. Soon they are in formation and disappearing over the horizon, climbing as they go.

Now let us in our mind's eye observe the enemy flotilla. Aboard the flagship an enlisted man at the sound locator sings out to his commanding officer, "Airplanes approaching from the East, sir."

The officer trains powerful telescopes on the unbroken blue sky.

"Airplanes directly overhead!" comes the cry. Before he has finished speaking, there is the high pitched whine of a falling shell and the battleship immediately behind reels drunkenly, a gaping hole in its forward deck.

The officer shouts, gives the range to the gun crews.

"They must be above forty thousand feet!" he gasps.

The guns spring backward against their recoil mechanisms and clouds of black, acrid smoke appear around their muzzles.

But in the planes overhead the pilots simply grin as the shells burst several thousand feet below them. For they are the Navy's "ceiling slappers"—the boys who hit the stratosphere and thumb their noses at anti-aircraft guns.

Now they are registering more hits. A bomb falls directly down the funnel of one warship. The huge vessel seems to do a buck jump as it is blown virtually in half. Bodies are spewed out into the water like flies brushed from a table. Another ship rolls completely over, sinks beneath the waves. Soon the key ships of the flotilla are disabled.

Meanwhile, enemy planes have taken to the air to fight off the attackers. They reach their ceiling at 30,000 feet, struggle vainly to go higher. The U. S. Navy flyers overhead pick them off easily from their superior altitude.

Then, their mission done, they return to the carrier, stringing out in a long line like a flock of wild geese as they approach the vessel. As the first plane jockeys for a landing, the landing officer at the stern waves his flags, then holds both arms outstretched. The plane is coming in a little too low and the officer drops his flags a trifile. The pilot immediately pulls up. He's watching the landing officer rather than the deck, and it is the man with the flags who is really going to land the plane. As the machine comes down into position, the landing officer drops both flags abruptly. The pilot cuts his gun, eases back on the stick for contact with the deck. His wheels engage the arresting gear and the plane is brought to a stop in a surprisingly short space.

Instantly, a landing crew is swarming across the deck as the landing officer shouts, "Take it away!" The crew hangs onto the wing tips to keep the plane straight as the pilot taxies to the far end of the deck. In a few minutes all the planes are safely back from the combat.

The Navy's equipment for high flying has proved its mettle!

YES, our Navy is pushing its planes higher and higher into the rare altitudes. Over at the Naval Air Station, at Anacostia, D. C., remarkably efficient oxygen equipment for pilots and superchargers for engines have been developed by the Flight Test Section. On almost any fair day, you will see a pilot, bundled up like a deep sea diver, climb into a plane and start for the cold, lifeless world that lies far above our heads.

There are several good reasons for flying so high.

For one thing, our planes will be out of range of enemy A-A guns and inferior pursuit planes. Then, too, the high, thin air cuts down resistance and makes terrific speeds possible.

The Navy's system which keeps these high flying
he calmly edged his plane up and tried to drop it in the skipper’s lap. Then he lost distance quite noticeably and finally ended up by flying around in a wide left circle, gradually losing altitude. His wing men saw his shoulders heave as he bravely pulled at the nipple to coax more oxygen into his starving lungs. After descending to 18,000 feet he regained control of his senses and responded more or less intelligently to the signals of his left wing man, who finally coralled him back into formation.

“Upon landing, he could not remember clearly what happened, but about half an hour later, while eating lunch, the memory started coming back. He then reported the following symptoms: twitching of muscles in the wrists; difficulty in controlling his hands; range of vision very short; feeling of annoyance when squadron commander made a turn; no apparent discomfort or loss of breath; no knowledge that anything was wrong; and inability of hearing (he had a radio but failed to respond to repeated calls).”

Lack of sufficient oxygen has the same effect as alcohol upon some men—in short, they become intoxicated. Recently, a formation of high speed planes were approaching Washington, D. C., on a high altitude flight when one of them suddenly cavorted crazily about the sky. It performed all manner of wild stunts and finally went zigzagging toward the earth. After the rest of the formation had landed, the missing pilot struggled in. He was forced to admit, rather sheepishly, that he had let the oxygen tube slip from between his lips. He had become light headed under the influence of the rarefied air and had performed his antics, he said, in a spirit of high glee.

Oxygen equipment for trips to the outer layer of the earth’s atmosphere is not confined to human use. The engine, too, must be provided with the life-giving oxygen, otherwise, as it goes higher, it will lose all of its efficiency and become virtually useless. Since it is impractical to carry the requisite large quantity of engine oxygen in tanks, an ingenious little device known as a supercharger is used.

A supercharger, in a broad sense, is simply an air compressor. It is not unlike the electric fans used in ventilating systems. Its purpose is to provide sea level air pressure to the engine cylinders of the high flying ships.

Two types of superchargers are in use at the present time—the geared centrifugal and the turbo centrifugal types. In the latter type, the power for driving is developed by utilizing the energy available in the exhaust gases, while in the case of the geared type the power is taken directly from the crankshaft.

The supercharger gives an airplane engine constant power re-

(Continued on page 88)
The "Wright Biplane" Never Flew!

W -wait a minute, fellows! Not so fast with your thunderous protest! Before you start to argue, note that we've used quotation marks in making that statement. Then settle down in your easy chairs and read what we've got to say here. We'll guarantee it'll surprise you.

WHAT is the most discussed plane in the world? No, not the new Boeing bomber, not the China Clipper, and not Frank Hawks' new racer.

The most discussed plane in the world, the one that has had more stories written about it—is the first Wright biplane! For no plane built since the Wrights first learned to fly has ever received the wording given to the original Wright biplane—not even Lindbergh's Spirit of St. Louis.

But before we give you what we consider an inside story on the Wright biplane, let us first go into its background and origin—

YOU all know that in the early part of the present century, man was really beginning to get the idea of artificial flight by the aid of wings and motive power. As far back as 1848, John Stringfellow had established certain principles of flight. Indeed in 1868 he won a prize of $500 from the Royal Aeronautical Society for a triplane (not man carrying) he built and flew with the aid of a light steam engine.

Stringfellow was an Englishman and his original motor with a model of his original triplane is to be seen today in the Smithsonian Institution in Washington. His original plane and other spare parts are to be seen in the British Museum. Now remember all these points.

Later, another Englishman, Thomas Mory, built a steam-power model plane that lifted 120 pounds off a track and actually flew. That was in 1875. Again, in 1889 Lawrence Hargrave, an Australian, designed a monoplane model, also powered with a light steam engine, which successfully took the air. And later he worked out a compressed-air motor, put it in a model, and made it fly various distances up to 368 feet. He used the flapping wing (ornithopter) idea of flight. Hargrave's model with its compressed-air motor is with Stringfellow's model in the Smithsonian Institution.

Then Sir Hiram Maxim—the Yankee inventor who had to go abroad to get recognition—invented a huge steam-powered multiplane in 1898. In its first trial along a half mile of track (so anchored that it could not get clear) the 3½ ton mon-

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PILOTOPICS

BY ROY HUMPHRIES

The first showing of the movie "Garden of Allah" will take place in the air.

Stratosphere airplanes may have trouble in cooling motors at seventy below zero...

Imagine losing your parachute in mid-air—read what happened to Captain Craw...

Most unusual flying mascot.

Stories Back of the Above Pictures

1—BECAUSE cinema spies from rival picture studios often "sneak" a look at new films at previews, no matter how guarded the passes, Selznick officials held the first showing of their photoplay "Garden of Allah" in novel surroundings—2,000 feet above the ground in a chartered transport.

And for the film spies, the game was "up."

2—SEVENTY degrees below zero is plenty cold. Yet a distinguished British scientist holds that because of the rarefied air, great difficulty may be found in keeping the motors of stratosphere planes cool—at seventy below! Some one will have to invent a palm beach coating.

3—ARMY flyer Captain Nick Craw had a horrifying experience when he bailed out during a practice flight over Honolulu two years ago. As he pulled at his rip-cord he felt a heavy object slip from his back and saw it go hurtling through space. His 'chute! His heart beat madly. But a moment later he breathed a sigh of relief as his "silk" billowed out above him and arrested his fall. The object which had fallen was merely his seat cushion!

Would’ve been tough trying to land on that pillow.

4—ON the West Coast recently, Mardonii, well-known escape artist, thrilled the crowd by breaking out of handcuffs while aloft in a plane and parachuting to earth. On examining his lucky rabbit’s foot after his leap, Mardonii discovered that a flea had clung to it during the whole stunt. The flea had "got aboard" while the magician was visiting the San Diego Exposition’s flea circus earlier in the day.

"Twas the longest flea hop in history!

52 h.p. and weighed only 125 lbs., a plant decidedly better than the one originally planned.

This was the father of the present day radial engine and probably one of the finest mechanical devices of the century. But strange to relate, few know anything about it today.

At any rate, Manly placed his amazing five-cylindered engine in Langley's "Aerodrome" and the contrivance was finally poised for its flight off the houseboat catapult on October 7, 1903. The motor was started and warmed up, the release gear was thrown, and the great "Aerodrome" leaped away.

But something happened. A front gus post caught somehow in the launching gear, and while the "Aerodrome" managed to get as far as 50 yards ahead of the houseboat before it plunged into the water, there was always plenty of argument as to whether it had actually flown under its own power, or had simply been hurled forth far by the launching device.

Pilot Manly and his engine were saved, but the plane was badly damaged.

Meanwhile at Kitty Hawk, the two Wrights were working furiously on an old Pope-Toledo automotive engine, which they had rebuilt and redesigned for light aircraft work. This plant weighed 180 lbs. and developed about 16 horse power. They were sure they would outstrip Langley for the honor; but then they learned on December 8, 1903 that the Langley "Aerodrome" was to be given another trial off its house-boat catapult.

So back on the Potomac, Manly climbed into the "Aerodrome" again. The whole world awaited the result and again Manly gave the signal for hammering the restraining cords and releasing the gear. The Manly motor moved away. Her front main planes caught the air. There was a great cheer—and then came a grinding, rending crash. The "Aerodrome" shot off the catapult with her rear wing and tail a total wreck. She stalled, slid backward, and dropped into the river not many feet away from the houseboat.

This time the "Aerodrome" was a total wreck, and the field was left clear for the Wrights.

That was December 8, 1903, remember. Nine days later from the dunes of Kitty Hawk, Orville Wright lay down on the lower wing of the Wright biplane. The engine was started and the plane shot along a greased track—and for twelve seconds it remained in the air, flying a distance of 120 feet.

Then Wilbur Wright got aboard and flew it for a distance of 195 feet in 10 seconds. And finally Wilbur climbed before that great morning by bettering his brother's mark by 2 seconds and ten feet. Triumphant, they decided to take one more whirl at it at noon, and Wilbur was selected to make the flight.

He opened up and let her go full tilt. She came to a crashing rest at 580 feet. She had been in the air for 59 seconds!

The Wrights had won, but their machine was a wreck. Still they had satis-
The Airmail Pals

Well, scribblers, we've coupled up model builder with model builder, and aviator with aviator; we've palled up those who have flown long distances to meet each other, and now we've had the honor of hooking up a pair of F.A.C.'s interested in a type of "aircraft" which fluttered about the skyseways y'ars and y'ars before our huge transport planes were even thought of.

"What is this?" you ask. Well, the pair of flyers on the well-manicured "tarmacs," reproduced here, will give you the idea. Yep, you've hit it—this type of "aircraft" to which we refer comes under the classification of butterflies and moths. You see, Dot Gens, F.A.C. of Cleveland, Ohio, and a great aviation enthusiast, has gone in for the interesting winged hobby of raising brilliantly colored butterflies.

Some idea, huh?

Anyway, your friend the R.H.P.D. was happy to send Dot's letter across the seas to Roger Bethell, of Cromer, Norfolk, England; and of course we've already sent Roger's letter to Dot. We selected Roger, you see, because of his interest in butterflies, birds,—and everything else that flies. Of course, with snow already flying this is not a particularly good time to hatch cocoons or to take a net in hand and go out after butterflies in this northern part of the world, but no doubt both of the F.A.C.'s in question have nice collections laid away which they can swap. At this season, though, we ought to be able to get some Australian F.A.C.'s interested in this subject—"for summer's under way down there. How about, Australia?

And now permit us to correct an error! Yep, the R.H.P.D. made a boner. In the December issue, you'll no doubt recall, we made mention of a swell letter received from "Lindy" Coy, an equally swell "young lady" out in Komoko, Ind. Imagine our surprise when Lindy wrote us one day last week to the effect that he was a "Mr."—and much certainly not a "Miss"! Folks, our face still somewhat resembles the lower half of this typewriter ribbon—which is a brilliant red. Lindy, please accept our humble apologies!

Truly, this department is taking "root" in the far corners of the earth! Here's a letter from Reginald A. Williams, an enlisted man, located at Headquarters, Baluchistan District, Quetta, India. We're not surprised to find that "Reg" would like a girl pen pal—but he sure has the Right Honorable Pal Distributor scratching his head when he asks for a Mexican girl. Anyway, if some Mexican senoritas read this and would like a pal in India, this is a good tip. Reg's complete address is above.

And last but not least, it is once more necessary for us to send out an S.O.S. for letters from our airminded girl readers. In response to our recent request, many of you gals responded. But there are still a lot of fellows on our tarmac craving feminine letters. As an illustration, we quote from a letter received from Walt R., out in Ohio:

"... You see, I am the one and only at home and I do wish quite often that there were a little sister or brother around to be a pal to instead of my own face reflecting in the mirror. Oh, nuts, I don't want to be sobbing all over your shoulder as though I were at my wits end for companionship, for that's all rot. I have some very fine friends whom I value a lot. Still, I'd like an airminded young lady with whom to correspond. Can't you do something about my case, R.H.P.D.?"

Come on, gals, let's come to the rescue not only of Walt, but Joe, Harry, Sam, Felix, Bill, and a slew of other fine pen and inkers.

The Right Honorable Pal Distributor

HOW TO GET AN AIRMAIL PAL

FIRST, write a letter just as if you were writing to your new pal—the kind of letter which tells your age, particular interests in aviation, your hobbies, etc. (If you wish, you may include a separate sheet of paper telling us, in a general way, what kind of a pal you seek.) Next, send this letter to Airmail Pals, care Flying Aces, 67 West 44th St., New York City. And be sure to enclose a stamped, self-addressed envelope in which you wish to correspond.

Now, when your letter arrives, we select a Pal for you from our files of letters—those of Airmail Pal your letter indicates you want—and we mail his letter to you in the stamped envelope you send us, and we mail your letter to him. Then you're all set! Of course, if you want additional Pals, just write us again.

REGARDING FOREIGN PEN PALS

In case you do not reside in the United States, write a pen pal letter as above—but do not enclose a stamped, self-addressed envelope or send money for stamps. Your pal letter will be forwarded to an American correspondent, following which you need only wait for his reply.

If you are an American who wants a foreign pal do not write a pen pal letter. Simply send us a stamped, self-addressed envelope with note telling us what kind of a pal you seek. A foreign correspondent will be returned to you in the envelope you send us—whereupon you may begin writing to him direct from your own home. The foreign airmail pals are cared for in this fashion because foreign stamps sent in from other countries cannot be used in the United States to forward letters to Canada or across the seas.

Those of you who seek foreign pals will be given American correspondents whenever the supply is exhausted. Please note also that we cannot supply you with foreign pals in non-English speaking countries where Flying Aces is not distributed.
Modern Planes Album

VICKERS VENOM

The Vickers Venom

This is another in the many new British single-seat fighters employing modern low-wing design, retractable landing gear, and variable-pitch prop. The Venom, however, must not be confused with the new Vickers-Supermarine Spitfire.

Fitted with the Bristol Aquila sleeve-valve engine, the Venom is somewhat lighter than most single-seat fighters. This interesting motor, believed to be the first air-cooled sleeve-valve motor in series production, has been under test for several years. It develops about 350 h.p. and is a beautiful job with no external valve gear, thus insuring quiet working and an improvement in operating costs with less fire hazard. It was originally intended for commercial work, but on displaying unusual low fuel consumption figures, it was seen at once that here was the ideal motor for intercepter ships, which must fly fast, high, and carry as small a load as possible.

The Venom came out last summer under the name Vickers Single-seat Fighters; but upon being accepted for certain intercepter work by the R.A.F., it was placed in production under the name Vickers Venom.

Actually, we know little about it and must garner our information from our photographs. It is obviously very light and small for a modern service machine. The cockpit is carefully streamlined and covered over, but the glassine windows insure a wide range of vision all around. It of course has a very veiled performance sheet, hence we do not know whether it does 150 or 350—but possibly 250 would be nearer the actual mark.

The retracting gear is neat and trim, folding well into the wings. The wheels appear to be mounted on oleo-sprung legs which fold upward completely out of sight, so that in the air, especially head-on, she presents a beautiful sight. How'd you like one for a sport job?

Westland's A. C. Monoplane

The Westland Aircraft Works in England recently celebrated its twenty-first year of making British government aircraft, and the occasion was heightened by the appearance of the new Westland A. C. Monoplane designed for Army Co-operation work. The machine has been adopted by the R.A.F.

This bus is really well loaded—for it carries every known aircraft instrument with the exception of a radio-beam set. Since it's for Army Co-operation work it has to carry cameras, two-way radio, guns, and all sorts of aviation instruments.

An interesting feature is the general cockpit arrangement, offering unusual vision for the pilot. He is completely enclosed and sheltered, and the observer behind has a sheltered pit which is also well open as far as all-around look-sce is concerned.

The tapering—both inward and outward—of the monoplane wing gives the plane an unusual form. The wing has but one main spar, but it is supported by Vee-struts on each side. It has Handley-Page leading edge slots plus flaps on the trailing edges. The outer section of the flaps are really Frise ailerons. The undercarriage does not retract. Maybe the British have not yet caught on to the Curtiss system of tucking wheels up into wells in the fuselage—which is the only way wheels can be retracted in a high-wing monoplane.

In test flights before press representatives the plane displayed remarkable performance in flight, getting away in a very short take-off and climbing steeply with the flaps down. In flight, the test pilot gave a rare display of a wide range of speeds, suitable for Army Co-operation work. All in all, the critics were loud in their praise of the craft.

In general appearance the Westland is far from being a good-looking ship, but machines engaged in this type of Army work have to face such a wide range of duties that there is little chance for beauty. Efficiency's the thing.

But one can't help remarking about the appearance of this ship. Generally, she reminds you of a bulldog, yet there's something camel-like about the way she humps up in the center—and "bell-bottomed" is the term for those pants.
THREE NEW FIGHTERS AND A STRIKING AMPHIBIAN

Here's the modern plane menu for this month, fans: Two dashing new British military jobs—the Vickers Venom Interceptor, and the Westland A. C. Army Cooperation cloud hurter; the sensational Seversky P-35 that won the Wright Field Army Pursuit Competition; and finally that unusual new American craft, the Fleetwing Seabird.

THE SEVERSKY P-35

WE told you some time ago about the Army competition held at Wright Field, Dayton, Ohio, for new planes of the pursuit type. Four of the leading manufacturers in this country entered mounts, and the Seversky plane came out on top. The losers this trip were Vought, Curtiss, and Consolidated.

The winning ship was the Seversky P-35, a low-wing monoplane with an enclosed fuselage cockpit. Seventy-seven were contracted for at an average cost of $19,250 apiece. Would any of you like to buy a nice lil' Seversky, now that the depression is over?

The P-35 is somewhat like the BT-8, thirty of which are also being delivered to the Air Corps. It is an all-metal job of very clean lines, with a retractable landing gear, and sliding cockpit enclosure.

When the landing gear retracts, to be more explanatory, the wheels protrude slightly so that a safe—thats is, reasonably safe—belly landing may be made in case the retracting gear refuses to lower the wheels. Such a sit-down, of course, would break up the propeller and probably damage the engine a trifle—but the pilot would be able to walk away from it and the ship would be saved.

The P-35 is powered with the Twin-Wasp, which is rated at 1,000 h.p. It has a full cowling, with cooling flaps in the rear and a manually operated constant-speed Hamilton prop, which we take to mean that it may be regulated by the pilot from the cockpit for whatever pitch output is desired.

No speed or performance figures have been released on this ship. One of the other features of the plane, however, is the fuel tank which is actually the center section of the wing made water-tight and which can be repaired from the outside. Thus in an emergency, the center section becomes a flotation device in case the plane comes down on water.

FLEETWING SEABIRD

THIS unusual plane seems to have been lost in the general aviation shuffle in this country, but it nevertheless has received a big play-up in foreign publications. It's the Fleetwing Aviation Company's new Seabird, a stainless-steel amphibian with striking undercarriage arrangements.

The plane is being built at Bristol, Pa. With the exception of the fabric wing covering, it is made of stainless steel, shot-welded throughout. The hull is part monocoque and partly built up on steel tubing. The wings are the conventional two-spar type with light intermediate ribs and built-up drag struts and double diagonal tie-rod bracing. Flat plates, shot-welded against the webs, provide points for attachment for external wire bracing terminals. The ailerons and flaps are carried on ball-bearing hinges cantilevered out behind the rear spar.

The land undercarriage is very interesting. When the wheels are up they are housed laterally in streamlined casings, giving the appearance in flight of very small wing stubs. The wheels are in full view of the pilot at all times and the retracting gear is operated by a hydraulic hand pump.

The wing flaps are also hydraulically operated from the same double-acting pump that moves the landing gear. They are pumped down and will hold any position from 0 to 60 degrees. Upon being released by an instrument on the dashboard, the flaps automatically return to the "up" position through the combined action of springs and air pressure. Access to the cabin is through a hatchway in the center-section under the motor. With the 285 Jacobs radial the Seabird has a top speed of 150 m.p.h. She cruises at 135.

No information on the details of the cabin or the number of seats is available at this writing, but specifications on the ship are: Weight empty, 2,285 lbs.; Wing area, 235 sq. ft.; power load 12 lbs. per h.p.
All Questions Answered

This section of FLYING ACES is at your service, F.A.C.'s. Send in your questions and requests for aero information, and we'll be glad to answer them here in the order they are received.

Roy Bolger, Abilene, Texas:—Biplanes do not have to have ailerons on all four wing-tips. Many war-time jobs, for instance, had them only on the upper wings. The story of the Turner-Howard race last year seems to be something of a mystery, but we believe Roscowsky plane is not made by the Coleman-Frye way, which caused him to quit the race.

Seymour Grobert, Brooklyn:—The price of the book, What Plane Is That, is one dollar.

Eddie Larroca, San Juan, Porto Rico:—In the ordinary arrangement of the stick, where wire cables are used, the wires must be crossed to get the correct movement on the elevators. For instance, when you pull the top of the stick in toward you, it makes the elevator behave upward. It is pulled up by a wire fastened below the fulcrum point of the joy stick.

Robert B. Timm, Kitchener, Ontario:—The Curtis Goshawk came out in 1933. The R-101 crashed in France on the way to Indre, on Oct. 5, 1939, and the British government was notified. Much of the metal of the old R-100 is now in the new German dirigible Hindenburg. The original Wright biplane was given to the British museum some years ago by Orville Wright after a controversy with officials of the Smithsonian Institution over the respective claims of the Wright and Langley machines to the first heavier-than-air honors. There is a move afoot now to have it brought back here. Wilbur Wright died some years ago. Bishop is credited with 72 (official) victories. The Fleet biplane is now owned by the Consolidated Aircraft Corporation of San Diego California. No, only American citizens can enlist in the U. S. Army Air Corps. The Sikorsky uses the Armstrong Siddeley "Jaguar" radial engine. The top speed is 186 m.p.h.

Joseph Sperling, East Orange, N. J.:—The Imp motors are sold by the International Model Co., 1785 Broadway, N. Y. C.

Walter Warren, Newport, R. I.:—You can get blueprints and details on building the Flea from Peyton Antry, 420 Oak Street, Boonville, Indiana. I believe his price is $1.95.

Guenter Lehman, Chicago:—Where have you been? Compressed-air motors have been used in model planes for years. The system includes a tank charged by an air pump, and a valve device through which the air pressure operates a turbine-like screw, which in turn twirls the propeller shaft.

Geo. W. Hetrick, Chicago:—The volume, Jane's Fighting Ships, is an annual publication published by Messrs. Sampson, Low and Marston Company of 106 Fleet Street, London, England. It carries all details of practically every naval craft in the world and sells each year for forty-two shillings in London. The price here ranges from $14 to $17 and can be ordered through Brentano's Book Shop, Fifth Avenue and 48th Street, New York City.

Chet Mroz, Buffalo, N. Y.:—Thanks for your long letter, Chet, and all the business about the boys at the Buffalo Municipal Airport—although it is not very clear what "marvelous work" I have done concerning the new Naval Air Station at Grand Island, you'll have to explain further. I do not know a ship by the name of the Avia 231. There is an Avia 34 and an Avia 534/11, both single-seat fighter biplanes. The Grumman JF-3 is a Navy general-purpose amphibian. I do not know if any of the Seversky experimental Army models had three-bladed props.

Kojiro Kawaguchi, San Francisco:—Sorry you do not like Buzz Benson, but many readers do, and we have to cater to all. Hope it isn't because he has occasional brushes with the Japanese Blood Brotherhood.

James P. Robertson, Belmont, Mass.:—I have no idea how fast the Boeing F4B-4 or the P-26 would go if they were fitted with the new 1,000 h.p. Wasp motors. I do not know whether these engines could be fitted. After all, there is a matter of weight to consider. It is hardly necessary to invert the rudders of the Boeing 299, as you suggest, since there is a tail gunner who can fire under the tail assembly. Yes, the inverted air-cooled motors do offer better streamline but so far, in this country at least, the air-cooled inverted jobs have not been brought up to the power output of the average radial. Glad you liked that yarn "Code in the Cockpit."

Dale Stillwell, Albany Oregon:—You can reach Howard Hughes at Grand Central Air Terminal, Glendale, California—when he's on the ground.

Donald Crittenden, Glen Ridge, N. J.:—The best book on aircraft is All the World's Aircraft published in London every year and which may be ordered from any good book-seller. It costs about $16.00. The next best is the Aircraft Year Book published by the Aeronautical Chamber of Commerce, priced at $3.00. This, too, can be ordered at any good book store.

Malcolm Inglis, Jr., Toronto:—I advise you to write to the secretary of the Aviation League of Canada, Journal Building, Toronto, for full information on light plane clubs and instruction facilities in your district. I am sure you will be glad to assist you. We are pretty well filled up on solid models just now, thanks.

Harvey Mullen, Beaumont, Texas:—The Douglas O-28-E has a Wright Cyclone of 575 h.p. I do not know what speed it does. Glad you like our magazine so well. We give our best. Your model photo was too foggy.

Richard Whistler, West Lafayette, Indiana:—You certainly do read FLYING ACES, don't you? We have given all your questions dozens of times, but I suppose we'll have to plod through it all again. The Germans had no aircraft carriers during the war. The British had two. Today, Britain has the Argus, Hermes, Eagle, Furious, Courageous and Glorious. The French have only the Berne. Italy has no aircraft carriers, neither has Germany, and Russia has only an aircraft tender. Bulgaria had no air service during the war, but a few ones were flown for Bulgarian troops by German and Austrian pilots. They were either German or Austrian ships. The only Roumanian ace we know of is a Lieutenant Suk with seven victories. There are no Turkish aces, to my knowledge. Now would anyone like to know something about aircraft carriers?

Charles Haysom, Hull, England:—Biplane coefficient is a very broad explanation of the relative lift of the upper wing to that of the lower. Thanks for your newspaper clippings. I have heard of that idea of a wingless plane before.

Robert J. A. Little, South Melbourne, Australia:—Many thanks for all the information on your late father, Captain R. A. Little D.S.O., and for letting us know that he was an Australian and not a New Zealander. Many people in this country were under the impression that he was an American. Thanks again.

Henry Kehl, Baltimore:—If I could answer your question they'd make me Secretary of War tomorrow! There are no actual figures or available facts to show which country in the world has the
best defenses on sea and in the air. You never know until they start shooting. Sorry, but your question is too tough, and I'm afraid you and your uncle will have to carry on your argument without my aid.

Merle McNitre, New Bedford, Mass.:—You do not make yourself clear on the vocational school situation, so I can only advise you to go to high school and take mathematics, chemistry, and physics.

—Joseph DeBiredettes, New York City:—I have no idea what contest you are talking about in your letter. Our F.A.C. transport contest closed in July. What's it all about, anyhow?

Bruce Branson, Kansas City:—The highest rating any aircraft Diesel motor has received is 750 h.p. (the Junkers "Jumbo" 204 motor), whereas there are several gasoline-ignition engines that rate 1,000 h.p. No Air Service planes are fitted with Diesel engines—as yet. The Spad 13 was not equipped with wireless.

Dick Schwab, Peoria:—The Seversky BT-8 uses the 440 h.p. Waap. The Bristol Bulldog's top speed is 225 m.p.h. The Bristol 120 does 180 and the Hawker Nimrod does 192.

Elmer Gaden, Brightwaters, L. I.:—Yes, there was such a ship as the Zep- pelin Giant, a five-motored biplane, but the first time it went over the British lines it was shot down. All the World's Aircraft is a large volume put out every year. It is published by Sampson, Low and Marston Co., of 100 Southwark Street, London, England. It will cost you about $16.00 here. Ask your book store.

Douglas Cowdry, Itasca, Mich.:—The new Boeing bomber using four 700 h.p. Pratt and Whitney Hornets is probably the largest plane in the Army Air Service; and the smallest is, no doubt, the Boeing P-26A, which uses the 600 h.p. Waap. Rickenbacker was in the 94th Aero Squadron.

Robert Stuart, Bracebridge, Ontario:—The air speed indicator of an airplane is an instrument using two small tubes. The openings at one end are usually set well outside in the airstream on an interplane strut. Air is forced down the tube into the instrument box on the dash. Here the air forces a diaphragm outward, and the diaphragm is connected to a needle which moves on a form graduated dial and registers the pressure of air. The air is then released through the second tube slowly so that the recording is fairly constant.

—Edward Halper, Brooklyn:—The Dornier DoX used twelve motors and twelve propellers.

Niel Utberg, St. Paul:—The ninth Observation Squadron was assigned to the Western front on Aug. 26, 1918. I do not know of the observer you mention, but you could find out about him by writing to Washington and getting his record.

D. K. Lumb, New Zealand:—Many thanks for the interesting air line catalogues. As to the cutting on page 95 you mention, we have no idea what it might be, as you do not state what month you are referring to.

John Dicks, West Ealing, London:—Many thanks for your long letter and clippings. You must remember that the article on the R.A.F. squadrons was written three months before it was actually published and you did not see it for about two months after publication here—so by the time you noted the changes, we did, too, and had already shown many of the planes you mentioned in our picture sections. Thanks for the check-up just the same.

John Knepper, Salmon, Idaho:—As there have been so many changes in state laws concerning the licensing of aircraft, I suggest that you get in touch with the Chamber of Commerce at Moscow, Idaho, and obtain the latest rulings.

Michael A. Williams, Southport, England:—The Whitehead flying scout you refer to is no doubt a Camel built under government contract by the Whitehead firm. They built several models this way. It of course used the Clerget rotary. The German plane you refer to no doubt is the Friedrichshafen FF-67, a two-seat float, built both as a land and seaplane. We appreciate your suggestion concerning a foreign date for contest entrants.

Jack Bedall, Lake Carey, Penna.:—You are much mistaken about the "Fairey "Fairydale." It was built to a specificat of at least 300 m.p.h. and actually passed that figure in the tests in Belgium. But it crashed on a landing test in Belgium, not in England; and it has since been withdrawn from production, mainly because of trouble in getting the Hispano-Suiza 12Y CRS engines. But it did do more than 300 m.p.h. I do not know the official speeds of the machines you name. I wouldn't worry about speeds of ships, because we actually know nothing about any of them until they have been in service about two years.

Howard Hohnson, 718 North 36th Street, Seattle, Wash.:—Sorry, unless you're going to be on our next flight, I don't know where you can get a copy of the March 1935 issue of Flying Aces. The Pfalz planes were first built at Speyer-on-Rhine, Germany. Several firms have advertised the sale of war-time photographs in our magazine. Why not look them up?

Bradley Vesper, Goliad, Texas:—The 149th Aero Squadron did not see active service at the front, according to our records.

Edwin Ruthven Dyer, McGehee, Arkansas:—Write to Superflying Aircraft Company of Lawrence, Kansas, for their bulletin on the Flea. I believe you can buy the plane in kit form for $195.00. Their price list on all parts and drawings costs ten cents.

Charles D. Bright, Long Beach, California:—The S.E.5. was fitted to carry but one Vickers gun between the cylinders of the Hisso, but they also carried a Lewis mounted on a yoke on the top plane. Immelmann was shot down by a Lieutenant McCubbin, an Englishman flying an old "Fee."

Stanley Gramlich, Los Angeles:—A sesquiplane is a plane having a stub lower wing. The French Breguet fighters are outstanding examples. The top speed of the new Flea is about 90 m.p.h. The Germans did not give up the use of the Maltese cross until 1917.

Wesley Huhne, Remus, Mich.:—The Sparrowhawk was covered with fabric. The German Hannover C-4 had a top speed of 96 m.p.h. at 10,000 feet. The new Boeing Bomber has, to all intents and purposes, been approved by the Army Air Service. Thirteen have been ordered and the first one was finished in October. It is a metal-covered ship.

George Thompson, Dorchester, Mass.:—Your ideas concerning the Beechcraft as a fighter plane are for the most part good, but unfortunately they do not give the gunner much of an arc of fire in some of the drawings. I do feel, however, that the back-staggered plane has its points, but mainly as a single seater, not a two-seater.

Dick Schwab, Peoria:—I believe the Nakajima 91 is the fastest fighter in the Japanese Air Service. It is supposed to do about 230, although we do not have any official figures on it. There is no record as to who first developed this project, but Nakajima is the name mentioned most often in the November Pilotropics. Many forms of it have been put in operation on planes since as far back as 1911. The Boeing Monomail in 1929 had what I believe to be the first really modern
On the Light Plane Tarmac

For Lindbergh—An American Powered British Job

Light Plane Prices to Drop

A Few Shorts

FOR LINDBERGH—AN AMERICAN POWERED BRITISH JOB

LIGHT plane fans in the U. S. will be interested to learn that the new British Miles Mohawk light plane, built expressly for Charles A. Lindbergh, who is now a permanent resident of Great Britain, is powered with an American Menasco Buccaneer B6-S—an inverted in-line air-cooled engine supercharged by a centrifugal blower to give 200 h.p. at 2,250 R.P.M. at 4,000 feet.

The Phillips and Powis firm, which built the plane to Col. Lindbergh’s specifications, must be complimented on the ship they have turned out. They have every reason to believe that other enthusiasts will order replicas of the Mohawk, as they call it. Thus far, however, it cannot be considered a production job.

In general, this craft is a typical Miles two-seater, but it differs from its forebears in its cockpits, undercarriage, tail unit, and American power plant. It should also be stated here that the license to manufacture the Menasco line of motors has been purchased by the Phillips and Powis firm. Soon, therefore, this fine plant will be in production in Britain.

Structurally, the Mohawk is of wood. The wing is similar to the Miles Hawk Major, with two spars and plywood covering taking drag and torsional stresses, but incorporating strengthened spars to take care of the greater all-up weight plus a few minor modifications to permit the installation of extra fuel tanks. In addition to the wing tanks there are two other tanks set in the center-section.

The wings use Miles flaps along the trailing edge, and the fuselage is skin-stressed with ply-wood and has a fabric covered tail. The engine is mounted on blocks of Ferodo brake lining and small springs allow a ½ inch compression. For the time being this job is fitted with a Fairey fixed-pitch aircrew, but provision has been made for a variable pitch propeller. Hamilton does not make a variable pitch aircrew suitable for such light engines as the Menasco, but DeHavilland, the British company that holds the Hamilton license abroad, has successfully developed V-P props suitable for such power plants.

THE supercharger is driven at 3.75 times engine speed. It uses an Eclipse starter and generator and Smith’s instruments.

The tandem seats are mounted on the front and rear spars of the wing and are sheltered by a neat transparent coupe top. There is a fixed portion of the panel between the seats, but movable panels are set immediately above each occupant and meet on the center line of the fuselage.

(Continued on page 92)
Honorary Members
President and Mrs. Franklin D. Roosevelt
Casey Jones
Wallace Berry
Al Williams
Col. Scaron
Major von Schleich
Lieut.-Col. Pinard
G. M. Ballance
Capt. Boris Sergeyevskay
Colonel Russeusmer
Charles W. A. Scott
Capt. A. W. Stevens
Capt. O. A. Anderson
Majore Fred Lord
Lieut.-Col. Theodore Roosevelt

Official Charters
F.A.C. Flights and Squadrons are recognized only when they have been awarded Official Charters. These Charters are illustrated to depict the various steps of advancement in aviation. The first step is in keeping with the high ideals and purposes of the Club. They are printed on a very fine grade of paper and the names of the Squadrons are hand-lettered. Charter applications must always be accompanied by a complete list of members with their addresses. For the Flight Charter send 25c, for the Squadron Charter 50c, to cover costs.

Volunteers for G-2
G-2, the Inner Circle of the F.A.C., is open to a restricted number of members who are qualified for Secret Service activities. Those who are chosen will have unusual opportunities to win the Club's Distinguished Service Medal. Those who are accepted will be given a secret number and identification card as well as the secret code. Assignments will be made by letter and code.

Save This Coupon for the NEW CADET WINGS of the Flying Aces Club

[Image of a coupon]

Do Your Full Share to Advance Aviation
No Dues-No Red Tape
How to Join and Form a Flight or a Squadron
To advance the cause of aviation, over 50,000 men and women are working to help bring together to form the FLYING ACES CLUB. It's the easiest thing in the world to join. Just clip out the application blank at the right, fill in, and mail, along with a stamped, self-addressed envelope, and you will receive your official membership card and return mail. After that you can quickly advance to earn CADET WINGS, PILOT'S WINGS, and other honors.

The HIGHEST AWARDS
After the membership card and Cadet and Pilot's Wings, comes the Ace's Star, awarded for obtaining five new F.A.C. members, using the application to the right. THE FLYING ACES CLUB Distinguished Service Medal is awarded to members whose work on behalf of the club is "beyond and above the call of duty." The best way of putting yourself in line for this coveted medal is through the medium of efficient G-2 work. And of course honorary memberships of promotion flyers, or persons otherwise engaged in the various phases of aviation, will bear weight when members are being considered for the D.S.M.

Attention, F. A. C.'s!
This Beautiful Aviator's Identification Bracelet
Now 25c!
Because we wish to place the beautifully designed F.A.C. AVIATOR'S IDENTIFICATION BRACELET within the reach of all members of the club, decision has been reached to cut temporarily, the price in half. Remember—this offer will be in effect for a short while only, and we suggest that you send your quar- ter to us at once. There are no secrets. In sending coins be sure to wrap them securely.

The Beautiful F. A. C. Ring
The official F.A.C. club ring is a beautiful and should be worn by all members. It is self-adjustable, to insure a perfect fit. It is finished in antique gold and is set at 50c, postpaid anywhere in the U.S. and possessions for only 50c. (A STERLING SILVER ring of similar design, may be had for $1.00.)

February Membership Coupon
I, the undersigned, hereby make application for membership in the Flying Aces Club. I agree to live up to its rules and regulations; to foster the growth and development of aviation; and cooperate with all other members in the work of spreading aviation information, building up confidence in flying for national defense and transportation. I will also build up the Club and its membership, and do my best to win the honors that the Flying Aces Club offers.

Volunteers for the NEW PILOT WINGS of the Flying Aces Club

[Image of a coupon]
Flying Aces Club News

Ta-Ta-Ta-Tah-h-h! The bugle blares out "Assembly" for all members of the F.A.C. And we certainly have revved up a slew of lively Club News for you this month—every bit of it peppe up with the Christmas and New Year spirit. All set, fans? Okay! Off we go—

Well, F.A.C.’s, once more we are in the midst of the Christmas season and in an effort to bring all our Club members closer together in spirit we have a brilliantly lighted Christmas tree here at GHQ. It’s a representative tree, too, for it boasts glowing colored lights for every State in the Union, all U.S. possessions, and all English-speaking foreign countries wherein are located members of the vast world-wide F.A.C.

And so, in this mellowed atmosphere of good-will, with the wind howling outside of our windows, we settle down to write the Club News for the last time during 1936—and what a pile of it your old friend, Doug Allen, has in front of him! Well anyway, the more the merrier. And if you fellows and girls will devote the same effort to Club affairs during the coming year as you have during the twelve months just closing, that’s all the Christmas gift we ask for.

Speaking of Christmas gifts, here’s a great one for Jimmie Hunter, of Raleigh, N.C. Jimmie, we’ll bet, will be mighty proud—and perhaps the balance of you 49,999 members a wee bit jealous. Most of you buzzards will remember that back in the summer—during August, to be exact—Jimmie was swimming with a girl friend at a pool in Raleigh. Suddenly there was much commotion in the water and the girl friend cried out: "Jimmie, there’s a young fellow out there drowning—go get him!"

Jimmie did, and subsequent investigation on the part of our Awards Committee certified the fact that Jimmie saved the life of Ray Ellen, Clayton, N.C.

In recognition of this act, Jimmie has been granted the first F.A.C. Medal of Honor bearing the Valor Bar—and this latter is indeed an honor. The Medal of Honor, of course, is a high award in itself, but the extraordinary distinction here is that Valor Bar. No doubt during the course of the coming years many such medals will be awarded, but we feel safe in saying that very few Valor Bars will be given out; for they are the reward for exceptional and heroic deeds alone. Once again we congratulate you, Jimmie!

Old units progress in the F.A.C., and new ones are ever springing up. Here’s a letter from Terrell W. Hill, 550 W. 172nd St., New York City, advising of the formation of a new F.A.C. unit, to be known as the Black Knights Aviation Corps. Terrell and his gang are going about things in a lively manner. Moreover, they already have a radio station connected with the unit—W2HNV. We understand that this unit earnestly solicits new members, so if any of you “Lone Eagles” situated in that vicinity really want to join a lively outfit, why not contact Terrell?

And here’s news concerning the formation of another new unit—down at Ocean City, N.J. Harry Gannon, 101 W. 10th St., Ocean City,—who has read good old FLYING ACES for the past four years—says they’ve just succeeded in getting their Ocean City Model Airplane Club under way. Harry further advises that they intend to build a gas model this winter. Now, that’s what we call a peach of an idea! While the wintry winds blow with gale, Harry and his friends can spend the long winter evenings building a real job. They can take their time, then, when spring rolls around they’ll have a powered craft all set to compete with the best of ’em.

Across the blue Atlantic come many ships weekly, bearing greetings from enthusiastic English F.A.C.’s and telling us that FLYING ACES is positively the best air magazine published in the good old U.S.A. But it has taken H. G. Lee, of Manchester, England, to go the others one better. Friend Lee says, in part: "You are certainly keeping FLYING ACES up to its reputation and I maintain that it is absolutely the best flying magazine on either side of the Atlantic. Thanks, old man, we appreciate "them thar words.”
ELSEWHERE on these pages is a picture of George Cull, of San Francisco. We've written much about George in this magazine, but we've never shown you his picture; in fact, we've just learned several things new to us about this courageous West Coast F.A.C. A short while ago we picked up the September 7 issue of the San Francisco Chronicle and there was almost a half page devoted to George. Here your old friend, Doug Allen, was cranking about having to lay in bed for five weeks recently, and this article tells us that George was stricken with infantile paralysis six years ago, and that through something approaching a miracle his life was spared. Day after day he lay, first in Children's Hospital, then in the Shriner's Hospital for the Crippled. And get this—twenty-eight times surgeons operated, trying to replace muscles with those that lived.

The occasion for the article in the Chronicle was the fact that United Air Lines gave George his first ride in a modern transport plane. And in this particular case United Air Lines came rather more than they'll ever know. For George has his mind set on becoming an aeronautical engineer some day. We're certain, too, that the world will see the day when George ranks among the best.

And here's another F.A.C. in the limelight of the press! Steve Sanchez, Shreveport, La., decided that his FLYING ACES "training" qualified him to build a model that would "copy" a prize in a model building contest down in the Gulf country. Well, he turned out a darb, and the Shreveport Times told the story when it said: "... Steve Sanchez is king of model plane builders in the Shreveport area, judges in the Shreveport Times-Little Theatre Ceiling Zero contest decided."

Steve's plane was commended in particular for its accuracy of detail, its completeness, and the excellence of its finish. Steve, we of GHQ are mighty proud of you!

While we hear regularly from points in the South Pacific, some months have passed since we've been contacted by our old friend, Jim Tetteh, at Accra, on the Gold Coast, West Africa. Here we had just about given up hope of hearing from him when along comes a request for this for A.C. to his membership cards! Good luck, Jim, and at the first opportunity we wish you'd whip your camera and snap a picture of your West African F.A.C. unit. We're all anxious to "meet" you and the boys.

You bombardiers will no doubt recall that some while back we published letters from members who walked the farthest for their copies of FLYING ACES. Many of them walked or rode a good many miles, and naturally considerable crowing was in order. However, good old Joe Mangano of Syracuse, N. Y., couldn't see the point to it, so he up and wrote us as follows:

"Seeing that there's quite a lot of confusion going on as to who has to walk the farthest for his copy of FLYING ACES, I suggest a little attention be given those who just reach out and grab their copy of good old F.A. Just because we guys are lucky don't mean that we don't care a hoot for FLYING ACES. We enjoy it just as much as the fellow who walks all those miles for it!"

Well Joe, old timer, we haven't forgotten the "reachers" in the least. In fact, we're right ready to hear testimony as to which reader stretches his hand the least to grab old F.A. More seriously, though, we would like to know which reader lives the farthest north. And which the farthest south on our globe. Are there any bids?

AS we gaze out over our "field" here we note a bunch of planes lined up in front of the honorary membership hangar. Come on, let's taxi over ourselves and see just who's who.

Well, well, of all things! That one to the extreme left is interesting. We've often heard it said that the Royal Canadian Mounted always "get their man." This time one of our men "got" one of theirs. Yep, Leonard D. Robinson, Toronto, Ontario, Canada, "labeled" Major-General J. H. MacBrien, Commissioner of the Royal Canadian Mounted Police. Congratulations Leonard upon getting your man!

Who's that poking his head out of the plane next in line? Well, it's none other than Al Williams, and Al has landed on our farm at the invitation of Floyd Witten, who lives down in Gastonia, N. C.

And say—we just couldn't leave our aforesaid pal, George Cull of San Francisco, out of this line-up. This time George has induced Richard Arlen, famous movie star of many air pictures, to join the F.A.C. George, you are a go-getter!

A short while ago a couple of spunky fellows made a round trip flight across the Atlantic. Of course, you know we make reference to Harry Richman and Dick Merrill. Well, Ross Smyth, Toronto F.A.C., felt that both should be honorary members, so he up and wrote 'em. Result so far: 50% success! Ross has just sent us a letter from Harry Richman graciously accepting honorary membership in the Club and promising to send Dick's letter on to him. Thanks, Ross—and welcome.

We're pretty certain that this one was sent up from "Down Under" just to make all of us winter-bound F.A.C.'s jealous of the Australian summer. With the snow flying up here, it almost gives us pneumonia to look at those shorts. Anyhow, the girls are Kath Furness and Daphne Parkinson, two of our Away members of the F.A.C. Daphne, on the right, has many hours in the air to her credit, most of them being solo hours.

If we ever attempt to discover which of our F.A.C.'s has the outstanding hobby and activity man, this hushing fellow—Jaroslav Chemelik of Chicago—will be a hard one to beat. "Jerry," a Farragut High Junior, makes scads of airplane models, collects war plane data, is an avid airmail pal scribbler, conducts aviation departments in several amateur publications, is a top-notch stamp collector, a glee club singer, a poet, a school honor society member, a captain carrier of Chicago's "Shopping News," and an active type. Where! We're out of breath. Above, we see "Jerry" deeked out for his part in a recent play, titled "On the Czar's Command." We'll bet every feminine heart in the audience googled-the-loop.
Harry! And say, Dick, we want you in the fold, too!

And still they come! Here’s a letter from Lieut. Commander G. O. Noville, of the Byrd Antarctic Expedition. Again Ross Smyth is the “captor” and Mr. Noville’s letter reads in part as follows: “... I am delighted and honored in that you have asked me to accept an honorary membership in the F.A.C. I wish you every success in continued growth and endeavor.”

To David Bartelt, Chicago, Ill., goes the honor of “landing” two honorary members. They are none other than Patrick J. Sweeney, president of the Central Gas Modelplane Society, Chicago, Ill., and Geo. W. Vest, Supervising Aeronautical Inspector, Department of Commerce, Bureau of Air Commerce, Chicago. Good work, Dave—and welcome to our tarmac, Gentlemen! We’re glad to have you with us.

FLYING ACES evidently proves of much interest to Waldo D. Waterman, president of the Waterman Arrowplane Corporation, Santa Monica, Calif., since Harry Treen of Ocean Park, Calif., has just sent us a letter from Mr. Waterman, reading: “In reply to your letter in request that I become an honorary member of the FLYING ACES Club, I wish to state that after reading about your organization in the magazine which you sent me, I will accept the honor with pleasure.” Good work,

The F.A.C. Medal of Honor as it appears with all four bars.

Harry—and we appreciate your sentiments, Mr. Waterman!

Last but by no means least in the line-up is the honorary membership brought us this trip by Leroy Scott, Jr., Shreveport, La. Roy has induced William Amis, Commanding Officer of the 90th Attack Group, Barksdale Field, to join the Club. Welcome to our tarmac, Commander. And many thanks, Roy.

Before closing this “meeting,” we’d like to call the particular attention of members of the F.A.C. Radio Communications Corps to a letter just received from England. This letter says: “... Please could you give me some wavelengths and frequencies, also the locations of various amateur radio stations belonging to members of the F.A.C.?”

All of which reminds us, we do have a partial list of the stations and locations, but in many instances we do not have the wavelength and frequency information. Therefore, will all members of the F.A.C. R.C.C., please furnish us with complete information at an early date? Well, bunch, it looks as though we’ll have to break up this last meeting of 1936. It has been a swell year, corresponding with you F.A.C.’s, and I’ve enjoyed every minute of it. Herb, Joe, Arch, your old friend Doug, and all others here at GHQ look forward to many fine times through the medium of FLYING ACES during 1937, so with a Merry Christmas and a Happy New Year to all, I’ll hop a bus for Jersey, put on a Santa Claus suit, and see if I can’t revive that flickering belief in Santa on the part of my little nephew.

—DOUG ALLEN

Citations and Awards of the FLYING ACES Club

The Distinguished Service Medal of the FLYING ACES Club has been awarded to the following members of G-2 for exceptional services to the club:

- Richard Blayney
- Leroy Scott, Jr.
- William I. Wilbur
- Roy Berg
- Irwin Mathers
- Alex Thorne
- Bernt Olsen
- Kenneth Marriott
- Elmer T. Uebel
- M. H. Shapiro
- William Bates
- William Ciappa

The following members of G-2 of the FLYING ACES Club have been awarded the silver F.A.C. ring for exceptional service to the Club:

- George Hassen
- John Wenglarz, Jr.
- Edwin A. Ohler
- Anthony Buzcko
- James Flaherty
- Bob Rosenbush
- Winthrop Difford

The following member of G-2 of the FLYING ACES Club, has been awarded a pocket knife for exceptional services to the Club:

- Charles E. Heinric

The following member of G-2 of the FLYING ACES Club, has been awarded Aviator’s Identification Bracelets for additional services to the Club:

- Gaston Auger
- R. C. Hutto, Jr.
- Robert Letourman
- George Petts
- Albin Slowik
- Harry A. Herron
- Henry Dumas
- J. Robert Riley
- John Pazucha
- I. C. Sieving, Jr.

Demons in the Nullahs (Continued on page 29)

Hawker Demons roaring their way, tossed by the treacherous air currents and hammered by volleys of lead from the machine guns of fearless Afridi tribesmen crouched on the narrow ledges. The leading ship has just loosed a bomb. We see it exploding on the mountain-side at the left. And on the right, eagle-eyed Afridi have drawn a bead on the third Demon which has dropped so low that it offers a broad target for the Indian marksmen. If those bullets stop its engine, the craft will plunge to the floor of the nullah.

Yes, the R.A.F. pilots stationed at the North West Frontier face unusual dangers in carrying out their duties. To “shoot the nullahs,” one must be an exceptionally smart flyer with more than a fair share of nerve together with courage to oppose the devilish fighters of one of the most cruel races known to modern civilization.

It’s all in the day’s work with the British.

And they can have it.
With the Model Builders

Here’s one that proves that our artists are right there with the boys, as well as with the brush. Tom Roota, who turned out the illustration for “Suicide ‘Chutes’” in our October P.A., made this swell scale model Curtiss Goosehawk. The tiny pilot was fashioned from a piece of art gum.

Right: Richard L. Gates, of Elyria, Ohio, is a Douglas fan—and there’s no arguing the point once you’ve looked over this sweet job of his. Many an hour of painstaking work went into this craft. Yes sir! We'll bet TWA officials would like to see her.

Once again the British! On the left, a Boulton and Paul Sidestrand bomber; and on the right, a Hawker Osprey Fleet-Corpsed flight—both made by Mr. C. Arbon, of Ipswich, England. He’s a little powerful on his struts; but his paint job is great, and those miniature flyers in their pits add just the right touch.

Yes, since balsa is quite expensive over there, the British use white pine and spruce.

John Habrick, of Thief River Falls, Minn., is our personality of the month. John is showing us his Stinson model (left) and his Curtiss Goosehawk (right). “What’s that thing hanging from the left wing of the Goosehawk?” you ask. Well, fellow, it’s a first prize also he won at a Minneapolis fair.

Right: Ah-h-h! Here’s a top-notch job for you! It’s the “Mr. Mulligan” built by Ralph Guernsey, of Paso, California—and it’s as good as they come. Fact is, you can hardly believe it’s a model rather than a real ship. Note the excellent details about the cowling and cabin, also the careful lettering. Those are the finishing touches that stamp it as a first-flight woodworking. Our hat’s off to you, Ralph—and now how about some more “shots” of your models?

A zipping racer for you, boys! Gilbert H. Minnig, of Cumberland, Md., built this slick job, and he’s named it the “Flying Ace Racer.” And now where have we seen something like it before? Don’t prompt us now. Ah, yes! It’s got the lines of that famous French Caudron that cleaned up the National Air Races. Nice work, Gilbert!

Wow! Count ‘em! One-two-three-four! To be exact, a Taylor Cub, a Boeing FJ-4, a British Hawker Fury, and a Fokker Dr. All were constructed by George Recht, of New York City. George’s photography, selection of types, and woodworking are all darned good, we’d say. Model building is a swell hobby—and “shots” like this prove it.
Right here, fellows, you’re headin’ into a real “up” ship. For when Henry Struck put this job before the judges of a recent contest, she “stood up” when it came to scale perfection, “stayed up” when it came to duration, and got “talked up” plenty when she buzzed away with first prize. No, you can’t afford to “pass up” this hum-dinger model. So “up” and at ’em with the balsa—

Build the Davis D1-W

By Henry Struck

Modern in every respect, with tapered gull wings, bulge type N.A.C.A. cowl, wheel pants, and glassed-in cockpits, the Davis D1-W is a splendid ship for the sportsman pilot. The 125-h.p. Warner Scarab permits a maximum speed of 142 m.p.h., with a landing speed of 46 m.p.h.

The fuselage and tail group are built of welded steel tubing while the wings are made of dural ribs mounted on spruce spars. The entire ship is fabric covered. Its wing span is 30 ft. 4 ins. and the length is 20 ft. Fully loaded, the Davis weighs 1460 lbs. and has a cruising range of 480 miles at a speed of 123 m.p.h.

Our own original model of this trim job (see photos) was entered in a recent scale model contest, where the planes were judged both for fidelity of scale construction and for flight duration. And we’re proud to say she carried away the first place trophy.

Fuselage

As you build your Davis, note that Plans 1 and 4, and Plans 2 and 3 fit together. The fuselage sides, shown on the plans by the heavy black lines, are made first. Secure a soft flat board, place the drawings over it, and then pin the longerons of 3/32” sq. balsa in place. Cut the vertical struts and diagonal braces to size, also from 3/32” sq. balsa, and glue in place. Make both sides at the same time to assure symmetry.

When dry, remove the sides and join them by cementing formers C, F, and K in position. After the glue has hardened, bring the sides together at the rear. Cut all the formers from 1/16” sheet balsa and set in their proper places. The stringers of 1/16” sq. are cemented to the formers. The cockpit cover formers are bent out of 1/32” sq. bamboo.

The cowling is built up of two formers, A and B, connected by four lengths of 3/32” sq. balsa covered with 1/32” sheet balsa. Former N is cut of 1/4” soft sheet balsa and cemented to the front of the cowl.

The cowl bulges are shaped from a strip of 3/16” sq. balsa. Ten of these are required. Make the dummy cylinders from a piece of 3/8” by 3/16” sq. balsa sanded to a half-round cross section. Cut this strip into five equal lengths and then cement to former B. The finished cowling is glued to former C, completing the fuselage.

Landing Gear

Strut O is sanded to a streamline shape from 3/32” sheet balsa. The long shock strut P is streamlined from a hard balsa strip 3/32” by 3/8”. Make the wheel pants of a center piece of 1/4” soft sheet balsa, and the cover pieces of 3/16” soft sheet. They are cut first to outline shape, then cemented together. When dry, the edges are rounded off with knife and sandpaper. Two small streamlined blocks Q are carved from 3/16” by 3/8” balsa and glued to the side of the pants. Wheels of 1 1/8” diam. and 3/16” thick, either of balsa or pine, will be needed.

Tail Group

The tail skid is bent of .020 music wire and cemented to the bottom stringer at the rear of the fuselage. As for the tail surfaces, these are very simple to construct. However, try to keep the weight down as much as possible.

The rudder post is of 1/8” sq. balsa and also serves as an anchorage for the rear hook, which is bent from (Continued on page 94)
BUILD THE DAVIS D1-W—Plan 3

FORMERS

ALUM. HINGE

PROP BLOCK 6 x 1 x 5/8"

[49]
Here Are Plans For the S.P.C.A. 30 French Bomber

This striking flying fortress of the Tricolor is produced by the Societe Provencal de Constructions Aeronautiques. An all-metal ship, it carries two 650-h.p. Lorraines, has a top speed of 160 m.p.h., and features strongly- armored fuel tanks. The measurement scale below is in meters (one meter equals 3 ft. 3 3/8 ins.).
For a hot-shot, top-notch solid model, you fellows can’t go wrong on this sky hurtling job. Yep, it’s the Navy’s fastest—the striking Grumman F2F-1. Already, three different aircraft carrier squadrons have ’em. And now, if you have your balsa and tools handy, you, too, can command the services of this speedster.

Make the Grumman F2F-1

By Edward C. McCollon

HERE’S a single-seat fighter that in hardly a year’s time took the U.S. Navy by storm. As ample proof of it, the Grumman F2F-1 is now used by three different squadrons on the aircraft carriers.

The power plant is a 14-cylinder Twin Wasp Jr. of 650 h.p. Due to the plane’s highly-perfected streamline shape, it flies at the excellent average speed of 248 m.p.h. with full military load. Two 30-caliber machine guns fire through grooves on the top side of the fuselage. As with previous fighting models, the usual bombs are not carried, leaving the plane strictly a fighter. A later model, the F3F-1, has also recently been put into service. But this craft is slower due to the heavy armament it carries.

The landing gear and tail wheel are retractable by hand when in flight. The arresting hook that is used for landings when aboard the carrier is also retractable into the sleeve under the tail. Due to the fuselage’s metal monocoque construction, the plane has proved very rugged. The fin and stabilizer are covered with metal; and the rest of the plane, with exception of the fuselage, is covered with fabric. Metal construction is employed throughout. To complete the streamline, the cockpit is covered with a celluloid cage that slides aft when opened.

In building the model, you can make the wheels either retractable or fixed. While it wouldn’t be advisable to make them retractable with the small model size indicat-

BUILD the fuselage of balsa wood. The motor cowling should be made separate from the rest of the fuselage, joining the pieces after shaping them. By making the fuselage of sheet balsa a more perfect shape may be obtained. Make a template of the fuselage side-view on cardboard and use it to mark the balsa with. Turn out nine fuselage side-views on ½” sheet balsa. On one of them include the rudder. Make two more of 1/64” sheet balsa. The sheets that are near the middle should have a portion cut out for the cockpit. By laminating all these sheets together, putting the sheet with the rudder included in the middle and a 1/64” sheet on each side, you will have your cockpit already cut out and the rudder attached.

Now you can shape the fuselage, checking with the cross-sections on the plans. Make the cowling out of a solid block of balsa. The best job can be made on a lathe. Whether you put a motor in or not is optional. The streamliners on the motor cowling should be formed with glue or Plaster of Paris. A well should be built into each side of the fuselage for the retractable landing gear. This is just about as deep as the wheels are wide. A thin cut that goes clear through the fuselage is made for the struts to fold into.

After you have sanded the fuselage as smooth as possible, you might cover it with tissue paper to cover any small cracks left. Details in the cockpit always tend to make the model more interesting. Be sure and have the inside of the cockpit painted gray before covering it with celluloid.

WINGS AND TAIL SURFACES

YOUR top wing should be made of one piece and the lower wing in two panels. Note that the top wing becomes thinner in the center section. No dihedral has been shown on the side view on the plans for clarity in shaping the bottom wing. After the wings have been cut to the airfoil shape shown, you (Continued on page 93)
When the official meet was called off at Hadley Field, the contestants went ahead and ran their own tourney, each contributing a dime for prizes. Here we have a group of the boys posing with their entries just before the starting signal.

"Ma-mah-h-h, that gas model man's here again!" That's right, he is—and this trip he's worried about (a) All the rascallion fuel jobs that thumb their noses at the timers and scoot off into the unknown, (b) The comparative gas consumption of the Goofus and Blooey engines, and (c) What's going to be done about it? Anyhow, he's for rule changes involving "controlled flight"—and here are his arguments.

About Those Gas Rules

This introduction to our article is the calm that precedes the storm. Some one very famous for his writings (we don't remember his name) has said that all good literary fury should start with a calm, and that the reader should gently and unknowingly be carried into the action. We can positively guarantee that not only will we carry you in, but that they will also have to carry you out. That's how terrific we feel about this particular opus of ours. Never mind what an opus is, we're telling you it's terrific.

Anyhow the gas model activity we have in mind occurred in the merry mad month of October, when everything seemed to happen suddenly, namely one great big gas model spree for every Saturday of the month and with a gas model convention likewise thrown in.

We still wish some one would explain why sponsors pass up a swell summer in order to break loose in October. Maybe they remembered that Columbus discovered America in the month of October. On that basis, the sponsors probably figured that anything was liable to happen in October, and we're ready to believe it.

We're still carrying you into this thing gently, but now let's start something—Introduction of gas model competition may be assumed to date to the 1932 National Meet at Atlantic City when Maxwell Bassett entered his powered model against the rubber entries. At that time, you see, gas jobs were not considered a threat to the growing popularity of the rubber ships. We recall several well-known organizers (they'd now blush with shame) who said that the gas model was merely a novelty—that it would end just as soon as it started.

Apparently Bassett was not around when they made those sagacious statements, for he also entered his gas models in the 1933 National Meet at New York City. This time Bassett won every one of the outdoor rubber events—the Moffett Interna-

AND NOW LET'S MEET SOME OF THE BUNCH AT THE METROPOLITAN MODEL LEAGUE MEET. LEFT TO RIGHT: NATHAN POLK, WHO WTH IRVIN POLK SPONSORED AND DIRECTED THE CONTEST; THEODORE KAISER AND HIS WINNING MODEL; AERON ZIER, MODEL EDITOR OF FLYING ACTS; ROY HEIT, WHOSE EXPLANATIONS ARE DEALT WITH AT LENGTH IN THIS ARTICLE; SYLVIA RICHTER, WHO ACTED AS A TIMER; AND PHIL ZECCHITELLA, THE AUTHOR.

And so gas models originally started their competitive career as brothers to the rubber craft on the same official rule footing. But when it became evident that it was a far cry from rubber to gas, rules were drafted for a separate gas event.

For the past few years these rules have seemed sufficient to the majority. Results at gas job competitions have, nevertheless, been far from satisfactory. Freak flights and lost models are on the increase in a manner dwarfing those likesame conditions which prevailed in the early years of rubber competition. The National Meet at Detroit should have been accepted as a climax; for something was surely basically wrong there. Many entries were unable to receive flight recognition because officials just were not available. And yet provision had been made for a comfortable number of timers.

WHAT was the reason? Maybe we can try to explain. Together with Edward Roberts, vice-president of the Junior Motors Corporation, we set out to give official time to the gas model entries. At 1 p.m. we started to time a flight. After gaining a considerable amount of altitude, the model began to fly all over the county while we were in hot pursuit. For miles and miles we continued, and finally the model landed in a corn field.

After retrieving the model, we drove back to the airport. This first flight consumed one hour and fifteen minutes of our afternoon. At 4:30 we had only timed three models—and yet the entries ran into hundreds! Some officials were out for a period of as long as two hours for one flight. Many of them did not return with the models because they were completely lost.

Was there any analysis of this confusion to solve the trouble before the next national meet? There's the rub, as Hamlet said. With gas model activity rapidly increas-
ing, there'll probably be double the number of entries at the next Texaco. With this in mind, together with the confusion of the last National, what can we possibly forecast for 1937—other than bigger and better super-confusion?

The final gas model meets of October served only to accentuate our point. Results became so unsatisfactory that a gas model convention was finally assembled for the purpose of thrashing out the problem. This convention vindicated itself by asserting that the trouble lies in the rules.

Now according to the present gas rules, a model is allowed a certain ratio of fuel depending on the weight of the model. There is a certain allotment for every pound of weight; and the heavier the model, the more the fuel. Let us point out that there are several makes of engines on the market, and one may have a more economical fuel consumption than another.

So let us take this situation: There are two models entered in a contest, both having the same weight and consequently the same amount of fuel. However, the first model is powered with a Goofus engine, and the second model is powered with a Blooey. In order to tell our story, let us assume that the first model is so aerodynamically deficient that its Goofus must be at full throttle in order to take the ship off, and that the second model is, on the other hand, so efficient that it can fly with the Blooey at half-throttle.

But normally, let us say, the Blooey fuel consumption is much less than that of the Goofus. If you will add this to the fact that the Blooey is being run at half speed and that the Goofus is being run at full speed, it will soon be evident that one model will have an engine running time of at least twice that of the other entry. Yet, the models weigh the same, are given the same amount of fuel, and are officially considered on equal footing! Ouch!

An average motor run under the present rules is, at best, a few minutes—which is sufficient to get even the poorest model out of sight, provided air conditions are favorable. If one good flight is to occupy at least an hour of the official's time, how many flights are necessary before the field is cleared of officials? And what is supposed to happen to the rest of the entries who are ready for official flights?

But we are not attempting to create a problem without offering a solution. We think the answer can be found under the simple term of “controlled flight.” The idea is not new, but we have discovered that all objectors were simply those who were in ignorance of its merits. For the uninformed we will hasten to explain—

Controlled flight embodies the principle of the self-timer, as described in the November F. A. Under this method, all entries are given an equal amount of engine running time, regardless of weight. What happens after the engine stops should then be but a continuation of the aeronautic efficiency of the model. Flights will last for a few minutes at most. Very rarely will a model be lost. Officials will, for the majority of flights, remain on the field.

How does this strike you? Under the present system, flights may run into the hours, the officials are required to follow models for miles, and many models are lost. Even if lost models are recovered, it is generally necessary to reward the finder with a sizeable sum.

But the most important factor remains untouched! A contest is generally held for the purpose of determining which model is the most efficient, aerodynamically and by performance. What have these present rules provided in that direction?

Let us now further clarify our statement regarding controlled flight. With this plan, rules would specifically state that all models entered in a contest would have 45 seconds of engine running time; in short, after the model has taken to the air, the engine must cut after 45 seconds. The means by which to accomplish this are many. The contestant has his choice of the several mechanical means, some of which were explained in our November article. For those who prefer not to experiment with mechanical time switches, there is always the simple alternative of gauging the requisite amount of fuel. The sponsors are not concerned with what manner by which this outcome is achieved; their only stipulation is that the engine may run for only 45 seconds. Needless to say, no restrictive emphasis will be placed on the Simon-pure exactness of the running period. A few seconds under or even a few over should cause little concern, especially since the procedure is still in its juvenile stage.

Now about those October meets which motivated this discussion. The activity terminated with the aforementioned gas model convention, which serves very nicely to pick up our topic and carry it right through

Step lively, mister! And never mind your hat, mister—you can pick that up later. Yes, we agree that this action “shot” is mighty amusing. But our real reason for publishing it lies in the fact that it carries a moral for all gas meet directors. That moral is: Always keep your spectators behind ropes.
to the finish. So let’s slip back to October for a few minutes.

It was four o’clock on a Saturday afternoon in October and a certain Mr. C. E. Drake had gone out for a ride in his new car towards the outskirts of Plainfield, New Jersey.

In the distant sky he suddenly sighted a plane. And as it headed into the wind it seemed to poise, waver, then glide gracefully down. Mr. Drake, who is interested in airplanes, held his gaze. Abruptly the ship lost altitude, dived steeply. In swift circles, and much like a hawk stalking its prey, it descended to tree-top level. Due to its size, however, Mr. Drake assumed the plane to be still quite a distance away, so much was his surprise when he heard it crash among the trees nearby. Puzzled, Mr. Drake hurried to the scene, mentally rehearsing the A.B.C.’s of First Aid.

After some searching, an object was located atop a dead oak tree about sixty feet high. It was then that Mr. Drake realized that the craft was a model—which explained why it had seemed so distant. He attempted to recover the model, but its perch was much too high and perilous. Finally, with the aid of a long fishing rod, a note was removed from the wing. It was a polite request for notification in the event that the model was found.

The camera catches Jesse Bieberman, of Philadelphia, inspecting his removable motor mount during the course of the 10-Cent Meet, described herein. (You’ll find plans for Mr. Bieberman’s interesting engine unit in the author’s October F.A. gas job article.)

At Hadley Field, that morning, was scheduled one of the more important annual gas model meets, but due to threatening skies it was postponed. However, many enthusiasts had come from afar, thus when announcement of postponement was made there was a loud tumult. The contestants wanted to fly! But there was no contest—so they started one of their own.

It was at this point that your correspondent arrived—to find that the modelers had donated ten cents each for prizes, naming yours truly as meet director. Timers were chosen and the contest was on. The weather was very gusty, and what havoc it played with those gas ships! Model after model would skim the ground, shoot into a climb, waver at the apex, and then, as the wind would catch it under a wing, spin over and roar pell-mell for the ground as spectators dashed madly for cover. C-C-Crash! Crankshafts through gas tanks, empenagates scattered in bits, propellers in smitherines.

Spectators crowded about a gas model, gazing in awe as it took to the air, then suddenly scattering like wild rabbits as the model, leering drunkenly at the end of its climb, would dive madly for the cluster of onlookers. After watching the model dash itself to earth and perform a few flips as an added attraction, the crowd would rush over to see another job get under way, and the show was on again!

The field was thus transformed into a veritable dynamo of activity. Those few engines which preferred not to start were soon brought to life by Eddie Roberts, vice-president of the Junior Motors Corporation, who was present at the mêlée. The few models which did not crash were soon lost in the skies due to the strong overcurrent prevailing above.

A unique model was that of Andy Borysko. Andy’s entry was a flying wing—strictly that, for it had no tail surfaces, merely consisting of a back-swept wing with a Brown engine mounted on the trailing edge. At each tip was a fin, in true Pterodactyl style. This model used a graduated test tube fuel tank, as described in our November article on self-timers. Numerous hops were taken merely by filling the test tube to a certain level. The engine would automatically, cut, then glide into a landing. Borysko has used this idea for some time and most successfully.

But even this model did not escape the tragedy. On her last flight, the model made a rough landing into some bushes. As it overturned, some of the gas ran onto the hot engine and the model promptly burst into flames. Andy, hot in pursuit, managed to stomp out the fire. But unfortunately the landing gear was burned to char wood.

The performance of Ray Heit’s model, which won the meet, was particularly outstanding because of its ability to leave the ground, take to the heights—and disappear. Ray’s misfortune lay in the fact that a woman had consented to follow his model with her car. As the ship rapidly headed for the neighboring town, the woman driver, proceeding cautiously, lost sight of it. Ray returned to the field vowing that a woman would never learn how to drive. The model buzzed on toward Plainfield. Mr. Drake, as previously told, carries the action from that point on.

On Saturday, October 3rd, was held the annual gas model competition sponsored by the Kresse Aero Club and directed by Ben Shereshaw. The weather was like typical spring, and the sky was cloaked with billowy
white clouds.

There were two events at this meet. The first was the conventional endurance tourney in which a certain percentage of fuel was allotted to each model according to its weight. The second event was a new innovation. It was a contest in which each model had to carry a pay load corresponding to one quarter of the total weight of the ship. Among the entries were Ray Heit, Maxwell Bassett, Pelham Burnet, Gerald Smith, Charles Williams, Frank Tlush, Arthur Tracey, Frank Zaic, Gordon Price, and Gilbert Rosenzweig.

Charles Williams' entry was a beautifully colored, swept twin with a motor mounted on the trailing edge of the wing. It required six months to build this model. When launched, the ship flew steadily, gained altitude, and gradually became a speck in the blue skies above. But suddenly a part was seen fluttering away from the craft, and it started on a mad plummet to the ground. Seconds that seemed like minutes passed as the model descended. The remaining several hundred feet of altitude were covered in streak-lighting fashion. The model crashed nose down, parts scattered everywhere, and the motor buried itself six inches into the ground. Up in the sky could still be seen the fluttering tail surfaces, which had come off in midair. Upon investigation it was revealed that the tail unit was attached to the booms by means of rubber strands with a small balsa chock to maintain the necessary positive incidence. The constant air flow, causing a tension on the lower side of the elevator, had finally snapped the rubber strands, and it was thus that a good model came to its end without fanfare—for it simply buried itself.

Tracey's model met with a similar fate. The reason for this crash, however, was extremely unique. While several hundred feet in the air, the wing covering on the upper right wing suddenly ripped off completely. The sudden increase of lift on the opposite side sent the model over into a tailspin and to date neither Tracey nor the model have recovered from the sudden shock.

Gerard Smith had little or no difficulty in getting his ship into the air even with the pay load. This same model was flown 77 times in one day at Prospect Park, in Brooklyn. The Brown motor in the ship had been in use for three years. Incidentally, all 77 flights were made on the same 5-cent batteries.

Ray Heit's model, as usual, headed for the clouds and was seen no more. His flight won the endurance after previously winning second place in the pay load contest. A week later, this model was recovered at Highland Park, which is a suburb of New Brunswick. What manner of luck follows this Heit model? And even better luck, but for the past half dozen flights it has shown a continued propensity to head for the nearest cloud and disappear. More remarkable is the fact that the model is always located about a week or so after its disappearance. The model originally was off to a bad start when entered in the National Meet Texaco event in Detroit this past summer. While the model was still in its crate in the workroom in the Book-Cadillac Hotel, some one had a sudden desire for a Brown engine and accordingly removed it from Heit's entry. As a result, Ray could not place at the Nationals. A few days later the model was entered at the Elmira gas model contest, which was run in conjunction with the gliding meet, was sponsored by Richard DuPont, Jr., and directed by that veteran aeromodeler, Percy Pierce, who was winning trophies as far back as 1912, for sensational flights of one thousand feet. On its first takeoff, the model disappeared over Glider Hill Number One—to win the contest with a flight of 14 minutes.

At the Kresse meet, the model again disappeared on its initial flight and won the meet. At the next contest, the model duplicated the already repeated performance and won again. But when the model was located by Mr. Drake, it was evident that it would fly no more. A bough of the tree had pierced the wing of the ship and in order to get the model down it became necessary to sever the bough and allow both to fall. The weight of the bough wrecked the model when both hit the ground.

The third meet for October was held on the 24th, sponsored by the Metropolitan Model League and directed by Irwin and Nathan Polk. The weather was quite crisp, although the wind was very low. Not many models were entered. It was, actually, an experimental meet.

Here the rules specified that each model would be allotted only 45 seconds of engine running time. If necessary, the League was ready to loan a self-timer, but it was more desirable that the entries provide their own method of self-timing in order to stimulate thought in this direction.

Most of the entries preferred to gauge their fuel. This arrangement seemed to work out remarkably well. Among those using it were Allan Turner and the aforementionedascal, Ray Heit, who appeared with a new streamlined model. As for the meet results, Theodore Kaiser ran away with the blue ribbon.

The self-timer idea seemed to be quite successful as a whole. At first there was a question as to how long a model could fly with only 45 seconds of engine run. It was soon evident that...
Presenting the Raven

YOU stick model fans may wonder, first off, where this R.O.G. got its name. "Ravens are black," we hear you say, "and judging by the color of the ship as indicated in the accompanying pictures, she should have been called the Canary."

Well, fellows, we would have made the ship black—only we feared a lot of our Pittsburgh builders would be losing their models if we gave our stick job that hue (joke). But she’s still the Raven to us—because, like that bird, she’s so mischievous. And once you have her in the air, you’ll know what we mean by that. The way the original Raven flitted about when we sent her zooming into the ozone, we thought for a while she figured we were playing the part of the scarecrow.

Anyhow, she’s a pack of fun to fly. She’ll give you many hours of sky buzzing pleasure. Of course, if she gets too tricky you can always haul out your shotgun and plug her. No court would convict you.

By Jesse Davidson

BUILDING INSTRUCTIONS

THE following depicts the Raven in the making.

A stick of hard balsa measuring 3/32" by 3/16" by 11" is shaped in the manner shown by drawing at the top of the opposite page. To the front end cement and bind with white silk thread the metal thrust bearing. The can and the rear hook, of which drawings are given in life size, are next cemented into position. A few binds of silk thread are also applied to the rear hook. All wire parts are shaped from No. 8 wire.

Both the rudder and elevator parts are cut to shape from 1/32" thickness sheet balsa. From the elevator dimensions, make a full-size drawing on any piece of stiff paper or flexible cardboard. Then after cutting out this pattern, trace it onto the piece of sheet balsa to be used for the elevator and finish the procedure by cutting it to shape with the aid of a sharp razor blade. From the drawings you will notice that the inner portions are eliminated and covered with jat tissue. After the paper has been applied over these areas, waterspray them lightly.

The rudders are made in like manner, and after they have been trimmed to shape and the inner portions removed and paper covered, they are then cut in two and each is mounted above and below the elevator surface (see top and side view drawings of the tail parts).

While the rudder parts are drying, be sure that they don’t fall off to one side. When fully dried, cement the elevator to the top of the motor stick, as shown by both side and top view drawings of the motor stick.

THE WING

WITH measurements taken from the plan, make a full-size drawing of the wing on a sheet of paper large enough to amply accommodate it. Tack down to your work bench. Shape out the required number of ribs, whose drawings are given full size. Both leading and trailing edge spars are of the same dimensions.

Now cement the ribs in position; and while they dry, shape the wing tips from 1/32" sq. bamboo. Small model making pins posted around the outer edges of these tips will assist in keeping them in position until they harden to the balsa spars.

When the wing structure is completed, make slight cracks in the center of the wings and bring the tips up evenly until the correct amount of dihedral is obtained. Apply cement generously over the cracks. Cover the top of the wing only and afterwards water-spray very lightly. Shape out the wing clips and cement them into position.

(Continued on page 94)
HOW TO MAKE PONTOONS

Gather around, all you R.O.W. and amphibian-minded model builders! For here's a corker of an article giving you the low-down on float construction. Monocoque, built-up, and contest pontoons—they're all covered here. So hop to it—

Flying Aces Model Laboratory

By Avrum Zier
Model Department Editor

In one respect, the construction of a pontoon is similar to that of a fuselage—that is, both necessitate the use of formers and stringers. But unlike the fuselage, the pontoon is simpler in that it does not have to house a rubber motor. This fact makes it possible to build your pontoon a great deal lighter than a fuselage.

Pontoon construction can be divided into two main classes: (1) the monocoque and (2) the built-up. Of these the latter is by far the more widely used, since it affords a much lighter pontoon. The former is seldom used on flying models; it is generally employed on non-flying replica ships where the weight factor is of less importance than appearance.

Aside from these two main classes we have the class of pontoons used on contest R.O.W. (rise off water) models. These pontoons are usually built very small, since they need only support the model as required by the contest rules. Their construction is extremely simple; in fact, so simple that in most cases no formers are required.

Considering pontoon construction for a replica job, the first thing that the builder is interested in knowing is the type of pontoon to use. We are, of course, assuming that the builder wishes to equip a replica model of a land plane with pontoons. In Figure 1 is shown five conventional types employed on present day airplanes. Of these, No. 4 has been found to give the least resistance, the others following in the respective order of 2, 1, 3, and 5.

Once the type has been selected, the next consideration is the length of the pontoon. In the case of a seaplane, the length is obvious; however, if the ship is not designed with pontoons, then the size must be determined. On most seaplanes you will find that the length of the pontoon is equal to the length of the fuselage, and though this rule is not always true it will give a good looking pontoon.

Assuming that both the type and size have been selected, we now come to the method of construction. As was mentioned before, there are two main classes of construction, however, each class may be built up under different methods. The methods described here in the built-up class have been developed by this department and have been found to give excellent results.

Those of you who have built pontoons in the same manner as fuselages probably recall the difficulty encountered in trying to maintain the correct alignment of the pontoon until sufficient stringers have been attached to maintain the shape. The methods described here for the built-up class take care of this.

The first method in this class calls for a jig which becomes part of the structure itself. This form of construction is illustrated in Figure 2. Thus our first step is to cut out the jig, which is generally made from 1/16" sheet balsa of medium hardness. Incidentally, it is important to remember not to cut the inside of the jig to a very narrow outline, since this will weaken the jig and cause it to break. Once the jig is broken the alignment of the pontoon is lost. On the other hand, a deep outline will necessitate a deep slot in each former which will weaken them considerably.

And so, about the best jig to construct is that using the proportional distances illustrated in Figure 2. In cutting out the formers it is advisable, however, to make each slightly larger so that if an error has been made in the layout it can be rectified.

(Continued on second following page)
TYPICAL TEMPLATE FOR MONOCOQUE PONTOON CONST.

POSITION OF STRINGERS

SECTION A-A

LAYOUT OF JIG

CHINE LINE

FRONT AND REAR BLOCKS SOLID FINISHED ON ASS'Y.

TYPICAL FORMER

BUILT IN JIG TYPE

JIG REMOVED BEFORE NOSE IS COMPLETED

TYPICAL FORMER

POSITION OF STRINGERS DETERMINED AFTER FORMERS ARE IN PLACE.

LAYOUT OF JIG

REMovable JIG TYPE

FIG. 2.
With the formers all glued in place, the next step is to attach the front and rear blocks. These blocks are first cut roughly and fitted onto the jig. After the complete pontoon is assembled they are finished off. You will notice that each block is cut with a notch so that it may slip onto the protruding portions of the jig.

With both the formers and the front and rear blocks in place, the next step is the attachment of the stringers. Stringers can be made either from 1/16" stock balsa or from bamboo. If balsa is used, then it is advisable not to go below 1/32" square stock, as the tension caused by the covering will in all probability cause bending, even breaking.

In using bamboo stringers, on the other hand, there will be a tendency for the bamboo to sag between formers unless the formers are very close together. However, in using bamboo its size should not exceed 1/32" square. In some cases, bamboo and balsa have been used together. The balsa stringers (used alternately with the bamboo) take the side load of the covering so that the bamboo merely serves to give the pontoon its shape. Since it is a very complicated job to determine the position of the stringers beforehand, it is advisable to first glue the formers in place and then actually lay the stringers on to determine their positions.

The other method for the built-up class, as illustrated in Figure 2, also employs a jig. However, the jig in this case is optional and is removed after the pontoon is completed. The jig itself is a straight piece of sheet balsa tapered at the end as shown (top view). The formers are first laid out and the notches for the jig cut. With the jig marked to indicate the former locations, the formers are slid into place. With the formers in place the stringers are next glued on. The front and rear blocks are glued directly to the formers.

In using this method, bear in mind that the jig must be taken out; therefore it is necessary to remove the jig before the nose is completed. Like the first method, the front and rear blocks are finished after the complete pontoon is assembled and covered.

Because it is necessary that the jig be removed, it is found that this method is unsatisfactory to use on some types of pontoons where the noses of the floats tend to curve in shapely. It is because of this that the first method explained is more widely used. Another disadvantage of the removable jig type of construction is that the jig must be removed before the pontoon can be completed, thus there is a possible chance that in completing the nose the alignment is lost. But while this method calls for a removable jig, if it is desired the jig may be left in. This will insures the proper alignment of the structure and will add strength to the pontoon itself.

Of the monocoque type, only one method is mentioned here, since it seems to be the most practical system of construction. A monocoque pontoon, of course, is of shell construction. The shell serves as the covering itself and takes the entire stress on the pontoon. The construction of such a float depends greatly on the builder himself, as the pontoon must be first carved out of a solid block then hollowed out.

The photograph at the top of the first page of this article illustrates the monocoque structure. The pontoons shown are of Seversky amphibian type in which wheels are housed to facilitate landings on the ground. About the best way to construct monocoque pontoons is to cut out templates for various sections along the pontoon. A typical template is illustrated in Fig 2. The pontoon block is cut until each template fits perfectly around its respective section.

With the pontoon carved in accordance with the templates, the next step is to hollow out the inside. If the pontoon is to be used on a non-flying model there is no need to carve the inside out; however, in the case of a flying model it becomes essential. The pontoon is cut-in-two along the center line. The cut should be made as fine as possible, since the two halves must be reunited. The inside of each is then hollowed out to as small a wall thickness as possible. A test of wall thickness can be made by holding the pontoon up against a bright light. If the wall thickness is very small the light will penetrate. The light test may also be used to obtain an even wall thickness throughout. The brilliance of the light should be the same throughout. If not as bright in some places as in others, then it is an indication that that particular spot is thicker.

It must be remembered that flaws in the wood may be the cause for the uneven brilliance. It is best to check this. With the pontoon completely hollowed out, the two halves are glued together and set away to dry. It may be advisable to press the halves together, giving a tight seam which is essential to the pontoon.

Once the two halves have completely dried, the last step is the finishing off of the pontoon. Because balsa wood is a very absorbent material it becomes essential to give the pontoon a water tight coating. About the best coating is banana oil.

The banana oil should be applied as follows: First, a rather heavy coat should be brushed on. This coat should be allowed to sink into balsa so that it fills up the pores.

(Continued on page 95)
Irwin Ohlsson, holder of the California State record for power models with a time of one hour and three minutes, has perfected a new gas job motor that, according to reports, is turning in some excellent flights on the Pacific Coast. An Ohlsson-designed ship bearing the new motor placed as one of the winners in the Santa Barbara contest held last July.

The engines, which are now being marketed, are manufactured by Ohlsson Miniatures, of 630 North Alvara-do, Los Angeles, California. They are sold only in the completely assembled unit form. A feature which will be appreciated by gas model builders is the plant's removable crankcase. This makes possible easy replacement of main bearings. The crankshaft of the "Miniature" is one piece and has a standard tapered pin that takes the play as the shaft wears out.

The makers state that each Ohlsson motor is block tested before it is placed on the market, also that precision finished parts are constructed with a tolerance of .0001. This tolerance is to assure close-fitting of the parts of Ohlsson motors. One of the motors, it is announced, was successfully block tested for fifty hours. The motor was designed by its manufacturers for development of 1/5" horse power. Its rated r.p.m. is between 500 and 7500.

The cylinder is constructed of alloy-steel. The piston is cast by an electric furnace. The dural finned head provides efficient cooling. The connecting rod is a drop forging with an I cross-section. The manifold is die cast and may be removed for periodic inspection. A 2 1/4 ounce bakelite case coil is designed to furnish a hot spark for quick starts.

Specifications are given as follows:

- **Stroke**: 7/8 in.
- **Bore**: 15/16 in.
- **R.P.M.**: 500 to 7,500
- **Bare engine weight**: 6 3/4 ozs.
- **Flying weight less batteries**: 11 ozs.
- **Gas capacity**: 2 ozs.

Endurance on 2 ozs. .... 20-24 min. (approx.)

The accompanying picture of the Ohlsson "Miniature" illustrates many features of the plant. While the usual mounting consists of two horizontal protruding flanges upon which the engine is bolted, the "radial mounting" of the "Miniature," so termed by the manufacturers, features direct bolting to the fuselage by three horizontal bolts arranged in radial manner. From an engineering standpoint this mounting is advantageous, since the torque set up by the engine acts against the bolts in line of single shear (a stronger arrangement) across the shank. Considering this fact no critical condition can set up sufficient stress to shear the motor from its mounting.

Note that the head of the cylinder is cooled by curved flanges. This also helps to reduce the air resistance. It can be noticed on the picture that the propeller is secured in place by four prongs extending inside the hub discs.

From the Model Builder's Workbench

U.S. Army Insignia

Model Builders, how often have you tried to make your own star insignia for that Army plane and accomplished only a bulky, ragged-looking set after much effort? Here is a method—if you are photographic minded—by which you can make all the stars that you need, all exactly the same, and of any size desired.

To start with you will need a pattern. Draw a circle of the desired size and divide the circumference into five equal parts. If you do not know how to do this by the geometrical method, use a protractor and make five 72 degree angles at the center and extend out to the circle. Next inscribe a five-pointed star by connecting the first and the third points, the second and the forth, and the fourth and the first.

New secure some thin celluloid by soaking photographic film in hot water and scraping the gelatine from both sides with a dull table knife to avoid scratching. Pin this dry sheet over the previously made drawing and copy it in India ink using a ruling pen and inking compass. An ordinary pen might be used, but the result would not be quite so neat. Then fill the star in completely with ink and also fill in a 1/16" circle around the star. This completes the insignia negative.

To print from this negative you need blue-print paper. Buy a small quantity of ferric ammonium citrate and of potassium ferricyanide from a drug store and prepare a small amount of concentrated solution of each. Mix equal parts of these and apply to thin bond paper under artificial light.

When the paper is dry, place a piece under the negative you prepared and covering both with a pane of glass to attain perfect registry, place in the direct sunlight for about three minutes. Then wash well in plain water and allow to dry. A bath in dilute hydrochloric acid will brighten the print. Red paper discs of the proper size are next.
Construct a Fokker F-36

By Nick Limber

Among the European transport airplanes produced by Tony Fokker, the F-36 is the best known. Not only is this remarkable craft praised by the Continentals but also by Americans who are traveling abroad. Indeed, one cannot help but congratulate the builders of this ship once having flown in it. Its roomy cabin and sleeping compartment have made the traveling public comfortable on long trips to the Mediterranean countries and to the Orient. Its clean lines and ample size will undoubtedly make it popular with you solid model builders, too.

Before starting construction it will be wise to study the plans carefully and to decide upon the size of your model. As the scale given is in inches (see Plan 1) it will be easy for the builder either to enlarge the model or work with the size ship given.

**Fuselage**

First trace the side view of the body on a balsa block the length of the fuselage. When this is completed cut away the excess balsa outside the line drawn and proceed to trace and cut away the top view. Once the side and top views have been cut away you are then ready to shape the fuselage, as illustrated in the various cross sections (Plan 1).

At this point it would also be advisable to construct cardboard templates from which the proper contours of the body may be shaped out. As you cut away the body, as indicated at the various cross sections, you simply hold the template in place against the fuselage and with it you will see when the proper shape has been obtained. This completed, the builder may proceed to sandpaper the body to get a smooth surface.

When the surface has been finished properly, you next outline the doors and windows of the ship. A sharp instrument will prove very useful in this work. After the windows have been “checked” in, the builder may dope the body several times, sandpapering it after each coat. The doping process continues until the desired smooth, glossy surface has been obtained. The amount of dope will vary according to the type of balsa used.

**Tail Unit**

With the fuselage completed we turn our attention to the tail unit. The rudder and the elevators are made of soft balsa sheet and sandpapered in a streamlined shape. The movable portions of the empennage may be separated from the stationary by thin grooves or black lines after painting. To get the rib effect, thread is glued to the surface of the tail. After the thread is cemented you dope the tail unit until the proper surface has been obtained. This done, you next proceed to cement the tail to the fuselage. It would be wise to use tooth picks to hold the tail to the fuselage in addition to the cement. Moreover, you should first attach the rudder, then the elevators.

**Wings and Motor Nacelles**

Our next step in the construction of our model will be the building of the wing. This may be carved and shaped in either one piece or in two.

First draw the top view of the wing on the plank of balsa selected for this purpose. Next, cut away the excess balsa and proceed to taper the wing by referring to the front view of the model. Then sand the wing and give it the proper airfoil section. The sections of the wing are included in the drawings and should not prove hard to form. Now we sandpaper the wing and proceed to dope it. Be sure, however, that the aileron and landing flap grooves have first been applied.

When the builder is satisfied with the surface, he should proceed with the motor nacelles. Drawings of the nacelles are furnished, and with a little care it will be a simple matter to build them. The modeler is advised to use a very sharp instrument in their carving and to be extremely careful when cutting out the portion that rests on the leading edge of the wing.

If you find that the nacelles are a little too large to fit tightly on the leading edge of the wing, use plastic wood to remedy the situation. Plastic wood may also be used as a fillet between the body and wing when they are assembled.

**Engines and Other Details**

When the wing has been assembled and cemented to the fuselage glue into place four engines and cowlings. The engines and cowlings may be purchased at any model airplane supply house.

Our next step will be the construction of the landing gear. By referring to the front and side views of the ship, this, too, may be easily constructed. The wheels are then placed on the struts and other details are added. The radio aerial, pitot tube, landing lights, and avigation (Continued on page 96)
Model Workbench
(Continued from page 63)

cut and pasted in the centers of the dry prints which are cut out to complete the proper insignia of the United States Army.

Please do not say that the insignia are not worth the trouble of making, especially if you are one of those modelers who have a mania for gluing stars on everything from a six-inch glider to a ten-foot gas job! Once the negatives are prepared the rest is easy.

—JOHN DALLAIRE, JR.

A SLEW OF HINTS

MOST fellows at some time or other have taken an old Ford coil apart to have some fun with the "wire-wire." However, few have ever used the bundle of core-wire contained therein. I have used these wires in making the wing tips, tail surface tips, and many other curved parts on scale models—cause they are easily formed to the desired shapes and will never warp in the way bamboo sometimes does.

Moreover, the foil in these old coils can be used to cover solid models, to give them an all-metal finish. Tea wrappers may also serve this purpose, and they have paper glued to their backs so they will naturally hold better.

Large scale models are easy to equip with electric lights, but lighting outfits are often expensive. However, here is a cheap and dependable outfit I have installed in a four-foot Stinson! For sockets I used the sockets from old flashlights. To these I soldered wires, running them to a flashlight located in the fuselage baggage compartment. Then I soldered the ends of these wires to the dry cells. When I wanted the lights for built-in use, I merely opened the baggage door and snapped the switch in the flashlight, which operated three flying lights, a dome light, and a dash light.

In building large models of bombers, the difficulty of making transparent gun turrets can be overcome by obtaining medicine capsules. You can get them in all sizes.

Perhaps, too, you have a friend who is a jeweller. One I know gave me some old balance wheels that were shaped exactly like the new control wheels.

Old teeth make excellent cylinders; and springs and valve cores make good shock absorbers.

To get stringers on evenly, I pin twine along the formers; then when the proper shape is obtained, I mark their positions with a pencil. Then removing the string I have the positions of the stringers.

—EVER WILSON

How to Make Scaarf Rings

ROUND reed or rattan is good for making scarpf rings for mounting guns of the Lewis and Parabellum type on two-seater and bomber models, but this material is hard to bend into a perfect circle by ordinary means. Here, however, is a method you might try. Wet the reed and wind it around a small bottle or can of the desired size, leaving about half an inch overlap. This overlap is to be used for a long tapering joint when cemented. Secure the reed at two surgeons' adhesive tape. Then warm it carefully over a flame, watching to see or three points with narrow ribbons of that the moisture sizzles out of the reed but that the flame does not char. Turn it around slowly until the whole circle is dried out. Then take it off and cement the ends together with a tapered joint.

—JOSEPH F. MORRIS.

SIX SHORT-CUTS

Perhaps some of these short-cuts I’ve gone in for in model building will prove of benefit to other readers of FLYING ACES:

1. A good paint job on a model makes all the difference in the world in the appearance. Your paint, if not applied just right, more than likely will show brush streaks. An excellent dapping job of any sort of a model, but especially on flying scale ships, can be accomplished by using an insect spray gun and a mixture of one-half brushing lacquer and one-half lacquer thinner. A little practice on an old wing or fuselage will give you the hang of the thing and help you to determine just how far you should hold the nozzle from the surface to be sprayed.

2. Cylinders and crankcases for radial and rotary engines can be “turned” lathe fashion on an old electric fan motor with surprising ease. Remove the fan blades and use the protruding shaft to spin the parts on. The wood can be made to adhere to the shaft tightly by moistening the area around the hole made in the wood to admit the shaft. The piece is forced on before the swelling is completed. After the wood is sanded to cylindrical shape the general outline of the engine cylinder is sanded. The cooling flanges are cut in by using a needle or pin in the jaws of a pair of round nosed pliers as a cutting tool.

3. Rubber tired wheels can be made by turning the balsa centers on a fan motor, as described in the preceding paragraph. The actual tire is made

(Continued on page 99)

Attention Model Builders!

FLYING ACES wants plans and directions for building flying scale models of the latest modern planes. In order to be printed in this magazine, drawings must be done in India ink, and must fit a 7 x 10-inch page. Plans should not exceed six pages. Photographs of completed models must accompany plans. Send in your work, model builders, and get it printed! Payment is made for accepted plans.

HERE’S THE ALL-ACE LINE-UP

FOR THE

NEXT GREAT FLYING ACES

FICTION—“Richard Knight” in a thrilling novel of death in equatorial skies. "Kerry Keen" and the secret of the flying tanks—a top-notch, action-packed air yarn. And good old Phinex in “Leave La France”—another high-revving, rip-roaring, laugh riot.

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MODEL BUILDING—Full plans for a flying scale model of Frank Hawks’ sleek new “Time Flies” speedster; How to build a swell ski plane; Plans for a solid model B J Fighter; Hints on adjusting models; And another top-flight feature for our gas modelers.

IN THE

MARCH FLYING ACES

ON SALE

JANUARY 25th
Simple to build, a great climber, and practically unbreakable — those are just a few of the good points about this perennial-favorite stick model we've dug up for our R.O.G. fans. Yes, the "Dart" is a crackerjack flyer, and you'll find it easy to follow the plans and directions given here —

By Julius Unrath

The Flying Aces R.O.G. "Dart"

AGAIN FLYING ACES gives its readers something unusual and surprising. This time it's a 24" all-balsa R.O.G. with a new type of construction which makes the building of this model extremely simple. The flying ability of the "Dart" is unusual, to say the least. To date, it has made approximately 200 flights with no more damage than a small nick in the propeller when it flew head-on into a parked car.

The model will take off in approximately four inches, then climb very steeply for 20 or 30 seconds, after which it will level out a little and continue climbing, if conditions are favorable, to better than 500 feet. Due to the model's weight, the glide is very fast, but the cambered wing and low degree of incidence give it a very flat glide. This type of glide makes this model ideally suited for outdoor flying. Care must be taken, however, to see that the flying surfaces are true. Otherwise the speed of the model will be detrimental rather than helpful.

FUSELAGE

THE fuselage of the "Dart" is constructed entirely of 1/32" flat balsa. The sides are shaped as shown in the drawing, while the top and bottom pieces are 1/2" wide the entire length of the fuselage. Begin by cutting out the sides. After this is done, the top and bottom pieces should be cut. The fuselage is assembled by cementing the sides to the top pieces. The bottom piece is then cemented on. Make sure that the edges are flush and that the cross-section of the fuselage forms a square.

The ends of the fuselage are reinforced with 1/32" balsa. The nose and tail blocks are cut to shape and a square of balsa, the inside diameter of the fuselage, is cemented to them. The bearing for the nose block is made by inserting an eyelet into a large washer and cementing it to the nose block.

WING

THE wing is built by a new type of construction. Begin by cutting the two wing panels to shape from 1/32" sheet balsa. From 3/64" flat bamboo (which has been bent to the correct airfoil shape), split the required number of ribs (3/64" sq.) and cement them in the correct places. When the cement has thoroughly set, the ends should be carefully cut and sanded flush with the trailing edge. The leading and trailing edges (1/8" x 1/8") are cemented in place and shaped. The wings are now ready to be cemented together to obtain the correct dihedral angle of 2°.

TAIL SURFACES AND PROPELLER

THE tail surfaces are constructed in the same manner as the wing, and no difficulty should be encountered. The propeller is cut from a block (1/4" x 1/4" x 11") to the shape shown in the drawing. The propeller shaft, like all wire fittings, is bent from .034 wire.

ASSEMBLING AND FLYING

THE landing gear, which has been constructed of .034 wire and fairied with balsa, is cemented firmly in place. The tail surfaces are cemented in their proper positions and aligned. The wing is fastened to suit the builder. The following methods may be used:

(1) Wing clips that pass under the fuselage.

(2) Wing blocks and rubber bands.

The most important thing to remember is that the wing has 1/16" positive incidence.

The original model was colored yellow with black details. Aniline was used for yellow and lacquer for black.

The model is now ready for flying. Six to eight strands of rubber should be used. First test the model by the gliding method; then wind it fully (800-1,000) and be prepared to witness some real cross-country flying.

Please enclose stamp when asking for information.

Next Month —

You'll Want to Build

"Time Flies" — Frank Hawks' New Speedster

The B/J XF3J Navy Fighter

and Others

Don't Miss These Model Plans in FLYING ACES

Next Month!
Airfoil

True length of landing gear struts:

Tread is 8½
Secret of the Cyclops

(Continued from page 8)

Hours had passed but there was still no trace of Rear-Admiral Blanchard's Seversky. It had not turned up at San Diego; in fact, no report had been received of it from any source. The Admiral's men, having thrown the rest of the fleet, was frantic. But trying to keep a cheery countenance, he explained that Benson would turn up okay. He always did.

Could the Admiral have seen what was really happening to his beloved ship? It seemed to have thrown several forms of the noted Blanchard fits. Unknown to him, his Seversky was, by noon, a wallowing wreck, flapping about on the white-capped combers of the Pacific ten miles off shore. It was a hopeless derelict, bobbing and swishing under the lash of the ocean!

* * *

BUT what of the Cressfords?

That spat of gunfire which had virtually lifted their craft from the water had bitten a chunk out of the starboard pontoon. Cressford then quickly tried to get off, but the punctured float began to ship water, and as it filled and leaped lower under the waves, the plane screwed around in a dangerous surface loop. Cressford swore roundly, tried again. But he had to be content with holding on hard rudder against the pull of the pontoon with the hope that he could get away from the submarine and seek shelter in the surging crests of the rollers. While he worked, Lonny yelled to him.

“What happened?”

“We stopped a chunk of that stuff and it’s pulling us around.”

“Can’t you get her up on the step?”

“I’m in these waters. We’re licked!”

“What about Mr. Benson?”

“I hate to think about it.”

The pontoon of the Seversky only wallowed deeper and deeper. They were having a bad time of it, but Cressford continued to try. He was glad they had been well away from the submarine when it first came to the surface, but he realized that since the Seversky was helpless the undersea craft would soon follow up its fine fire by tracking them down, provided a shell did not sink them outright. Still, the submarine was now hidden behind the lashing hills of water.

Suddenly Lonny yelled: “Look! Look over there!”

Cressford, fighting the rudder and nose of the Seversky, glanced to where Lonny pointed. He saw the motor boat which had first attracted their attention. It was swaying and rolling in a deep trough of black-green water.

“Holy smoke! There’s our chance. I’m going over to it.”

Without another word, Cressford for the Seversky again, brought his boat around so that he could be plunged on the cabin top of the wallowing boat. “Get over and see what’s going on,” he called to Lonny.

“You stay with me, though,” Lonny chided.

It took but a few minutes for Lonny to go over her. There was no one aboard and not a drop of fuel in the tanks. He came up with a length of spiral hose and yelled to his father.

“Break the three-way cock connection and run the gas down this. I’ll put my end into the tank. We’ll get her moving then.”

The elder Cressford threw Lonny a line and they quickly lashed the plane and the motorboat together. Then he hammered the copper fuel line apart and let the gas trickle through the hose Lonny had thrown him. That was too slow, however, so they crawled down, opened the drain vent of the main tank which was set in the center-section of the big wing, and held the open end of the hose there. In about four minutes they had transferred the greater part of 60 gallons from the Seversky to the motor boat. Then before they cast the seaplane adrift, Lonny salvaged the rear gun and all the available ammunition. Finally they dropped down in the boat’s cockpit and took stock of their new charge.

Once the elder Cressford dropped inside, he knew what the motor-boat represented. He let out a low whistle, glanced about to make sure he was not throwing a false alarm in the control panel in the rear cockpit.

He fingered with the starting magneto, pressed the starter, and quickly flipped over on to the regular mags. The Thornycroft caught at once with a strange, almost silent hiss. The craft whipped around and leaped up a roller like some mad shark.

“What is this . . . ?” gasped Cressford, as he snatched at Lonny who almost went overboard. “What the deuce!”

The big boat climbed the roller and all but leaped off into space. The nose came down and rammed into the next roller like a massive dart. Cressford flicked the throttle back, finally got her under control, then let her swerve gently over the green waters until he could get some idea of what it was all about.

“She doesn’t make any noise,” cried Lonny breathlessly. “What does it?”

“You’ve got me. Here, take this tiller until I can go down and figure it out.”

In about a minute . . . Look!” yelled Lonny.

The elder Cressford peered over the raised section of the cabin on which was set a low, rakish glass wind-screen. There ahead of them loomed the sub-marine they had been attempting to elude. In their eagerness to get the motor-boat in action, they had completely forgotten the sub.

Lonny nodded. But he was complete master of the situation. “Hold her dead on that sub—dead on until we are within fifty feet of it,” he cried. “I’ll show you something.”

Lonny nodded and gripped the spoke of his motor boat. He could see indistinct figures ranged along the deck of the Japanese submarine. He hung on while the elder Cressford yanked the throttle down slightly, then dropped into a lower well on the right. There were four gleaming bright steel levers in that well, and Cressford grasped one while he peered along a rifle-type sight that was built through the glass windscreen.

“What’s that?” yelled Lonnie, giving the array of levers a glance.

“You keep your eyes on your steering. Aim straight for the conning tower. I’ll tell you what to do.”

“Rest. . . rest? . . . what? There’s Mr. Benson on the deck—Look out!”

“He’d better start moving if he knows what’s good for him,” barked Cressford the elder. “Here goes!”

The amazing motor boat was hurtling through the waves, with the motorboat grinding against a jerk forward. There was a loud seedy hiss and the elder Cressford yelled: “Hard over to the right! . . . Hard!”

Lonny wrenched at the wheel and the hurtling motorboat rolled over on its side, turned sharply. They could see the faces of the men on the deck of the submarine. They saw Buzz suddenly dart clear, race down the flat deck, and hurl himself over the sharp prow of the undersea boat. And just then a terrific explosion blanketed out the coming tower!

Lonny was unable to comprehend. He let his father shove him aside and snatch at the whirling steering wheel. The air was full of debris, flailing water, and the twisting bodies of men.

The motorboat ran in a wide circle, and Cressford eased back on the throttle, rounded her again, and watched for the white coverall arm of Benson.

Finally they glimpsed him splashing up a green comber, then he disappeared. Lonny snatched at a light life-preserver and drew the coil of rope clear from the rack. The next time they came around, they saw him clearly, fighting to stay afloat. Lonny’s heave was almost perfect, for the life preserver slapped the water not ten feet from Benson’s bobbing head. In half a dozen strokes he was clinging to it, and Lonny started tugging. In a few minutes they were able to drag him over the curved gunwale.

“Keep clear,” gasped Buzz as he flopped inside almost exhausted. “They’ve got a boat out there . . . big enough to pick up any that get out of that . . . Keep clear.”

“We can’t let them drown,” argued
Cressford grimly eying the debacle.

"No, we won't, but there won't be enough to save. Keep clear!"

Buzz lay back semi-conscious, let his weary eyes slowly wander over the cockpit and the gadgets that were visible. He smiled wanly, lay back.

"Keep clear," he muttered again.

Cressford nevertheless tried to save a few of the sub survivors, but they were only broken bodies, wretchedly battered by the force of the strange explosion. An ominous oil patch had come up, throwing a weird design on the wallowing water. The stern of the sub flut- tered up, and there was a flash of a bronze screw—then she went down with a chug of escaping air.

Cressford went around twice, but could find no one to save. Not even the folding boat and the crew that had been across to the Kawanishi.

"What is it, a C.M.B.?” asked Buzz when everything was under control again.

"Right! A C.M.B.—but not one of ours. Look at the plates over the dials. All in Japanese.”

"Japanese?...Japanese?..." Buzz argued. "I was talking to Rear-Admiral Blanchard about these things. Only the British, U.S., and Italy have them."

"Well, maybe it’s one of ours with the dial plates in Japanese just to make it look like a C.M.B. to somebody in Cressford."

"Say, do you realize what this means?” demanded Buzz, crawling to his soaked knees. "If they have these things—that is, many of them—they can raise Cain with our big vessels. Don’t you realize that there is not a round-dirt gun aboard any vessel in our Navy that has a low enough angle to even fire a shot at these things. They are all high-angle mounts—for anti-aircraft work."

"Sure, I know that. I read what happened in the Mediterranean months ago when the Italian Navy suddenly produced a flock of them. The British had to calm down on the Navy stuff and shift their vessels back to Gibraltar where they changed the one-pounder and three-inch mountings to cope with these boats."

"Do you two gentlemen,” broke in Lonny, "object to getting me in on this? What is a C.M.B. and what was it we sunk that submarine with?"

"Sorry, Lonny,” grinned Buzz. "The development of these things was a little before your time. Such craft were first used in the Great War by the British Navy. They are high-speed motor boats carrying at least two 18-inch torpedoes & surprise attacks on enemy vessels. Then they carry at least two depth-charges—these "ash-cans" back there on the Y-gun, you know—and also several machine guns stowed away somewhere."

"When we actually discharged a torpedo?"

"It was sent off from its tube by compressed air and of course its velocity was increased by the inertia given by the speed of the boat. Once it is discharged, you simply pull the helm of your C.M.B. over, run away, and ‘watch the fun,’ as a hard-boiled sailor would say.

"Fun?” said Lonny with a serious mein. "That wasn’t much fun for those poor birds out there.”

"No, you’re right. But I liked it—for yours truly was in a pretty bad spot for a few minutes,” said Buzz, staring about. "I only had a bunch which was actually happening, but when I saw this boat plunging for the sub, I knew that she was either out of control, or there was something sticky in Denmark. The only thing for me to do was to heat it."

"What were they going to do with that Kawanishi?” asked Cressford.

"You’ll never guess. Take me before our old friend the Viper. How do you like that?"

"The Viper? Then he did get away after all! Where is he now? Shall we look for him?”

"I don’t know. You birds didn’t give me time to find out," said Buzz. "At first I thought he was aboard the sub itself, but when they held me on the deck and then began to warp the Kawanishi over, I figured they planned to take me to him by air."

"We blew Cressford. "The Viper is still on the job, the Japanese are using C.M.B.s, and—"

"And we sank the Admiral’s pet Seversky," broke in Lonny.

CHAPTER III

PARALYZED PLANES

They were still circling the great oil patch as they conversed and tried to lay out a plan of action.

Twice they passed the lonely Kawanishi. It looked like the grimmest of the sea. Buzz had now clambered out of much of his heavy wet clothing and had borrowed Cressford’s dry coverall to keep himself reasonably warm.

They eased down to conserve fuel and pondered on the situation. They studied the boat and discovered that the tubes still contained one torpedo. The problem was whether to attempt to get back to the Yorktown and warn the Rear-Admiral or to go into San Diego and get the Cressfords ashore as originally planned.

"What are we going to do about the Kawanishi?” said Lonny to add to the dilemma.

Both Buzz and Cressford tried to figure that one.

"If we go charging after the Yorktown,” said Buzz, "we stand a chance of being fired on before we can identify ourselves. On the other hand we probably do not have enough fuel to make it.”

"There’s no radio aboard this thing. She’s wired for it, but the set has been taken out," Cressford added to the fund of information.

"We can make San Diego, of course, and we should,” Benson went on. "But I don’t like leaving that Jap plane, either."

"What shape is she in?”

"She looked all right—the cockpit’s a butcher’s shop, of course, but she must have been okay for that guy to get her down like that.

"I can’t get over that Viper man,” chipped in Lonny.

"I don’t like that, either,” Buzz muttered. "Then he suddenly broke out with a new idea. "What about the radio in the Kawanishi?”

"Without another word, Cressford steered the big motor boat over to the bobbing seaplane and they lashed the two together. Cressford, who was an expert on radio, clambered over and made an inspection of the rear cockpits of the Japanese plane. He grinned back and they knew he had discovered something.

"You get that hose going again, Lonny,” he barked. "There’s gas here, and we can use all the fuel we can get. We’ll get back to the Yorktown yet."

"Wait a minute,” argued Buzz. "We can’t catch her in this. The Yorktown’s doing well over thirty knots now and we can’t do much better than forty in this thing."

"Well, we’ve got to get to the Yorktown somehow. There’s no radio aboard this thing, either. I wonder how to account for that,” yelled Cressford.

"How much gas aboard?”

"The tank’s more than half full."

"Okay I’ll take her to the Yorktown. You and Lonny can go on to San Di-ego.”

"I don’t like that idea,” moaned the youngster.

"There’s no other way out, Lonny,” explained Buzz. "We’ve got to warn the Navy, somehow, about these C.M.B.s. This situation is serious."

"Yeh, but what about you? Flying a Jap ship smack into the middle of the U.S. Navy.”

"That’s one of the chances I’ll have to take."

"Okay, if you say so, Mr. Benson," said Lonny. "And of course we—"

"No evasions, now,” interrupted Buzz. "You two will have all you can do to get this tub into San Diego, remember."

Cressford had climbed into the cockpit of the Kawanishi and had started the B.M.W. motor. As it warmed up, Buzz drew on his parachute harness, which was still dripping, and now prepared to go aboard the seaplane.

"Well, so long, Lonny," said Buzz off-
erding his hand. "We've had a lot of excitement together and you've been a great scout. Back to school for you now. You can't expect to do this sort of thing all your days, you know."

"So long, Mr. Benson—and thanks for all the fun. I'll see you when you get back, I hope."

"I'm not sure when you get back to school!" grinned Buzz, rubbing the boy's thick thatch of blond hair. "Well, I must be off."

"So long, Mr. Benson. Best of luck."

"Thanks."

And with that Buzz crawled along the wing and stood on the root rope while Cressford scrambled out and left the cockpit clear for him."

"She'll just make about it, if you're not interfered with," Cressford said."

"Get going!"

There was no unnecessary farewell business. They simply clasped hands.

Buzz climbed in, looked over the neat array of dials and controls, and found the throttle.

"Let's go," he grinned.

Cressford slapped him across the shoulders, grinned broadly, and went back to the motor boat. With he shoved the Kawaniashi clear and Buzz gave her the gun. The feel of the controls was similar to that of the late lamented Seversky. He had no trouble in taking her up a roller and getting her on the step. With a lurch she went down from the side, the feeling of a swell, up again, and was in the air.

Buzz climbed her for some time, then tried her on the turn. She came around nicely, and he saw the big motor boat below circles about with a great swarm and head for the east. Buzz waved over them, then turned in the opposite direction.

"Well, I hope we've finally sent Lonny on his way," he muttered.

BUZZ flew the Kawaniashi carefully for the first ten or fifteen minutes. He had no idea how badly she had hit, and there was no use in taking chances with her. His main idea now was to get to the Yorktown as fast as he could and advise the fleet commanders of what was going on.

He set his course on the chart position Rear-Admiral Blanchard had given him, climbing to about 3,000 feet and nursing his fuel all the time, he managed to make 150 m.p.h. For nearly an hour he hustled on, trying, as he flew to fathom all the incidents that had come up since they had left the deck of the Yorktown three hours before. Amazing things had taken place!

Then suddenly the dim outlines of the Fleet riding in line-astern came into view. A glorious display of naval might! Grim battle ships and frowning cruisers, with jaunty destroyers deployed out fannedash to protect the carriers. Buzz turned to watch for skulking submarines.

"Now what?" Buzz asked himself. "All I have to do is get down on the deck of the Yorktown and say my piece—in a Jap fighting plane. That's going to be a big order."

He raced ahead, hoping to signal the Yorktown quickly before anyone could have a chance to throw a Vought V-177 up in the air or fire a Grumman fighter off a carrier deck. As he approached, however, he sensed that something was decidedly wrong. There wasn't a plane of any kind bearing U.S. Navy insignia anywhere in the air! His Kawaniashi alone was in the sky!

BRR-OOM! PUNG! . . . PUNG! Spats of black and yellow were slapped against the sky. The Archie gunners were at it—against him!

BRR-OOM! BRR-OOM! A full salvo from a battleship directly ahead crashed about him, made the Yorktown shudder. Buzz flipped the stick around, slipped it through, and hurled for the Yorktown which was keeping station well off to the south amid a convoy of speeding destroyers.

BRR-O-O-OOM! Another salvo of three-inch stuff blasted all around him—but Buzz had to risk it. He ripped off his helmet, scribbled a note on a piece of Navy chart.

Next, he tore a hole through the paper and threaded the chin strap of his helmet through the hole and buckled it. Then he weighted the helmet with a small pocket knife and raced for the deck of the carrier.

Now they threw everything at him from a variety of three-inchers, one-pound Q-F guns, and light machine guns. The sky was speckled with smoke blotches. The air screamed with spitting shrapnel, and through it all was drawn a crazy-quilt design of tracers from the M.G. turrets. The Kawaniashi sang, squeaked and grunted under the battering. Still Buzz could not get it out of his mind that there were no planes in the air.

Kawaniashi.

Another blinding belch of smoke, and a yolk of flame. But the Kawaniashi slammed through the lot and came out dead over the control tower of the Yorktown. With a quick flip of his hand, Buzz hurled the helmet over the side and watched it fly down toward the sea.

It seemed to waver for an instant over the grimm, black-smoked funnels, but the hot air blast from the furnaces below caught it, hurled it away. It flickered in the air for several seconds, then fell with a slap a few inches in the stern lip of the Yorktown's flight-deck.

Three bluejackets raced for it and retrieved it just in time.

Meanwhile, Buzz streaked away, darting back and forth through the bashes of gunfire that came up from the destroyers. Almost instantly fire ceased aboard the Yorktown, and Buzz knew that within a few seconds Rear-Admiral Blanchard would give a fleet signal that would silence the guns throughout the rest of the convoy.

The big panel in front of the Yorktown's control tower flashed quickly. A signalman leaned far out on the bridge, flapped his flags. Soon the firing ceased entirely.

Buzz awaited the signal from the deck and saw the Yorktown slacken speed. Her screws churned up the water into a massive milky foam and he knew the engine had been put in reverse. A boom swung out from the freeboard deck and he knew they were awaiting him.

He put the Kawaniashi down carefully as the Yorktown lost headway and let her ease up under the swinging boom. They was lowered and Buzz flipped the hooks into the shackles that were built into the center-section. In a few minutes the Japanese seaplane was being hoisted aboard.

In a puzzled ring of officers, pilots, and mechanics on the flight deck stood Rear-Admiral Blanchard. The plane was lowered and the shackles released. Buzz climbed down while a crew of mechanics clambered all over the ship, ripped away the motor cowling, and peered inside.

"How do you do it?" demanded the Rear-Admiral.

"Do what?" grinnned Buzz.

"Fly!"

"Fly? What do you mean," said Buzz, sensing that something was coming.

"Don't you realize that there isn't a U.S. Navy plane in the air?" the Admiral inquired.

"I . . . I wondered about that. What's up?"

"That's what we'd like to find out. Not a Navy plane anywhere in the fleet can be started. Where did you get this thing?"

"You can't start a plane in the fleet?" gragged Buzz hollowly. "Why that sounds crazy!"

"Crazy or not, that's what has happened. They've done something to every electrically fired engine in our fleet. Not a single plane can take off. How the hell does yours fly?"

BUZZ rattled off his experiences, explained how he came to arrive back in a Japanese plane after having taken off in the Seversky.

"Then Mangu Khan is not dead."

"Hush! the Admiral, watching the Yorktown gain speed again and race for her station. "That, perhaps, explains some things. But not that." He pointed to the Kawaniashi, where a number of officers and mechanics were attempting to discover the secret of the black-out of ignition.

Buzz jumped, peered about in the cockpit. There he found a switch that seemed to have no real connection with anything. He climbed underneath, traced the wiring that led to a small black enameled box with a bakelite plate on each side. He found this gadget dotted with small brass screws, bolts, and little brass hinges. It was fitted into the main high tension line between the secondary windings and the distributor—for no particular reason that Buzz could see.

"She's getting the juice through from the generator," Buzz said, "but then
this device seems to be hooked in here. I can't figure out why."

"Cut it out, then try to start the motor again," one of the young pilots suggested.

Buzz took a pair of plyers, loosened the terminals of the strange box, then tried to start the still-warm motor. The starter whirled the prop, but nothing happened. They all stared at each other.

"Hook that gadget in again," Buzz ordered. A mechanic leaped to his bidding. In a minute he came from under the plane and nodded. They wound the inverter starter again and Buzz pressed the button. She whirred, then caught with a roar.

"Whatever it is, that's it," said Buzz. "All we need is one of those things for every plane in the fleet. Right?"

He shut her off, climbed down again. The Rear-Admiral was a weary, puzzled man.

"What do you make of it?" he finally said.

"I don't know. It can only mean that they have discovered some means of killing all forms of ignition systems short and out of the way, and that they allow their own planes to fly through development of a gadget that jumps the effect of the ray—if that's what it is—somewhere between the secondary winding of the coil and the distributor." Buzz—Admiral Blanchard jabbed a pencil on a pocket message pad and had the information radiated throughout the fleet.

"Wait a minute," he suddenly barked. "How did the Seversky act back there?"

"She flew all the way—that is, to within ten miles of the shoreline. But that was some three hours ago. Probably this thing does not have as wide a range as that."

"You say this motor boat started all right, too?"

"Yes. When I left the Crossfords, they were high-tailing it for San Diego."

"The boat was fitted with an electric-ignition engine?"

"Sure, a Thornycroft."

"I'll be dammed—the same as our C.M.B.s!"

"Have you contacted the enemy fleet yet?" asked Buzz.

"No, how can we? We can't put a plane into the air."

Then you're all just running blind—and nowhere?" Buzz snapped.

"What can we do?"

"If I had anything to do with it, I'd turn back and try to get out of the area affected by this ray, or whatever it is they are using to blank out your ignition systems. You can't fight a naval engagement without aircraft of some kind. I'll be dark soon and you might run into these Japanese boats and—well, it seems foolish to me."

"We can't run back," the Rear-Admiral cried.

"Why can't you? That's the only thing you can do just now. If you wait much longer, you won't have anything left under you to run back with."

The Admiral was plainly worried. He snatched out another message pad, scribbled a note, and handed it to his Flag-Officer, Lieutenant-Commander Howard Jepson, ordering him to translate it into a Navy code and have it radiated to the Fleet Admiral.

"I can only suggest it," Blanchard said. "Buzz is a lot of fun, but he's crazy, too. We had about a dozen out when this business started. We managed to pick up the crews, but the planes were total losses. You have the only plane in the fleet that will fly."

"Well, then it's up to me, eh?" growled Buzz. "Or do you want to rip that thing down and see what makes it tick?"

"That's another problem. What should we do? We need someone up there, and we ought to find out what makes your bus fly while ours won't."

"That's the decision you'll have to make, Admiral," Buzz said.

BUZZ was taken back to the Staff Officers' quarters and given a complete new outfit and a chance to really dry himself. A good hot meal awaited him, and he ate in solid comfort while the Admiral paced his chart room, hurrying messages from one flotilla leader to another.

In a short time he came back to Buzz, said that Fleet Admiral Kincad had decided to turn back and attempt to get out of the "dead-ignition" area. Not that he was running away, but that as long as he could not get aerial scouting, he deemed it the better part of valor to play safe.

"That I should live to see the day that any fleet could make the United States Navy run back to its shores," smirked Rear-Admiral Blanchard. "What's the Navy coming to?"

"Well, perhaps some of you shell-back surface vessel officers will now appreciate the flying service," snorted Buzz. "You and your old battle wagons. All blind, running in circles without the flying support that lets you hit home."

"If you think I believe that flying men are of no use to the Navy, what the devil do you think I am doing, running this damned tub—an aircraft carrier?" snorted the Admiral.

"You win," laughed Buzz, "you're a swell guy, sir. But what are we going to do now?"

"You go up on deck and see. We've daubed out the Japanese insignia so that you will no longer be fired on by your own side, and you and my man Jepson, here, can go out and find the enemy fleet."

"Then you are not going to take that gadget apart and find out what makes it work?"

"No, that would take too much time just now, and we might not be able to get it back together again in time to do any good. But I hope you realize what a load you are carrying. You've got the only plane in service in the whole U.S. fleet!"

"Have your experts any idea what it is that is blanking out the ignition systems?" asked Buzz as he got up from the table of this ray—or whatever it is—between the fleet and the Japanese coastline. "If it is coming from some point between us and the mainland, it may not cover such a great area."

"Then, Lordy!" spluttered Blanchard, "you don't think we have the enemy between us and the California coast, do you?"

"Well, you can't laugh off that submarine. It was close enough to the mainland to toss oranges into Hollywood," gagged Buzz.

"We'll be scared stiff until we actually stop that thing. How would you like to take off, knowing full well that some bird miles away can shut your motor off for you whenever he feels like throwing a switch?"

Buzz stopped dead in his tracks.

"Holy mackerel! I never thought of that!"

And for the first time, Benson realized the full significance of the ray that had put every service plane out of commission. It was a form of silent death, an invisible ghost that jabbed its talons deep into the hearts of men. It brought a crushing fear that made gallant Navy pilots cringe at the thought of taking off again over the lip of a flight deck. They could see themselves dropping over the edge into the sea, to be racing carrier to be chummed to death under the prow of the great steel hull or slashed to pulp by the great screws at the stern.

Should there be a few minutes respite from the effect of the grim ray,
FLYING ACES

February, 1937

they would be expected to take off at once, but no one could tell when the bell would ring and they would have to leave. Maybe there was a war. Maybe they were fighting with the Allies. Maybe the Germans were coming. Maybe they were fighting with the Russians. It was hard to tell. But what was certain was that they were going to die. They had been placed in the ship, nodded their heads.

"All set?" suddenly asked Buzz.

"All set, Jepson. You're ready?"

"I'll be the sand-bag. You take her. You've already flown her. Suits me okay."

The Rear-Admiral came up again, slapping Buzz a chart position indicating the probable position of the Yorktown at every hour for the next four hours. The Fleet had already completed its full turn and was now heading due east. The Yorktown flashed her signal to the destroyers and began to slow down to put the Kawanishi overboard. They fixed the target, and the derrick squealed when they put steam on her winch. The seaplane rose from the deck, the boom swung over, and they were lowered gently and dropped on the water. Buzz closed the hooks. The tackle was raised and he started the motor.

With no trouble at all, she kicked over, burst into a boom of power, and Buzz eased her away from the suction swells that rolled off the grim sides of the Yorktown.

"Best of luck!" bellowed the Admiral from the wing of his control tower.

"Thanks!" said Jepson.

But Buzz was still easing her clear and preparing to get away. He had no time for farewells. He was out to get the Viper and his blankout ray.

The Kawanishi, with her load of bombs, guns and ammunition, took plenty of time in getting off. Buzz had to fight her all the way until he could get a suitable roller that got her clear of the step. Then with another thump, hammering hundred yards she was off, zipping her water-rudders through the white-caps. At last they cleared, swung wide of the destroyers, and saw the full magnificence of the Fleet as it rode in battle formation toward the American shore.

He stared down in the lowering darkness at the forest of fighting tops, the battery of belching funnels, and the grim snouts of destroyers. Yes, it was a gallant armada of nautical strength. But it was sightless without the Navy flying men and the knife-like wings of the aerial fighters.

No situation in the whole book of Naval history had ever been faced like this. Both Benson and Jepson realized what they were undertaking, and they exchanged glances as they settled back in their cockpits.

For twenty minutes Buzz headed the Kawanishi due west, then he turned north for a time and gave Jepson a chance to make a report. Already it was dark with no moon and only a few stars. The grim waters of the Pacific below lay like a great velvet blanket that seemed to move gently in great rolls as though some massive blower was being turned upon it.

They sat and strained their eyes in all directions, trying to follow the movement. There was no light or outline anywhere. Then suddenly directly below them they caught the dim outline of a fleet of what appeared to be long black water beetles. There were fully forty or fifty of them, zipping over the crests of the waves. Buzz had a crazy idea.

"That means trouble," said Buzz, pointing down.

Jepson centered his night glasses on them, and in another instant he was at his radio set, tapping out a warning to the Fleet now more than twenty miles behind.

"They get it?" asked Buzz when Jepson came up from his panel.

"Yeh, and replied."

"What?"

"Wonder whether they can start their motors, if those Thorncrofts don't have anything to work.

"That's a idea. Get them to let us know if they put ships up. We want to know what to expect."

"They won't," growled Jepson. "I'll bet these babies have those special condensers, whatever they are."

"I didn't think of that," muttered Buzz. "Boy, there's a flock of them!"

"Where'd they come from? Must have a depot ship somewhere."

"That's another idea. Let's go down and have a look."

"I'm ready—two guns worth," answered Jepson.

Buzz drew the throttle back, nosed down, and the Kawanishi screamed as she dived. Then Buzz dragged on the front bomb toggles, let two twenty-pounders out.

The Kawanishi jerked as the bombs fell. They flashed in the glare of the exhaust and disappeared. Then in a few seconds there were another two, a dull flash and a low boom—two booms.

Buzz had no time to see a motor-boat swerve to avoid the curling column of water that suddenly spiralled up. There was no time to see the darting motor ship roll over on its side, then charge across the bow of another with an ominous grinding of metal. There was a loud crash and a thunderous roar as the torpedo went off somewhere in that crash. There was a blinding illumination for Buzz to hammer into with his front guns.

The motor boat armada fanned out, leaving nothing standing in the path. Then Buzz turned and climbed the mighty capes of flame and heat, and dural to wallow in the flame streaked sea. Burning gasoline splashed up on the rollers and formed an insane lake of fire. The Kawanishi spat at the others, broke up the orderly fanning. Then Jepson, pounding away with his rear guns, left another airplane ring of fire so that it rammed one of the leader boats full in the side and rolled it over on its back. There was another belch of flame and a low cough from somewhere half way between the moonlight and the smoke. Then there was another burst of flames and the whole thing burned out, and the smoke filled the night sky.
Then, before Jepson and Buzz remembered that these boats were also well armed, they were hammering through a wild curtain of lead and Q-F gun fire. The Kawanishi took a terrific battering from all angles and they had to swerve out of the play.

Jepson swore and hammered away over the side, and somewhere both realized that it was suicide to attempt to block the darting motor boats off further. They could drop the rest of their bombs, but they might need them. Still, Buzz could not resist another dive on them and he got the nod from Jepson.

Jepson flew off into the fan-shaped formation as it tried to re-form below. Buzz gave the Kawanishi all she had, then threaded his rudder when the front guns started to wall. He hammered into a wild hurricane of Nippon lead and the Kawanishi staggered like a punch-drunk fighter. Jepson waited his chance, then flailed away over the tail while Buzz fought to get her under control again. He sprayed the leaders once more, had the satisfaction of seeing one C.M.B. flip over and hard then leap like a gaffed salmon and nose down into the water with a great splash of foam.

"Get out of here," yelled Jepson. "We've done all we can. They're blasting hell out of us!"

"Don't I know it. This bedstead doesn't even answer the rudder any more!" yelled Buzz.

Then let's get out of here and get down somewhere we've got to see if we can haywire it together again.

Buzz had no alternative. He climbed fast and used the ailerons to maintain some sort of horizontal direction. They headed away from the hurrying fleet of coastal motor boats and let the Japanese hurl final blasts of Q-F shrapnel after them.

Once they were in the clear and well out of sight, Buzz let her ease into a glide and waited while Jepson advised the Yorktown of their predicament.

The night was very dark by now, and Buzz had to drop two flares to get the discovery signal into the condition of the surface of the water before he dared attempt a landing.

He hoped he could get away with it, but there was no other way of determining conditions below. In a few minutes they were down and swaying gently.

"I tipped them off," Jepson explained as he climbed out of his cockpit and dropped down on the pontoon in an attempt to trace the break in the rudder control cable. "There was little time to get much from them, but they have not begun to try to start any of the fleet planes yet."

"Then the same power is still in evidence," Buzz mused as he dived deep in his cockpit to seek the broken cable. "And those boats are evidently equipped with those condensers, or they would not be able to operate in this area."

It was nothing to answer. They were both too busy tracing the cable on the port side. In a few minutes he let out a low cry of triumph.

"Here it is," he cried. "Clipped off as neat as you like just under the radio pack in the rear seat. We'll soon have this spliced."

They bobbed about for some time while Jepson sought something to make connection. At last he found a small turnbuckle, and unscrewing the two eye-ends to the fullest extent, he drew the broken ends of the cable through the eyes and bunged them. Then while Buzz held his feet on the rudder pedals and held them at dead center, Jepson gradually tightened the turnbuckle until the rudder was lined up correctly with the fin.

"How's that?" Jepson said finally.

"Feels okay. How does she look?"

"Let's go!"

They settled back in their cockpits again, made everything ship-shape and snug for another take-off. Buzz got the displacement of 19,360 tons, a speed of 14.6 knots, and a draft of 27 feet 8 inches. She is 542 feet long."

Jepson went on as though he were referring to a lesson at the Naval Academy.

"With a cargo of manganese she was due at an Atlantic port on March 13, 1918. She reported at one of the West Indies Islands on March 4, 1918. Then she disappeared without trace. No one has ever known what became of Captain Blenk or the crew of his ship."

"What's this?" Jepson said. "Now how does she look?"

"Feels okay. How does she look?"

"Let's go!"

They settled back in their cockpits again, made everything ship-shape and snug for another take-off. Buzz got the word from Jepson that he was set. He was about to press the inertia starter, when all of a sudden Jepson let out a yell.

"What's up?" gasped Buzz.

"Look! ... Look!" Jepson yelled, pointed off into the darkness.

Buzz stared out across the water and saw the outline of a dull gray vessel.

"What the deuce is that?" Benson gaped.

"Listen," Jepson said standing up and practically whispering into Benson's ear. "Am I all right? I haven't been hit, or anything, have I?"

Buzz looked at the stolid Jepson. He was now a changed man. His face was a pasty white. His eyes were staring. It was plain he was making a game effort to control himself.

"You're all right," Buzz assured him. Then he turned back, stared at the gray vessel. "What is it—a Navy collier?"

"Yes," Benson said. "Jepson, his eyes staring at the image above him. "Are you sure you see it too?"

"Absolutely. It's a gray vessel with two funnels side by side near the stern end of the vessel. It has a number of vertical derricks running down the center of the deck and the bridge is well forward."

"How many coaling derricks, Benson?" Jepson said gripping Benson's shoulder.

"Let's see ... one, two, three, four—seven, all told."

"That's her, as sure as shooting."

"What's her name?"

"That's her, Benson. The 'Ghost of the U. S. Navy.'" Jepson said very slowly and very distinctly. "The Cyclops—the 'Ghost of the U. S. Navy!'"

FOR a minute, Benson could not quite get what Jepson was trying to say. The sounds were distinctly spoken, but they did not seem to make sense.

"Are you Okay, Jepson?" Buzz said sympathetically. Then: "That's a U. S. Navy collier, isn't it?"
Jepson, still white, had lost much of his service bearing. Now he was plainly puzzled and uncertain of himself. Buzz yanked on the heavy brass handle of the wheel-house door and shoved the door open. He leaped inside with his gun at the alert and headed for the wheel and binnacle.

There was no one there!

"Holy Moses!" gasped Buzz.

Jepson let out a low scream, then regained control of himself.

"I'm sorry, Benson. I'm trying to hold out, but you don't know how this affects me. I lost a brother aboard the Cyclops, and for years, on every sea, in every port, I have been seeking her. Now I've found her, I can't find anyone to tell me anything."

"Or to shoot at," added Buzz. "I can see how you feel about this, Jepson, but we've got to face facts. This is no ghost ship. How she has disappeared for so many years does not matter now. The thing that does matter is that she is sailing. There must be a crew somewhere, laughing that received your signal to stand to. There must be someone aboard this ship somewhere."

But Jepson was staring at the wheel. It moved slowly, creaking slightly as though unseen hands were keeping the Cyclops on her course. The card in the compass turned gently under the dim binnacle light. It indicated that they were steering a course set a few points south of east.

Both Jepson and Buzz stared at the wheel. It came back slowly, then held the card dead east. Jepson put his hand out as if expecting to find the solid outline of an unseen helmsman behind the wheel, but there was nothing and he turned with a pained expression back to Buzz.

"There's no use trying to make up another story about it being a ghost ship. Jepson, you can't climb aboard ghost ships. Ghost ships don't answer Navy signal flares and stand to order. There's a crew aboard this collier, and I'm going to find out where they are."

A with a furious gesture he turned back toward the door which was still open. Jepson started after him, then stopped dead in his tracks.

From a brass Navy-type communications tower set on the wall dead behind the wheel came an eerie cackle. They both stopped, turned and stared at it. The low cackle rose to an eerie, spine-chilling laugh that resounded through the wheel-house. It was a laugh that had a deriding, mawkish tone to it—A laugh that was sharp and cold, reminiscent of the clash of steel.

"Ha ha ha ha har-r-r-r-r!"

It ended with a rattling, shrill screech that made Jepson's blood run cold.

Together they both rushed to the speaking tube that was placed below it and stood there stock still.

There was a dull metallic clatter. The door, which had been left open, closed with a bang. The windows of the wheel-house abruptly disappeared and in their place appeared gleaming plates of steel. There was an ominous crunch of locking levers, and they knew they were trapped.

"Ha ha ha ha hak-err-errr!" Trapped in the wheelhouse of a ghost ship!

SECRET OF THE CYCLOPS

JEPSON swore and leaped for the wheel. It turned in his hand with no effort.

"Disconnected!" he raged, leaping back to the wheel seat. "Darn you," he bellowed, "I order you to reduce speed. This is a United States Navy vessel and I am Howard Jepson, officer in the United States Navy. Release us at once and send your commanding officer to the bridge with log book and ship's papers!"

"Only the discordant cackle of a laugh answered him.

Buzz was trying the door and contemplating the chance of shooting the lock out, but on a quick inspection he realized that the door was solid steel and would stand the effects of a howitzer.

"I order you to surrender the control of this vessel," Jepson was bellowing into the mouthpiece.

"Take it easy, Jepson. They've got us trapped. We walked right into it," answered a groggy voice of the United States Navy, the Navy man roared again. "I have certain rights on the high seas and I'm going to take advantage of them."

The mawkish voice came over the tube again:

"Within two hours there will be no United States Navy, Lieutenant-Commander Jepson. You and your calculating friend, Mr. Benson, will have no authority to draw on."

"Benson?" gasped Jepson. "They know you!"

"Of course we know the great Mr. Benson, and it is with rare pleasure that we entertain him aboard the Cyclops, the 'Ghost of the U. S. Navy,' as you so aptly put it. It will give us certain satisfaction to have Mr. Benson in the wheel-house, on the bridge of the vessel that is keeping every one in the U. S. Navy anchored to their catapults and flight decks."

"Did you hear that?" Buzz gasped.

"This is the hellish contraption that is creating that ray."

"No wonder they were using all those gear, plates, and cables—and those insulators," Jepson summed with a pained expression.

"The 'Cyclops'-one eye, one ray," taunted the voice over the tube. "The Ghost of the U. S. Navy returns to
haunt the Navy to its end." There was a certain tone to the voice now. Buzz listened intently and suddenly "placed" it.

"The Viper!" he said quietly to Jepson. "You are right, Benson. The Viper," the voice taunted again. "There's no use trying to whisper. The whole whole-house is suitably wired and microphones are hidden away there that betray every word you utter."

"Is that so? Then how do you like this?" And Buzz suddenly pulled the trigger of his gun and a resounding crack echoed through the wheel-house prison.

"I hope that blasted your ears off," laughed Buzz. "Now perhaps you'll turn those microphones off."

There was no sound from the tube now, and Buzz knew that the report of his gun, magnified many times, had probably half-stunned the man known as the Viper.

Jepson tip-toed across to a far corner, went into a huddle.

"You heard what he said," went on Buzz. "He said 'up there' which means that their control room is somewhere below. We've got to get out of here, somehow, and we may be able to do it, if you just put those microphones on. Intense sound can knock a man down—if it is handled right.

"Yeh, but that doesn't get us out of here," Jepson whispered back. "How can we work that?"

"Let's think. We've got a little time, but watch these doors carefully. We don't want them in here unexpectedly. We're reasonably safe while we are alone. We must think of something to work on them."

They huddled against the wheel and carefully studied the whole layout of Simon's house. They had the usual complement of metal pipes that carried cables, telephone wires, and other electrical equipment. There were a few conduit boxes, framed charts, and nautical law cards.

Then Benson's eye caught something which made him frown somewhat. It was the metal rack that usually carried a fire hose. But the hose had been removed and the brass connection was clean and new.

"Wait a minute," said Buzz. "Let's try this first!"

He grabbed up a chart table and twisted the valve handle of the water pipe. Then he stood clear.

Nothing came out.

Buzz sniffed. "He must have learned his lesson from that other time we pulled that. They've shut off the water so we can't flood the place out."

From the wall tube came the same taunting laugh.

"You were smart once, Benson," the voice of the VIPER said, "but you can't expect to have all the luck, all the time. No, we saw to it that you'd never pull a trick on us like that again. You'll have to think of something smarter this time."

Buzz listened, then turned to look around the room. Suddenly his eyes lit on the binnacle bowl. He pointed to it and drew Jepson's attention. Then he placed his forefinger against his lips and grinned at the tube which led down to the wheel-house below.

Jepson looked at the binnacle puzzled. What the deuce was Benson referring to? Benson poked toward the binnacle bowl again and once more gave the "keep quiet" signal.

Jepson went over to it, stared down at the blopping card under the light. What the deuce was Benson up to?

"The alky... the alky," Buzz finally whispered through his cupped hands around Jepson's ears. "The alcohol in the binnacle bowl!"

"What about it?" demanded Jepson. "It has to be there to float the compass card. Water would freeze."

"I know... I know. But we'll use it. Loosen the drain cock in the bottom and empty the alcohol into this—into this old spilitometer... the cuspidor."

"But I don't get it," Jepson worried. "Drain off while I rip up a handkerchief and do something." Buzz husked.

For several minutes they worked quietly while Buzz continued to hold a "cover up" conversation with the VIPER somewhere below.

"Are you keeping us clamped up here for?" he demanded into the voice pipe, "if it's the finish, why prolong the agony for us?"

"Just my little way of enjoying myself, Mr. Benson," the Viper replied. "Besides, I'd like to see just how adaptable you really are. You Americans pride yourself on your sportsmanship. Let's play a little game, and see just how far you can progress toward making your safe getaway before the finish."

Buzz was tearing his handkerchief up into four-inch strips. Then he removed two bullets from his gun clip, wrenched the slugs out of the brass cases, and poured the black powder into the first strip. This he weighted with the bullet and tied it all into a knot with two long streamers. He hefted it in his hand, tested it for balance. Then he made a second in the same manner.

"But this is not sporting," he argued with the Viper. "We're locked in a steel room, unable to move. Why don't you be a man and come up here and finish us off?"

"And leave myself wide open for one of your tricks when I open the door... or window?"

"So you'd rather stay down there and torture us through this tube," growled Buzz as he watched Jepson drain the alcohol into the brass cuspidor.

"It's much safer," said the Viper with a laugh. "It's your turn to make a move now. I've made mine."

"Look here," pleaded Buzz, "let's talk turkey. You have us nailed up, and we're admitting it. You've got the whole Navy bottled up with your ray which blanks out ignition systems. Why not be a sport and let us be in the death. After that, the world's yours anyway, isn't it?"

"Well, the American continent, at least," the Viper replied. "No, I'm taking no chances on you, Mr. Benson. I'm rather enjoying this just as it is."

Buzz signalled to Jepson, and the Navy man came over with the cuspidor and alcohol. Buzz quickly dipped the bullet-weighted rag affairs into the alcohol and took out a match.

"A piece of that chart. Quick! Roll it into a funnel so that it fits into this speaking tube mouthpiece. It's about three inches in diameter at this end and the tube is about two inches. This'll go all the way down to the ear-piece below."

"Well, when are you going to do something?" the Viper called up the tube. "I'm really losing my faith in you, Benson."

"Don't worry, I won't let you down," cried Buzz. "Just listen carefully at that ear-piece."

And with that Buzz touched a match to the end of one of the rag affairs. The alcohol-soaked streamers flamed up quickly and he dropped the makeshift flamethrower onto the cuss-dor and lit it to rattle down the tube. Almost as quickly, Jepson, who had now caught on, rammed the funnel into the mouthpiece and poured the raw alcohol into it.

They waited anxiously, hoping that the burning rag with its bullet would stop at the bend in the tube at the bottom.

There was a low puff, then a sudden boom below.

Jepson pored again and the rest of the alcohol went down the tube.

"Boy! What a break!" beamed Buzz. "They had turned off the water on that pipe line to stop us from using it, and now they haven't any water themselves to put the fire out with. What a break!"

"Yeh, what a break," growled Jepson. "But how in hell do we get out. The ship is probably on fire by now!"

But Jepson did not stand still while he was complaining. There was still plenty of alcohol in the binnacle bowl. He opened the drain cock again,
replied the cuspidor and returned to the faintly smoking speaking tube. Her eyes turned once more and with Benson’s aid poured the rest into it and let it run down into the cabin below. In return they got a new crackle, and it was evident now that the alcohol was blazing fiercely.

“That will keep them busy for a few minutes,” grinned Buzz.

“I’m afraid it will keep them busy for hours,” Jepson replied. “That place must be a young furnace by now.”

“Look! Look!” Buzz roared, pointing to a smaller compass set just forward. “My Lord! What’s the Cyclescope doing?”

The card in the small checking compass was twisting at a slight angle and turning to indicate a southerly course. The wheel-house listed at a sharp angle then swung back again.

“She’s out of control. We’ve driven them out of that cabin. It must be completely afire!”

The compass card was now wheeling around again and it was evident that the Cyclescope was racing headstrong out of control. Buzz jumped for the engine-room and grabbed the graph handle to yank it to “Stop!” But the handle only rapped in its movement, and it was evident that that device, too, had been disconnected.

“We’ve got them, kased Buzz.”

“They can telegraph the engine-room from one of the wings, but they can’t stop the steam and get to come up here.”

“We wait a minute. Perhaps the controls that open and close these metal windows are down in that room, too,” Jepson suggested with a painsied glance. “If so, we’ll have to wait until they can get the fire out. Heaven only knows how long that will be.”

They listened intently and lay down on the floor of the wheel-house with their ears to the linoleum covering. They could hear the shouts of men below and the clash of metal. Feverish and frantic activity was going on—and then came the deadlast realization of all.

Jepson got it first. He began to sniff and place his fingertips on the metal plates outside the edge of the linoleum. The plates were hot!

“Say!” he whispered. “The whole section below must be in flames. We’ll roast in here—unless we get out.”

Buzz felt and sniffed. The plates undoubtedly were very hot now and there was a pungent tinge in the air of the wheel-house.

“We’ll never get us out of here now. That fire will fuse all those crazy levers and rods that hold these metal plates in position.”

“We’ve got to get out. Now think damned hard. You’re a Navy man. You ought to know some way out,” growled Buzz.


He thought for a minute, then suddenly jumped.

“Look here,” he said to Buzz. “The fire . . . . the fire will get very hot below us. It will make everything red hot, and if we can stand it long enough, we might be able to get something jammed in the top of one of these metal window plates they’ve slung on here and force it down. If the bars or rods that hold them up get red hot, we might be able to do it.”

“Got to do it. Damned good thinking, Jepson. Here’s a chest. Let’s see what can be found there.”

Jepson was pulling off his heavy outer clothing, parachute pack, and coverall. The heat was coming up in a wild surge through the narrow openings between the steel window plates and the window framework. Buzz raised the sea chest and went through it carefully. There were a few old Navy jackets of some sort. These he threw out.

“She’s still turning crazy,” yelled Jepson, staring at the card under the small light which still beammed. Evidently the fire had not penetrated the electric wiring tubes of control.

“Look here!” cried Buzz in amazement. “What luck!”

Jepson turned and saw Buzz come out with a small steel bar that might have been used on a capstan of some kind. It was about four feet long and had one end flattened down like a crowbar.

“It lay flush with the lower angle of the floor in front of the chest,” Buzz beammed. “They never saw it when they cleaned this place out.”

“All right,” said Jepson. “Let’s plan now. Say, Buzz, why control? Why the devil don’t they go back and use the hand-emergency steering tiller?”

“They can’t think that fast. Fires do funny things to sailors.”

“It’s doing funny things to me, said Jepson with a groan.

“What’s up?”

“Do you know,” Jepson said, wiping the heavy perspiration from his face. “I’m laboring under the delusion we’re going to get out of this.”

“Don’t worry, old man. We are!”

“All right, let’s stick it to the last minute. Where are we going to do when we get out?”

“Take our kapok jackets first. Then head for the forecastle deck. It is quite possible that they have all been driven aft. If this fire amounts to anything below, it will all sweep backward and drive them toward the stern deck-house. We might have a few minutes to decide further, then.”

It was terribly hot by now and smoke trailers were creeping into the wheel-house. They both realized that breathing was becoming more difficult. The compass card continued to turn. It was now pointing a few points past north.

They climbed up on a chart table, inspected the top of one of the metal windows. Great heat waves swept up from below through the space and almost stifled them, but they managed to get the hold of the steel bar into the top of the first plate.

Together they forced the other end up, felt the plate give a trible. A sweep of glorious clean air slipped through and they both grinned. They tried again, and the plate went down another inch or two, bringing more air in. They rested a minute, breathed deeply, and peered out.

There was no one on the forecastle deck.

“Come on, let’s get moving,” said Jepson. “I’ve got the damnedest feeling that we’re not going to get out of this. It feels like Christmas morning about twenty years ago when I got an air-rifle from Santa Claus.”

“Say, I hope there is a Santa Claus,” muttered Buzz.

They forced the thin end of the bar in against the side of the frame again and yanked up and down. The window plate gave another few inches. The heat behind them was terrific now. But they worked feverishly and got the plate down about a foot. From the way it act, they were certain it was only a matter of time before they had a red-hot bar to bend—somewhere.

“Come on,” said Buzz quickly. “Get back into some of your togs and climb into your kapok jacket. We’re forcing this the rest of the way with our bodies.”

They pulled on a few things and saw that the compass card had turned toward the east again. The ship had made a complete circle.

They now leaped up on the chart table and Buzz smashed out the window and mahogany frame which was up about half an inch. They waited a moment to see whether the crash would be noticed, but the noise had been muffled by the racket aft.

“Come on!” husked Buzz. “And the best of luck!”

They forced their bodies through the now open panel and drew their knees up. Then, working together amid the heat and stifling smoke that was coming up from below in great gusts, they applied their combined weight to the plate. It started down slowly, inch by inch, then suddenly went all the way down with a heavy thud, and as if too tired and exhausted to hold out any longer.

They slapped their automatics, kicked away the rest of the splintered glass and mahogany framework, and crawled out. They dropped carefully to the deck below, and amid the blinding glare of the fire that was now sweeping the whole of the forward superstructure, they raced forward and hid in the shelter of the donkey engines.

Well, that’s that,” said Buzz. “Now what. I don’t think we’ve been spotted yet.”

“I can’t get over this silly feeling at the pit of my stomach,” gulped Jepson, staring around. Then he suddenly clutched Benson’s arm.

“What is it?” husked Buzz.

“Look!” Jepson cried, pointing over the rail.

Buzz looked down the finger and saw
in the garish glare of the burning Cyclops something that made him leap.

"Holy Gee," he gasped, "there's a Santa Claus!"

There bobbing about on the easy swaying rollers were their daubed-up Kawanishi.

The Cycles, fully out of control, had doubled back on her tracks and was back where they had started!

CHAPTER VI

DOOM OF THE RAY

WITHOUT a word, Buzz darted for the rail. Jepson followed. They climbed up, pitched forward, and went over the side. They both hit with a crashing splash and disappeared. But they soon fought their way to the surface and struck out for several strokes to clear the side of the Cycles. About twenty yards away lay the Kawanishi.

"Can you make it?" gurgled Buzz.

"I could swim from here to Kamchatka!"

They struck out again together and watched the still-blazing Cycles sweep away. They could see the crews fighting the fire from the aft deck. They could see great blue flashes from the derrick masts as water splashed across the great cables. They could also see several crews preparing boats for launching.

"Hurry up," growled Buzz. "We've got to get into the air and advise the Fleet."

They clambered onto the Kawanishi's port-tower and worked up on the back of the fuselage in no time. They took their same positions, gripping but happy, and Buzz kicked the starter twice before she finally caught. Then as the exhaust flamed they got a glare of light from a searchlight.

They raised her and the Cycles had seen the flashes of the exhaust.

Almost immediately, a crackle of machine gun fire swept across the water. Buzz jacked the throttle, eased away, and forced her up a roller and down into a trough for cover. Then the Viper's men broke out a heavier weapon.

BRR-O-OM! The concussion almost deafened them.

"Keep firing, you swine," screamed Buzz. "You're asking for it now. I was going to give you all a chance, but this tapes everything up. Let's go, Jepson!"

The engines roared up, and Buzz started for the water and sheells fell all around her. Machine gun bullets zippered over their heads. Then finally the B.M.W. engine shoved her rev needle up to the dial and he took a chance.

The Kawanishi raced away, hammered away at the rollers, and leaped into the sky. Buzz made her climb for some time, but he was still keeping the Cycles in view. Jepson reeled out his aerial and began pounding brass for all he was worth.

In three minutes he had advised Rear-Admiral Blanchard that he could plan to get his planes on deck. He also warned him again of the C.M.B.'s that were headed toward the Fleet. He made no mention, however, of the Cycles.

Kawanishi responded nobly now. Buzz raced at the collier, nosed straight at the glare forward. Jepson slipped ahead at his guns and waited. Buzz reached for the bomb toggles and held the stick forward. They went down screaming.

"For heaven's sake, don't miss," said Jepson. "They might get that fire out."

"Never again. This time." snorted Buzz. "Watch this!"

They belted into the pall of flame and smoke and then Benson's body jerked. The Kawanishi shook as the bombs went out. Jepson then pulled the guns around and pored a belch over the ships.

WHERE-R-R-R-ONG!

The Kawanishi pulled up with a loud creak. She rolled over in the amazing concussion, then fought her way through a welter of debris. How she came out of it will never be known. For seconds, Buzz was almost blinded, nearly blanked out. He jerked himself into some semblance of consciousness just as the Kawanishi was nosing headlong into the ocean about two hundred yards from where the flaming Cycles was still blazing and hurling off weird bluish streaks from her derrick masts. He drew the plane out carefully and fully expected her to fold up. But she steadied and came out swirling her water-rudders through the clawing talons of a great white-capped roller. Jepson, completely himself now, was fighting everything he could put into her and put the plane on a run out of the blazing decks and hammered the crowded boats mercilessly. Buzz circled, having no more bombs to drop, then shouted as the Cycles suddenly blew apart in the middle sending two great sections swirling away with their great open mouths bellowing fire, sparks, and smoke.

It was a terrible finish, but one that had to be.

"Tell 'em! Tell 'em," bawled Buzz. "Get those damned Navy fighters off the flight decks. Get the two-seaters off the catapults. There's about forty of those C.M.B.'s to be taken care of—and damned quickly!"

There was another loud report, and the stern half of the Cycles rolled over and went down, swirling her great bronze screws in the glare of the flaming fore-section.

"If they can jerk out any of that blank-out ray now," grinned Buzz, "they're good. Get those Navy guys into the air!"

And a brass key set in the rear of a third Jepson, of the Jap Navy, went fanning the death knell of the secret C.B.M. fleet. From catapults and flight decks two hundred roaring Navy planes swept into the sky, turned to the west, and sought the onrushing hordes of the Pacific power.

BUZZ raced the Kawanishi away, conserving his fuel and huddling down in the shelter of the engine to keep warm. Behind him, Jepson hammered brass for all he was worth, told the amazing story of the Viper's vessel which by some ghoulish electrical fuse had kept the Navy planes down and had blinded the whole United States Fleet.

He got a cheering response and slapped Buzz on the shoulder.

"We've done it! We've done it!" he bellowed. They're taking off by the dozen now! The ships are all daringly up with Bogeins, Yachts, Consolidated flying-boats, and Helldivers, we won't be able to fly through the mess."

The warm comfortable cabin of a Consolidated would go swell just now, muttered Buzz. "I'm frozen. How are you?"

"Frozen? Cripes! I'm sweating!"

"You must like excitement," growled Benson, turning back to his task.

They raced on for another hour and then came into the mad tornado of terror that was spreading over the torpedo-carrying motor boats. Ahead, the sea rolled and roared with burning craft. Formations of Helldivers were picking off the racing surface craft with their torpedoes and blowing them to atoms. The sea was littered with dead and the wreckage of mahogany hulls. Guns flamed and tanks blazed up. Torpedoes flew, their bows below the surface of the sea, and depth-charges rolling wildly, slipped off their Y-guns, went below with a roar.

Great flying boats cruised about and picked up those unfortunate enough to get in the way of frantic bursts from their machine guns. The air was alive with radio signals, and twenty miles behind, a grim Oriental fleet, heard the pathetic tale of woe from its' C.M.B. commanders—and turned back for the shelter of their Pacific island bases.

They never came out again.

BUZZ and Jepson got back, somehow, and were picked up with several other planes that returned to the main body of the Fleet. They were hoisted aboard, all in and frozen stiff. They had to be lifted out of their cockpits and rushed to the carrier's infirmary by the sailors.
They got in to San Diego hours ago."

"Swell," said Buzz beaming.

"They did well, too. We got one of those condenser things from that C.M.B. they nabbed and we'll always have one on hand hereafter for every plane in the Navy in case anything like this ever turns up again. We hardly expected to get the one back that was on the Kawanishi, you know!"

"We're still wondering how we did get back," muttered Jepson, his great face deep in a bowl of soup. "When we tell you what really happened, Admiral, you'll chuck us both off the carrier."

"You can tell any sort of story you like," Blanchard grinned. "All we know is that we stopped them and have learned now that their main fleet is racing back for their bases in the Marshall Islands. The War in the Pacific is over!"

"Another one will start up when we tell you what we actually did," grinned Jepson, warming up a trifle now. "Be-

lieve it or not, we found—and sank—the old Cyclops!"

For a minute Rear-Admiral Blanchard stood stiff.

"Say that again," he said. Jepson repeated his statement. "She was Mangi Khan's base," he explained. They used the coaling derricks for the crazy antenna arrangement from which they discharged that ray. We had to sink her before you could get the planes off."

Then they told in detail the rest of the story.

The Rear-Admiral sat down. "I never heard a thing you said, remember," he warned. "You never saw the Cyclops. You never sank her. You sank something—but it was not the Cyclops."

"What's the idea, Admiral?" asked Buzz.

"Well, you two can go barging about all over the Pacific, spoiling a perfectly good war. You can fly a daubed-up Japanese ship and do the almost im-
possible. But when it comes to spoiling a perfectly good ghost story, that's too much! The U. S. Navy would never be the same without the old Cyclops. No, gentlemen, you can't lay the 'Ghost of the U. S. Navy.'"

"I guess we understand," grinned Buzz.

"You're sure you do. Now get some sleep."

And the Admiral went out with a strange smile on his face.

(Author's Note—The disappearance of the U. S. Navy Collier Cyclops is no figment of the imagination. Just as Jepson states in this story, this ship vanished in 1918 and no trace of it has ever been found. Details of the mystery are included in most War histories and a photograph and specifications of the vessel may be found in Collier's War Pictorial, a picture volume published in 1919. Interested readers may also check newspaper reports of that period.)

P. D. Q-Boat
(Continued from page 12)

When he stepped into the Ninth's operations shack, his eyes were glassy and his big buck teeth were clicking out a monotonous belch.

"It can't be nothin' less than double pneumonia," Bump Gillis howled sympathetically. "Quick, he looks delirious. Git some aspirin. Somebody hurry. Oh-b-b-b."

"Boys," the patient groaned, "git me to my deathbed in my hut as that is how I feel. It was all that Von's fault. Gittin' me into that Frog p-p-p-p-p. W-W-W-Where's B-b-b-b-b-b-b-b-b-?"

Howell and Gillis and three pilots got Phineas to his cubicule and put him to bed. Glad Tidings Goomer came running with a little glass bottle filled with white tablets. They fed Phineas four of them and in a little while he was sleeping peacefully—too peacefully. Bump clipped.

"It is a hell of a time to j-j-joke," countered Captain Howell. "Sit down and talk to him. Insult him. Keep him from droppin' off."

Insulting Phineas was the best thing Bump Gillis could do. He called the freek-faced patriot everything in a stovetore's vocabulary and then started on the truck driver's unabridged edition. He and Howell dragged Phineas around the cubicule, made him stagger along between them, slapped the Pinkham chops, and kept up a constant chatter.

"You are a lowbrow cad, Carbacun," Bump snorted. "You would steal a blind girl's pencils. Look at what you done to that dame in Dover. Kidder her along, you double-crossin' weasel. Broke her heart. Said you was gonna marry her, and then never even wrote her a line. You are lower than a beetle caught in the mud at the bottom of a coal mine. Compared to you, you fathead, a worm is as tall as a giraffe. Can you hear me, you dope?"

Shuffling and staggering along between the two, grunting and muttered, "—will bat y-your ears—off, you b-b-bum."

"He's better," Howell trumpeted.

"Goat, what could kill the goat?" grumbled the Scot, resuming his task of pushing more insults in through the Pinkham lilypad ears in the hope of seeing them turn red. He and Howell were weary and breathless by midnight when Phineas was declared out of danger. By that time the patient was talking to himself.

"Haw-w-w-w," he raved, "wait until Goomer needs an aspirin. The Old Man'll wonder why nobody can wake him up. Haw-w-w-w!

"To hell with him!" cracked Howell.

"I hope he croaks. And all the time we wasted on the crackpot. I got a good
mind to feed him the rest of the stuff. Cripes!

EARLY the next morning Phineas Pinkham, a little green around the gills, emerged from his hut just in time to be taken in hand by a pair of M.P.'s who were backed up by two grimy-bathed bastards. In their slipstream came Major Rufus Garrity, his face as hard as a teakwood stump.

"Now what did I do?" Phineas asked feebly. "What's the big idea anyway, huh?"

"Robbery," a brass hat hit out. "We found the stuff on your tent. You took them off last night. Three watches stolen from the Frog jewelry store in Bar-Le-Duc last night. Don't tell me you weren't there, Pinkham! The Frog gave us a description of a man who—"

"Why—er—sure," the flyer from Iowa said, "I was going to buy that dame an ear-ring or somethin' to put around her neck but—I bought them turns off a dough. He—"

"Save your breath for the trial, Pinkham!" ground out an A.E.F. Intelligence officer. "We'll have quite a session at Nancy in about ten days. The Advocate and all. Got a few other criminals to dispose of. All right, Pinkham—"

"You crook!" yipped Bump Gillis. "Git your stuff outa my hut. Breakin' an enterin', huh? I knew you was no good but—"

"Now let's all look at this sanely," Major Garrity cracked. "I'll be responsible for Lieutenant Pinkham. He—er—sometimes he tells the truth. He is an officer, sir, and should be given a little more consideration than just an ordinary—er—er—. But give him a chance to find his man if you saw him again, Lieutenant?"

"Yessir," replied Phineas, realizing that he was ten thousand miles from the truth. "There was two of 'em."

Major Garrity thereupon prevailed over the brass hats, and Phineas, for the time being, was the hero.

"Well," Garrity trumpeted when he was alone with Phineas, "you better find those doughs. Run out an' leave me holding the sack and I'll hunt you down until my dying day. You can get into more damn messes! Why I got soft-hearted, I don't know. I'm even a pushover if an alley cat brushes against my boots. Get out of here and find those doughs!"

Phineas got out. Heart 'bangbang' against his shins, he went to his hut two dozen times of action. And while he cogitated dizzily, Sergeant Casey was in a huddle with one of his mechs.

"The bum is right. I was in a bouffe last night an' two doughs come in braggin' about how they put it over on a shavetail. Then they had a scald or two handed over some frame—but they wasn't frances! It was phoney dough—soap coupons. Only Pinkham would pull that, the fresh bum. But who's goin' to prove he give 'em to the doughs, huh?"

"Ha! Ha!" chortled the ackemma. "What a laugh!"

"Ha! Ha!" echoed Casey. "I been waitin' a long time to see that elephant-eared mug git into a sling an' stay there. Things look kind of rosey to me. I think I'll have a drink on it."

NOW Phineas Pinkham had a great strain on his conscience that had nothing to do with pilfered timepieces, but he kept it to himself. The more he tried to draw a way to clear his escutcheon of a criminal charge, the more sluggish his brain became. There seemed to be no way out. And so at dusk Phineas decided to take a long trip. Yet, steeped in awe as he was, it was strange that he did not take a certain reflection from his mind. A pair of silk skivvies with a coat of arms on them. Who was that Von? Would he ever know?

"I guess not," he answered his own question. "Well, adoo Babette. Adoo bums I am desperate an' stripes do not that the Spad pusher wore a mustache and goatee and that he was in the uniform of a Frog flying officer. His papers had been in order. The name of Captain Jules Le Boullion could not be questioned. There was one thing that only Phineas Pinkham knew. The real Frog flyer was locked in a root cellar of Quincke's Contraband and had been in a suit of heavy woolen underwear.

"Run out on me, huh?" Rufus Garrity resumed back on the drome of the Ninth Pursuit Squadron. "That's gratitude! Oh, if I could get a piece of his carcass to tear at — I would know better than to trust that crappot."

Captain Howell said. "You would have faith in an axe murderer!"

The Old Man took a swing at Howell. The Captain saw that the C.O. was wearing no tunic so he returned the punch. Right in the nose of old lady's colors Goomer fled the mess and reached for a bottle. He thought he needed an aspirin—but the morphee he got him to sleep right through breakfast.

JUST eighteen hours after that Phineas "Carbuncle" Pinkham flew over the rooftops of Boecht and headed out over the English Channel at a sharp angle.

"I will be famous if I am forced down here," he chuckled and pulled off his beard and mustache, "as I will have to swim it. Haw-w-w-w-w! Well, I'll be in more in no time. I'll chuckle before I'll make amends. I would like to know how that Scotch bum knew that—uh—why there is a ship down there. Two ships!"

He took a telescope from his pocket and focussed it on one, a single-funneled bastion that was able to fool the tin fish. Phineas began to circle like a hawk that has spotted a barnyard full of succulent fowl. His vertebrae began to buckle, and he knew why. Somewhere near were Boecht.

He dived within five hundred feet of the other Channel packet and saw that it was flying an ensign made in Holland. The tub looked honest enough to Phineas Pinkham, and he started to pull back on the stick. Suddenly he changed his mind and took another peek through his telescope. On the after deck of the tub over which he was circling a line of men was waving. The men were of masculine attire drew the Pinkham glimmers like a mustard plaster draws lumbago twinges. There was a familiar looking insignia on those skivvies—a coat of arms. And Phineas recognized them even though the outlines of the armor were enough. He realized that caught Lieutenant Pinkham on the point of the jaw. The coat of arms of the family von Kluckmer! It was the Raider's relative he had knocked off a few days before and it was very clear now to the Boonetown miracle man that the Frog flyer was a tongue-tied oyster. He had been afraid that the Allied third degree artists would give him the works in an attempt to make him disclose some secrets about the Raider of Rugenwalde.

"That tags the bum!" yipped the
FLOYING ACES

February, 1937

ERRANT FLYER. "It's von Kluckner's tub. Those skivvies give him away. Nobody will sink any more tubs that look like his. I will ... er... cripes, I haven't any bombs! This is like meetin' a nice fat elk in the woods with nothing in my hands but a water pistol. What luck! Oh, they'll start poking that Allied tub in a minute, too. Well, I can feed some lead to the Dutch boys when they lift them fake hatchets off the guns. I will give my all to git the square-headed Captain Kidd. Here goes!

"Ow—what is shootin' at me?" He twisted his head around and spotted a Boche commander of which he had never seen before. Phineas had no way of knowing that it was a Brandenburg, a very efficient two-seater Krout seaplane that carried a Spandau and a Parabellum. He did not know that it had come out to spot pigboats and that it hugged four bombs to its chest.

The English Channel then lost its serenity with nerve-stirring suddenness. Von Kluckner's fake decks began to collapse. Guns were laid bare and one let out a roar just as Phineas Pinkham started to reach for altitude. Lead from both British guns raked along the Spad's short ribs. With an altitude of a thousand feet, Garry's fugitive Spad pushed winged over quickly to fool the Heinies. But they were smart Dutchmen. When Phineas straightened out, the seaplane was on his tail. The British hitman of Brandenburg's seaplane. The Kaiser's assassins laughed at the old trick.

"Hi! Hi!" rumbled the pilot of the Brandenburg. "Der trick what ist older as Christmas, nein. Das ist komical, ja?"

"I'll show ya, I'll—" He ripped his strap loose and raised himself in the pug—over the seat and over the Brandenburg's seaplane. He soared down on the bounding main, von Kluckner was pelting the daylight out of the Allied packet.

"Oh, you bums!" howled Phineas. "I'll show ya. I'll—" He ripped his strap loose and raised himself in the pug and he yanked the stick back and pointed his nose to the clouds.

But the heavy testimony thudded against the Brandenburg's breastbone—and then something happened that turned the blood of the Kraut buffalos to jello. Somebody back on the Dutchman's cruiser must have been a little sloppy about pinning the hell drops to the underside of the Kaiser's sea fighter—for a bomb jerked loose under the impact. It went down and smashed von Kluckner's tub right between the smokestacks!


"Haw-H-H-W-w-w-w!" Phineas howled. "What a wallop. There is a hole in that tub as big as a—gosh it's wobblin'! Now to smite the wiener workers on the hips."

The Yank tore for the clouds, winged over, and dropped like a hod of coal on his tail to the added Boche Brandenburg crew.

"Only one wing on your crate, huh?" the freelocked flyer howled. "You'll wish ya had three, haw-haw-w-w-w! Take that—and that!" Vickers lead ripped through the Boche crate. The Heinies began to unload their last three bombs lest the Pinkham bullets touch them off under their own pants. One of the eggs made a big splash at the stern of the listing Boche raider. Then something broke above the surface of the Channel, and it was not a porpoise. A long streak of white suction whisked out from a tin fish and headed straight for the wallowing Boche tub.

BLOOIE!

Von Kluckner's raider shivered and seemed to leap half out of the water like a fighting tuna. Several Boche dived from the deck into the briny deep.

"It's cold in that drink. I wouldn't want to be—" Phineas' words died in his larynx. There was a crash that shook half of his buck teeth loose and he saw that his Spad and the Boche Brandenburg had merged. "B—You fatsheads!" he gulped. "G-Got me, h-huh? Well, adoo everybody! Haw-Haw-w-w, I am a Neapolitan, St. Pio! Anyway, I wish I could have—got to—Dover, though, as—I wonder—how that bum, Bump Gillies—ever found—out about—" Spl-l-lass-sh!

Phineas went through a prolonged baptism. When he came up to the surface, his breath bung—his head against something hard. His fingers clutched at a floating hatch cover, and he drew himself onto it and began to empty his bellows of salt water. After awhile he found voice. Phineas always could do that.

"I bet the tide ebbed for awhile there," he gasped. "I drank half the Channel, haw-Haw-w-w! Uh—er—somebody's callin' me."

The dripping Yank saw a boat coming and he waved a flipper. Fifteen minutes later he was on board the shovel-hulled Limoit, St. V., able to talk. Survivors. Sitting against a bulkhead was a chagrined Heinie who wore in a black spade beard. Phineas grinned at him.

"I bet you're von Kluckner, the pirate. Haw-Haw-w-w! It was a mistake.

arin' your lingery in public. Boys, that is how I tagged your tub. Some fun, huh?

"Ach Gott!" groaned the Raider. "Der fregels und der tick teet yeid. Das Pinkham! Himmel, du bist einen deiff!"

Gold stripes ganged about Phineas. Red tabs and Yankee brass hats fought to shackle his hand. One of the U. S. big shots wanted to know why Phineas Pinkham had been patrolling the North Sea.

"Oh, it's a long story as my con- science was bothering me," the hero re-plied. "I have to make amends, in Dover, as ther is a damn' big—er—well, I got framed—er... two doughs—I will not talk. I want a lawyer. Awright, git the M.P.'s—er... the Marines. Arrest me! Go ahead. But I am a Pinkham and will take it to the highest court of the land—"

"A little whoozy," concluded a red tab, shaking his head. "Fancy him even being alive, eh, what?"

A big brass hat eyed Phineas narrowly. He suggested to a junior officer that the Yank be given dry clothes and taken to his quarters. While the tub lumbered on toward France, Phineas, a little bibulous from several long draughts of brandy, became very talkative.

"Haw-w-w-w," he boasted. "I am only a burlgar A.W.O.L. impersonating a Frog officer. Jumped bail! Well, it is only once they can shoot me. Swooeee-t Andy was a close one.

An hour later Phineas was almost himself again. He asked a red tab the identity of the brass hat who had been so solicitous to him.

"He's the Judge-Advocate General," replied the Limey brass hat. "Rippin' chap, eh, what?"

Phineas fainted. While the red tab scooted for stimulant, the wires were buzzing every-where. All over the front the news of Lieutenant Phineas Pinkham's latest contribution to the Allied cause trickled in. By the time theensa was due. It left Major Rufus Garry and his hirielings in a limp state. The Old Man pawed gobs of sweat as big as eight balls from his brow and reached for a bottle of strong grog. He was very nervous.

"G-Going to d-decorate t-the b-bum," he sputtered to Howell and the other Spad nurses. "Navy cross. D. S. M. Smacked von Kluckner in English Channel—knocked off a Boche seaplane—run right into it. Ha! Ha! Ha! Ha! Ha!—"

"Take his gun," Howell gulped. "Git the bottle away—"

"I could not lift a daisy with both hands," Bump Gillies choked out. "What in hell was he doin' over—?"

FORTY-EIGHT hours later Phineas arrived at the drome of the Ninth Pursuit Squadron accompanied by none other than the Judge-Advocate General who had come over from England to open court in Nancy.

"Hi'o bums... er, gentlemen" Phineas greeted his mates. "It is an awful let-down talkin' to you after hobnobbin' with Admiral Sims an' General Persh- in' an'—well, sir, I did not jump bail. How are ya, Major?"

The members of the Ninth Pursuit were as articulate as the crust of a deaf and dumb school. "It was von Kluckner's brother I shot down that day and he yanked the stick back and pointed his nose to the clouds."

"Heer—didn't. I was—just kiddin', Carbuncle," Bump forced out. "I made it up to stop you from passin' out when—"

"Haw-w-w-w-w!" enthused Phineas.

"When the guerre is over, Bump, you get yourself a glass doorknob and go
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He came back with a little glass bottle and it went the rounds. Everybody seemed in need of a small white tablet. Twenty minutes later Glad Tidings shoved his head out through the kitchen door and wondered why everything had become so quiet. A symphony of heavy, deep breathing twanged in his ears. The sad-eyed mess attendant gulped and looked at the glass bottle. Then he ran to the stroma to get a few belongings before going A.W.O.L.

All Questions Answered

(Continued from page 40)

mores" does 200. We are still "working" on the Siemens-Schuckert motor, trying to get it down to two-syllable words. I believe the Bren gun will be used on certain types of multi-place bombers. No, your opinion on the South Africa race is far off. No one over here was sure about the MacRobertson race result. There is no one here now with that much money to put into a plane of that kind, and none of the factories seem to have the time to go into it. It is very hard to say which country has the greatest air service today, with conditions such as they are. But Russia certainly has plenty of craft. When Britain completes her new program, she will be far ahead of any, in numerical strength. The twin-fuselaged German bomber you refer to is probably the Ago biplane, although these "fuselages" were really enlarged tailbooms. See picture in this month's "Snapshots of the War."

Jack VanGilder, Ketchikan, Alaska:

Sorry, but we do not know what the picture you sent us represents. They may be some form of the Keystone bomber, but the camouflage completely disguises them in the photograph you sent us.

Ronald Lee, Bournemouth, England:—

Unfortunately, they do not go in for that postcard size airplane picture here. We know what you mean, but the idea has not clicked on this side. There are several firms that advertise in our
magazine that sell airplane photographs. You might try them. Or you might get in touch with the amateur photographers over here who go in for exchanges. (Ronald's address is Hillcrest, 6 Court Road, Bournemouth, England, if you boys want to do some swapping)

Earl Dahl, Madison, Wisconsin:—The speed of the Flea is said to be 72 m.p.h. The Spad did about 118. The Fokker triplane is said to have done 123, and as there are so many forms of the auto-giro, it is hard to answer your last question. The Pietenpol auto-giro made in this country has a top speed of 140. This is the PA-34, two of which have been ordered by the Army Air Corps.

Paul Dunfee, Bridgeport, N. J.:—The Nieuport 28 did 124 top. The Goth bomb did 72. The Curtiss Robin was first built in 1928.

Kenneth Hobart, South Boston, Mass.:—Hamilton Coolidge of Boston was credited with eight victories. He died during the war. Fritz Weber came from Everett, Mass. He is dead, too. I know of no ace from South Boston.

Crawford Billig, Louisville, Ky.:—I do not know where you can get a picture of the Northrop attack plane unless you write to the company at Inglewood, Calif., and ask for one. The Boeing P-26 is said to do 235 top.

Bob Mitchell, Salinas, California:—You are probably referring to Baron Ritter Eduard von Schleich, the Black Knight of Germany. He is credited with 35 planes. Why not ask your local bookstore proprietor to get you the book you want. He will order it for you gladly. Von Richthofen is credited with 80 victories. As there were approximately 5,000 different World War planes built, it might be pretty hard to gather all the dope about them and put it on one page as you suggest.

H. A. Reid, Norfolk, Va.:—Your drawing is not very clear, but I presume your plane is supposed to be a Morane Parado.

Eugene Estill, Cedar Rapids:—I do not know anything about the armament on the new Seversky. I just presume it has two fixed Brownings electrically controlled or synchroized. I do not believe the Joyce cannon has as yet been accepted by the Army Air Corps. My own Camel was dark green, brown on the top wings, and sky blue underneath. Its number was 1434. The enclosed gun turret was first used, I believe, on one of the Bristol 120's early in 1931. There are so many types of aviation flares that your last question is very hard to answer. There is no age limit on "taking" flying lessons, but you cannot get a license until you are 16.

John Nelson, Charleston, N. H.:—You wish to get in touch with 1st Lieutenant Sidney Black and 1st Lieutenant Patrick Black, formerly of Concord, N. H. (If any of our readers know of these gentlemen, will they kindly get in touch with Nelson at Charleston, New Hampshire.)

Frank Strnad, Holtsville, L. I.:—Your drawing enclosed with your letter most certainly is not a Gotha. If Cy Caldwell says the ship used in Hell's Angels was an old Sikorsky, you can bet he's right. I do not have any record of any three-bladed prop on any war-time ship. Yes, Hisso is slang for Hispano Suiza. Dick Grace wrote a book called Squadron of Death in which he tells of his amazing escapades as a stuntman for movie picture films. It is published by Doubleday Doran of Garden City, Long Island, and it costs $2.50.

Robert McCann Jackson, Mich.:—Write to the Storms Aviation Company, 133 Southside, Asheville, N. C., for plans for a light plane.

Luke Rossi, New York:—We do not answer lists of questions that are obviously being used in a contest or Scout test. You are expected to do a lot digging on your own for that sort of thing, you know. They can all be found in a few minutes at the public library.

Harry Wilson, Fredericksburg, Va.:—Sorry, but we have run out of photos of war pilots. After all, we've been running them for several years you know, and as no one seems to want to sell us any more, we are having a hard time keeping up with you birds who want pictures of pilots. We were unable to get anywhere near the German Dorniers you mention.

Marion Rathburn, Aurora, Ill.:—No plane, to my knowledge, has reached a speed of 500 m.p.h. in normal flight. Von Richthofen's mother and a younger brother are still alive in Schweinitz, Germany. His other brother, Lothar, was killed in a transport plane crash in 1923. Voss is credited with 48 victories.

Pat Randolph, St. Paul:—The book referred to was Flying Fury, by Major James McCudden, V.C., published in London by John Hamilton. I do not know who is credited with drowning Lubefy. You're not going to get me into that Schaeffer argument, as I said before.

Warren A. Frye, Quincy, Mass.—The Vickers Vampire had a top speed of 121 and climbed to 10,000 feet in twelve minutes. It is generally conceded that the Handley Page bomber was a far better ship than the Gotha. The Bugatti en...
FEBRUARY, 1937

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give, since every take-off condition is different. It is hard to take off from still water with such a plane than it is when there is a certain amount of broken surface to the water.

Miss Hope E. Brown, Los Angeles—Miss Brown, a gentleman by the name of Arthur Magson, of 354 Prairie Ave., Providence, R. I., wishes to get in touch with you.

Theo. Jasminski, New York City—Why not ask the Polish Consul in New York for information on joining the Polish Air Service? I know nothing about it. Ray Brooks is usually in New York at the Algonquin Hotel on Monday nights. I see him there regularly at the Quiet Birdmen dinner. He was a captain, my boy.

Edward Warner, Wilkes-Barre, Pa.—The Red Knight of Germany is now in the one dollar editions and can be purchased at most United Cigar Stores that have book counters.

Dick Due Sault, Monroe, Mich.—The Hoffman Parachute Company of Cincinnati, Ohio, puts out just the book you want on parachutes. Why not write to them?

—By Arch Whitehouse

Stratosphere Death
(Continued from page 32)

Sky Gun Practice Today
(Continued from page 20)
single shot weapon or in heavy bursts. It weighs but 200 lbs. and the shell it hurls weighs 1½ lbs.

It is understood that a number of these guns will be mounted in special turrets on the new heavy British bombers, thus turning them into dreadnoughts of the air.

But without the trained gunner, where would they all be? In short, no country can afford to forget that its armament is no stronger, in the long run, than the ability of the man who handles the guns.

Gold Flies the Gauntlet
(Continued from page 28)

just warming the engine. Some day I'll prove that I can handle this ship on my own!"

Tom went back to the Stinson to get his strip map. He meant to chart a course farther south than his former route, in the hope of flying around any trouble that might show up. But as he turned his back on the Douglas, he heard the mighty engine leap into thunderous life.

It was too late! The kid, taking a desperate chance, was in the cockpit, hurling the loaded ship down the field like a catapulted thing! It screamed into the air—lifted.

There was instant confusion on the field. Tom ran swiftly to the Stinson to give chase to the crazy kid. He got the Lycoming started, but it was cold. He warmed it with brief, screaming blasts. The engine spit fire from it's cold guts. He taxied to the line!

Tom hunched down, snapped the thong, and with the Stinson leaped away, he could hear Mellenthin crying like a crazy man. "Stop that kid ... that plane ... it isn't safe ..."

The Stinson leaped into the air. Up—up—up! The Douglas was now a speck in the distance. What had Mellenthin meant about that ship not being safe? And now Tom realized that the kid was taking the old trail across the meadow in which Tom had been robbed two days before.

Tom fed soup to the straining Lycoming. He had to outtaxi that crazy kid. If anything should happen to him, Tom would never forgive himself. He watched the wild earth slide below him. He watched the spec that was the Douglas getting larger and larger as the faster Stinson crept up.

Suddenly he stiffened. Up from the jumble of earth came two planes! They circled up for the Douglas!

Tom prayed. He thrust the throttle against the stop and cursed the Stinson for having a "four," but it wasn't so. It was swiftly tearing into upon the three ships that had already begun to maneuver across the sky.

The Stinson had no armament but a Tommy gun stuck in a rack on the wall near the pit. And Tom had his automatic. Those were the only weapons available to him, while he could already see that the two attacking ships had menacing m.g.'s crouching on the cowlings!

The kid was wobbling about uncertainly in the first encounter. The old Waco, climbing his back trying to force him down. The kid was fighting his way clear. The other attacking ship was likewise a Waco, though a smaller model, and stuffed into the small pit was Gunner Sloane!

Tom's mouth drew into a straight line. He had vowed to take this gold through. All right, he'd show them if he was crooked or not. This would be a fight to a finish . . .

He jerked the Tommy gun from the rack. He swung the controls over and sent the Stinson screaming between the two bandit planes. It crouched as the first ship lashed back. His finger touched the trigger. The Tommy gun rattled, bucked, andammered in his lean hands! Little black holes appeared in the wings of the Waco. They looked like finger smudges.

Tom cursed, twisted his ship around. At the moment, he heard Gunner diving upon him, and he tensed. A flurry of lashing slugs stung through the cabin like wasps! He fought the controls, lifting the Stinson in a sloppy loop. He hadn't headway enough to close over the ship hung suspended for a moment—then rolled over flat!

Gunner was waiting for him. For ten minutes, Tom tried to shake that dogged plane from his tail. But it was no use. Gunner was trying to force him down. And he was coming perilously close over him. The ship hung suspended in the effort to put him out of the fight.

At the same instant, Tom saw the kid. He was skidding the Douglas flat to head in and help Tom. The kid was in a direct line for a shot at Gunner, but somehow he held back.

Tom understood. The kid couldn't take to the idea of killing. He was afraid to press the triggers! Tom could see his hunched head and the face white as new chalk. The kid was glaring down in the ring sights of the mounted gun, but his thumbs refused to press the trigger!

At the same instant the two-place job caught the kid again for a no-decision shot! Tom cried at the kid, "Breakaway! Wing down!"

But the kid was beginning to be paralyzed. He sat like a statue in the pit of the Douglas, eyes staring wide and arms rigid. Tom groaned as the gun on the cowling of the other ship rattled and bucked—hurled death into the Douglas! The thugs seemed anxious for blood.

Tom pulled the Stinson out and tried to get across to save the kid. He could see the slugs hammering closer—closer—forward toward the pit! A great hand seemed to grip the skin of his chest and twist it into a knot. He couldn't save the kid.

Tom knew he couldn't save the kid. He yelled for the kid to bail out, but realized that the kid didn't even have a chute on. The whole thing was crazy.

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—preposterous! It was like war . . .
At that instant, Tom saw an unreal thing. Although he couldn't get over to save the kid, Gunner Sloane could. Gunner had pulled over and was motoring wildly to the other ship to stop firing at the Douglas. Tom suddenly sensed the reason. The kid had saved Gunner on the field at the camp of the Roaring Buck. Now Gunner was trying to pay back that debt.

But Gunner's comrades ignored the signal. They had the kid in their gun sights, gold in their eyes! If Gunner wanted to pull out, that was his business.

Then the kid began to press the trips of the machine gun on the Douglas—pressed them frantically, wildly, like a novice would. He was shooting futilely through thin air! Then the gun on the cowling jumped, tore loose from its mounting! The synchronizing gear had kicked out. A hail of lead hammered into the synchronizing prop, chopping it from the hub of the roaring engine! The mounting of the gun had been loosened. Tom remembered Mellenthin leaving that plane.

The kid was doomed. Tom knew that and his heart and whirled back to have vengeance upon the killers, but skidded flat, almost stupefied by what he saw.

Gunner was hurling his ship in between the kid's tail and the Waco that was diving upon it, spitting lead! There wasn't room there for passage. Tom felt hot curses leap past his lips, as

Gunner's ship crashed with a rending, tearing screech into that other plane! A wing tore off! The two-place exploded in a mass of flame. The fire swept back blotting it from the sky!

With a tightlipped grimace of horror, Tom heard the screams of the doomed men in that ship. No chance to jump. They were caught by the flaming oil before they could unhang their safety belts. He jerked a look over at the kid. Andy was fighting his crippled ship down toward a clearing below.

This other kid was bailing out from the wrecked ship he had used to save the kid. Tom could see blood smeared across the Gunner's chest. He understood. Gunner had stopped hot lead that was meant for the kid, as he had screamed through that opening. He had written "paid" to the debt he owed the kid—with blood for ink and eternity for paper!

Then Tom circled down. He saw the kid flabbergasted awkwardly in for a landing on the small meadow. The kid over-shoot the clearing and wiped the wings off the Douglas in the trees beyond. But he was unhurt, and he ran up as the Stinson settled.

TOM ignored the kid. He leaped out, ran back down the canyon to where Gunner was waiting for the white mushroom of his chute. He reached the prostrate form—to find death stealing over the features.

Gunner opened his eyes, tried to grin. "Darned sorry, Liston," he gasped, "but it was great sport while it lasted. I—I wanted the gold, anyhow. It—was the excitement. Seemed like old days in—France . . . ."

The Kid leaned close. "Thanks, Gunner," he said simply. "That kid. He's part of my crew. "We're even, kid. Guess—guess I won't be able to teach you to shoot af—after all. That other gold is buried at the forks of Little River," he added.

Mellenthin was mixed up in this?" Tom asked.

Gunner gasped. "He—he only sent that radio message to Bradley that day. I ma—made him do it—at the point of a gun . . . threatened him into silence. Let him off ea—easy . . ."

Then Gunner collapsed and his face assumed that curious, frank expression that had always puzzled Tom.

From the Model Builder's Workshop
(Continued from page 67)
wind a model, the person hooks the eye of the prop hub onto the winders hook and bends forward. The model is held in the left hand, by the nose block. The drill handle is held between the knees.

About Those Gas Rules—
(Continued from page 57)

45 seconds was sufficient to keep a good model aloft for several minutes and always in sight. Under the proper conditions, a model could easily fly itself into a sizeable endurance record, and at the same time it would be much easier to follow it due to its limited power at the outset.

Anyhow, we're decided of the opinion that controlled flight is the answer to a lot of troubles in this game—so we hope something more is done about it.

What of the Rocket Plane?
(Continued from page 27)

finished craft and explore all that glinting mechanism in the nose of the fuselage. But wait. Here comes a mechanic. Perhaps he can help us out of this maze of mystery.

"Does this ship use liquid air and gasoline like the other rocket designs," we ask, seeking to open the conversation.

"No," he replies, "this ship burns a mixture of crude oil and compressed air in the two combustion chambers. The gases rush back through the big nozzles which are given a venturi effect."

He senses the puzzled look on our face. "Oh, a venturi tube is a pipe-like device which has a greater diameter at the center and exits ends than in the center. The chokes tube in your automobile engine carburetor is built that way. You see, since the same amount of air or gas is forced through the restricted central section at the larger mouths, naturally the material must go through much faster. That's just the idea—to raise the speed of the air or gas."

"And that's exactly what we do in this rocket ship," he continues. "We step up the speed of the gases so that the pressure built up against the rear section of the combustion chamber is quickly reduced. That leaves only the recoil acting upon the forward wall of the combustion chamber. This force pushes the ship along in a forward direction at a good clip."

"But what's that big shiny tank, and how—?"

"Yes," he breaks in, "I realize that this doesn't look like any of the other rocket ships. We have an entirely different system. That square, box-like contrivance is a flash boiler. In it we generate steam which entrains the air entering through the air inlet and compresses it to a high pressure. The big, shiny tank, as you call it, is a condenser. The steam and air mixture is sent through it to remove the moisture. The dry air then passes to the combustion chamber. There it mixes with the fuel oil and is burned. Additional air, to help the burning process, comes in through the openings between the combustion chamber and the nozzle. The gases are then forced through the nozzle as I explained before."

"But don't you need a large quantity of fuel oil. It must be burned up very rapidly."

For answer he points to the thick wing section at the roots. "We use the same system as the big transports. Our fuel supply is carried in those wing tanks."

Our final rocket ship is a real scoop! This job is now being built out in California. Although not enough of the work has been done to permit performance and other data to be released, the three-view drawings of Figure 3 are the real dope and have been reproduced here with official permission. On this three-view, the span is 1¼ inches, the length 1 foot. So if any of you readers are solid-scale model fans, you're all set, with these drawings, to turn out your own miniature of the ship. Why not get out the balsa and go to it? She's a mighty slick job—and wouldn't a sky hurter of the future go great on your model tarnac? We're sorry, though, that no more information on this job than that given in the drawings is available.

In conclusion, we certainly trust that this article has provided you with the basic information on the speedy rocket craft of tomorrow.

Dog Fights of the Films
(Continued from page 12)

planes separate, and the Sopwith Camel's upper wing flutters slightly—and floats off. This is moving picture realism with a bang!

Murphy jumped with his 'chute as the lower wing cramped. He landed safely, but his Camel was reduced to matchwood. It hit the earth at a terrific speed. Thank heavens for parachutes!

REED also was stunned for a moment by the collision, but recovered quickly and debated as to whether he should take to his 'chute. He turned his goggles upward, looked at his
right wings—both were almost torn off and the right aleron was completely disabled! Torn strips of fabric were streaming and fluttering in the slip-stream.

Without the use of the aleron, it was very difficult to keep the Fokker on an even level. Nevertheless, Reed decided to try to save his ship. In a shallow dive he slowly brought the Fokker nearer the ground. Cutting the Mercedes engine, he glided earthward. Coming in flatly, he brought the crippled Fokker toward a farmer's field which lay just ahead of him. The wheels touched, the Fokker D-7 bounced four or five times, then dragged heavily in the soft earth, as it stopped rolling. Reed had saved his ship!

To top it all, there was the tragedy of the bomber. The huge Sikorsky, which had been made into a good reproduction of a German Gotha bomber by a good deal of rebuilding, was to appear in an important sequence. It was to catch fire during a combat with several Fokker D-7's—and in addition it was to go into a 2,000 foot dive. A pilot and mechanic were to be the only occupants of the bomber, each wearing a parachute. The mechanic was to sit in the rear of the fuselage and set off smoke bombs as the plane descended, so that it would appear that the Gotha was being shot down in flames.

The day of the final filming arrived. Trundling into the wind, the bomber took off, climbed for altitude, and at 8,000 feet leveled off among the billowy clouds. The camera ships got into position. Signaling the mechanic in the rear compartment to start setting off the smoke bombs, the pilot pushed the control wheel forward and the nose of the ship dropped swiftly toward the distant earth. It dived for a few hundred feet. But instead of continuing its 2,000 foot dive, it then started into a half-turn as though going into a spin. Something had gone wrong! Fighting the heavy controls, the pilot tried to bring the huge machine out of its spin, but it was too late—the spin was getting faster and the turns more narrow. The wing was now shaking and vibrating as though they would disintegrate, and the scream of the wind and the shrill, high pitched shriek of the wires added to the unnerving din.

Realizing that the unwieldy machine was completely out of control in the throes of this deadly spin, the pilot turned his plane sharply back into the fuselage to the mechanic: "Jump! The ship's going to pieces!" His voice could barely be heard over the roaring wind and motors. The pilot attempted to rise in his cockpit, but he was hurled back by the terrific wind pressure. However, his second try was successful. He jumped, hurled past the tail of the Gotha, and his parachute blossomed open.

Swinging below his 'chute, the pilot anxiously watched the descending Gotha for the appearance of the mechanic. But the mechanic did not jump! Evidently, he had not heard the pilot's order above the deafening roar of the diving bomber. And at regular intervals he only continued to set off his smoke bombs. He was still setting them off as the huge machine spun into the earth and burst into flames.

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(Continued from page 40)

On the Light Plane Tarmac

These panels may be pushed down into the side walls for entrance, exit, and open cockpit flying.

There is a large luggage locker with a rack for suitcases behind the rear seat. This is accessible from both cockpits and from the starboard side of the fuselage. Behind this locker there is stowage room for a tent, a 10 lb. collapsible dinghy, and similar equipment which might prove of value on journeys into in hospitable regions. Moreover, the backs of the seats may be removed and laid flat to form a make-shift bed.

The Mohawk has conventional dual controls and incorporates a patent
Miles tail-trimming device. The undercarriage is a single-strut type made by the British Lockheed Company offering brakes and Airdraulic struts. In addition, a float undercarriage has been built out by the Short people so that the machine may be used as a seaplane. flattering. The manufacturer has not as yet been calculated, but her top speed is believed to be in the neighborhood to fly the ships away.

LIGHT PLANE PRICES TO DROP

Owing to the interest in light planes and private flying, it is believed that the prices of the better known light aircraft will drop considerably in 1937. The Taylor Aircraft Company, manufacturers of the famous Taylor Cub, predicts that possibly 2,500 Cub planes will be produced and sold in the new year. This figure is nearly 2½ times total production of commercial craft in this country in 1936!

For instance, a cut of $200 was made on the Cub prices late in 1936, and if conditions warrant, further cuts will be made.

Other light plane firms agree that 1937 will be the greatest light-plane year in history, and it is quite possible that there will be such a sale of these planes that prospective purchasers may face lengthy delivery waits unless they put their orders in before they expect to fly the ships away.

A FEW SHORTS

The Aerona is now being built in England and is selling for $1,975. Over there they use the British 95-1. J.A.P. engine, which gives the plane a top speed of 95. She lands at 33. Pretty nice job, eh? Two hundred have already been ordered by British enthusiasts.

The British Carden version of the Pops is also selling well over there—for $945. This version has a cantilever wing, no outside wires, and is powered with a 30-h.p. Carden engine. It does 80 top and climbs 400 ft. per minute.

Did you know that the Beechcraft flown by Louise Thaden and Blanche Noyes in the Bendix race had been purchased by the Honduras government?

A Koehoven (Dutch) single-seat fighter, employing a Lorraine Petrel engine driving two airscrews in opposite direction Macchi fashion, was recently shown at the Paris air show. It will do 322 m.p.h. Now go out to the back shed and try that one on your light plane—but don't ask us how they do it.

Happy Landings

(Continued from page 35)

were so elated at their success, however, that they immediately collected what was left, slammed it all into a crate, and headed home. They stored all this junk in a cellar in Dayton.

Immediately, a Mr. Griffith Brewer, of the Royal Aeronautical Society of Great Britain, made overtures for the ship to be placed in the Science Museum. However, during these overtures, Langley was getting certain recognition from the Aero Club of America and many were declaring that Langley's "Aerodrome" had flown and was therefore the first successful flying machine. And so, a model of his steam-driven "Aerodrome" was accepted by the Smithsonian Institution. And that was that.

Thus with fame somewhat curtailed in their own country, it is understandable and reasonable to assume that the Wrights were glad to grant the Royal Aeronautical Society the honor of placing their plane in the Kensington Museum. But when they came to look at what remained of their historic ship, it was discovered that the craft was a total wreck. The various members had been further damaged by a flood which had swept through Dayton.

And so they were faced with the task of complete reconstruction along the identical lines of the original machine. Incidentally, even the same sewing machine was used to stitch the covering fabric, which came from the same factory as the covering used on the original. Of course, a couple of the first ship's parts were saved intact—but the Wright biplane in the South Kensington museum has never been flown and probably never will.

How do you like that, Mr. Ripley?

Make the Grumman F2F-1

(Continued from page 52)

can smooth them off with the sandpaper. They may now be covered with paper. The stabilizer is made in two pieces by the same procedure as the wings. You can mount the stabilizer on the fuselage now. After it has been firmly glued, fill the corners where it meets the fuselage with Plaster of Paris.

Drop the fuselage up straight with the aid of your dope bottles and mount the top wing on the center section struts. After this has dried, turn the model over on its top side and glue the bottom panels to the fuselage and outboard wing struts. These "N" struts should be built in now—but not before mounting, or else they won't fit. The vertical member of the "N" should be used to secure the bottom wing, the other two members being put on after the glue has dried. Fillet the bottom wing to the fuselage with Plaster of Paris. No. 5 $00

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**FORTEEN**

1/16 inch balsa required to build the wing. These are shown full size on the plans. Only

.028 music wire and cemented firmly in.

Trace the rudder and stabilizer outlines from the plans onto 1/16" sheet balsa. Pin the outlines over the drawings and cement the spars of 3/32" sq. balsa, and the cross pieces of 1/16" by 3/32", in place. If movable elevator and rudder are desired, connect them to the stabilizer and fin with strips of thin aluminum. Superb result of the edge tool with sandpaper.

**WING**

FOURTEEN 1/16" sheet balsa are required to build the wing. These are shown full size on the plans. Only

.028 music wire and cemented firmly in.

Trace the rudder and stabilizer outlines from the plans onto 1/16" sheet balsa. Pin the outlines over the drawings and cement the spars of 3/32" sq. balsa, and the cross pieces of 1/16" by 3/32", in place. If movable elevator and rudder are desired, connect them to the stabilizer and fin with strips of thin aluminum. Superb result of the edge tool with sandpaper.

**Prop and Flying Instructions**

The prop should be carved from a medium strength piece of balsa. Balance carefully, then insert and cement the prop shaft to the shaft, mount a couple of brass washers, cementing one nut flush to the rear of the prop hub. Now install the shaft through the thrust bearing hole.

Motive power is supplied by using two strands of 1/16" flat rubber. Before attempting to fly your Raven R.O.G., you'd better glide her a bit to make sure she has the full "feel" of her wings. In the event the model stalls, move the wing back; should it dive, shift it forward. Experiment until you obtain the best gliding angle. Then rev her up for real performance figures—and keep your weather eye on her, for she really is "mischiefous."

**Build the Davis D1-W**

(Continued from page 46)
Propeller

Shape a nose plug from a block 7/8" sq. by 5/8" long. A washer with a bushing inserted should be securely cemented to each end of the nose plug to serve as a bearing.

A six inch propeller carved from a block 6" by 1" by 5/8" balsa is required. Do a good job when carving the prop. The rear of the blade should be cupped about 3/32". If desired, however, a semi-finished machine carved prop, or a completely finished prop, may be purchased. But whatever prop is used, for the best performance a free wheeling prop should be used, as the glide is greatly benefited by it. Bend the prop shaft from .028 music wire and pass it through the nose plug and the prop, not forgetting two or three washers between them.

Covering and Assembling

There is no set color scheme, as the Davis airplanes are produced to suit the fancy of the purchaser in regard to color. It is advisable to cover the model with colored tissue, rather than colored dope, however, to keep the weight down for longer flights and gentler landings.

The fuselage is best covered with narrow strips of tissue, especially the curved top and bottom. The wing and tail can be covered in one piece. Spray all surfaces lightly with water to tighten the tissue.

While the wing and tail are drying, inspect them frequently and straighten out any tendency towards warping by carefully pressing them in the opposite direction.

After the water has completely evaporated, dope lightly and again watch out for warping. Cement the landing gear struts O to the bottom center stringer of the fuselage. Next attach the long struts P to the top longeron and to the bottom of strut O. Glue the pants to the landing gear struts. When assembling the model use plenty of cement and scrape away the tissue at the point of contact to assure a solid bond. A short piece of .020 music wire slipped through the wheel and pant extended part way up strut O is used as an axle.

Shape the cabane struts from 1/16" by 3/32" bamboo to a streamline cross-section and fasten the ends of them, and force them into the upper longerons and rib 2. The wing should have an incidence angle of 3 degrees. The Vee struts are attached to the lower longeron and to rib 4. The stabilizer is cemented to the top longeron at an angle of 0 degrees incidence. The rudder is glued to the rear of the fuselage. Six strands of 1/8" flat brown rubber is used for power.

Flying

The model should balance at a point 1/3 back on the chord of the wing. A small amount of modelling clay may be needed to weight the nose.

Take the model out to an open space, preferably one covered with tall grass. Glide the ship, and adjust any stalling tendency, by depressing the elevators. Reverse the treatment to correct diving.

When a satisfactory glide is obtained, make a short test flight with about 50 Winds. Bend the rudder so that the plane circles definitely to the right. When your rubber is lubricated, stretched by depressing the winders, about 600 turns can be safely stored in the motor and real duration flights are a cinch.

Okay? Then take it away!

Construct a Fokker F-36

(Continued from page 64)

Flying Aces Model Laboratory

(Continued from page 62)

of the wood. The pontoon is then sanded until the surface is smooth. Another coat of oil is then applied. However, this time it may be thinned out. Banana oil can be thinned by mixing it with a small quantity of acetone. Next, the pontoon is again sanded to a fine finish. This process is repeated until a hard and smooth surface is obtained. It may be advisable to coat the seam of the pontoon a few extra times as it is possible that it had not dried evenly, thus causing small holes to appear.

So much for the monocoque construction. Now to get back to the finishing of the built-up pontoons. With the structure completed, it is given a smooth sanding so as to remove any bumps caused by the dried glue. Unless this is done, you will find that the covering will have a bumpy affect. This must be

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**COMET CATALOG**

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**Answers**

TO QUESTIONS ON PAGE 39.

1. Only four U. S. airmen have been awarded the Congressional Medal of Honor: Luke, Hickson, Backer, Bickley, and Goettler.

2. Charles Correll, the "Andy" of the "Amos and Andy" radio team, flies a Stinson.

3. The Hawker P.V.4 uses the Bristol Pegasus engine.

4. The Spanish Air Service (now the Loyalists) bought the manufacturing rights to the Hawker Fury a short time before the revolution broke out.

5. A wing-fillet is the streamlined section that smooths off the joint of the wing to the fuselage.

6. Falcons of France was written by Charles Nordhoff and James Nor- man Hall, who also wrote Mutiny on the Bounty.

7. A circle with crossed pick-axes indicates a quarry or a mine on an airway map.

8. Tom Campbell Black was recently killed in an air collision with a military machine near Blackpool, England. He was an honorary member of the Flying Aces Club. With W. A. Scott he shared the honor of winning the great England-to-Australiia race.

9. The book, Diary of a War Bird, written by Elliot White Springs, was taken from the actual diary of Louis, John MacDougall Girder, a fellow pilot in Springs' squadron.

10. Pakker is believed to be the first airplane designer to use the cantilever wing. He first tried it out on the Pakker D-7.
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