

15¢

BILL BARNES AIR TRAILS

SEPTEMBER
1936



THE BLOOD-RED ROAD TO PETRA—*Bill Barnes Novel*

96 PAGES OF ★ **PICTURES** ★ **ARTICLES** ★ **FEATURES**
★ **STORIES** ★ **MODELS** ★ **NEWS ...**

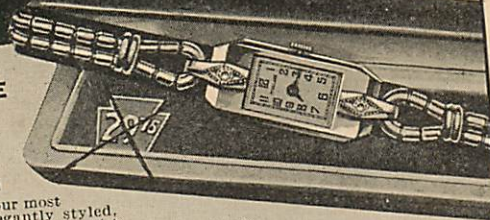
**To make
50,000
NEW
Friends!**

**These Astounding
Genuine Jewelry Values
Sent—NO MONEY DOWN!**

**2 Diamond
BAGUETTE**
Now only
\$19.75

\$1.98 a month

LA-1... Now at our most liberal terms! Elegantly styled, modern, genuine Baguette wrist watch at an amazingly low price. The streamlined white, lifetime case is set with 2 brilliant, genuine diamonds and fitted with a fully guaranteed and dependable movement. Smart, link bracelet to match. \$29.75 value specially offered at \$19.75. **Nothing down—Only \$1.98 a month.**



MEN, Look!!

**17 Jewel
WALTHAM
"Diplomat"**

Now only
\$24.75



Handsome Genuine leather strap included free!

LA-2... Where could you duplicate this? Factory guaranteed Famous 17 Jewel WALTHAM "Diplomat"—offered at a sensationally low price. Permanent white case, richly engraved and correct in every detail. Fitted with link bracelet to match and smart, new extra leather strap. By special permission ROYAL now offers this \$37.50 value, complete for only \$24.75. **No Money Down—only \$2.48 a month.**

That's exactly what we mean! No Money Down — Not one cent in advance — No C. O. D. to pay on arrival! All we ask you to do is to examine any of these values for **TEN DAYS** at our expense. After full free inspection, if you agree with us that our style and quality values challenge duplication by cash or credit jewelers anywhere, take

10 MONTHS to PAY

Royal offers you the most liberal credit terms without any embarrassment! **No red tape — No direct inquiries — No interest or extras.** Just send us your name and address and a few personal facts such as age, occupation, etc. (if possible mention 1 or 2 business references.) All dealings strictly confidential. After **10 DAYS FREE TRIAL** — pay the 10 equal, easy monthly payments, stated under each article, without further obligation.

Written GUARANTEE

Your satisfaction is always assured when you buy at Royal. A written guarantee — fully backed by ROYAL — **America's Largest Mail Credit Jewelers** — accompanies every ring or watch purchased from us giving you absolute protection.

Send for FREE CATALOG

**New 32 page
"BOOK OF GEMS"**

Hundreds of special values in genuine blue-white diamonds, standard watches, fine jewelry, silverware, cameras, radios and gift novelties. Each fully described and pictured. **Adults send for your copy to-day!**



NO DEPOSIT—NO C.O.D.—10 MONTHS to PAY!



Only
\$27.85

for Both
\$2.79 a month
5 Diamonds

LA-3... "LADY DIANE" DUO — exquisitely matched engagement and wedding ring ensemble of beautifully engraved 14K Solid White Gold. The specially selected, dazzling genuine blue-white center diamond in the engagement ring is made even more beautiful by the two brilliant diamonds on each side; the wedding ring is exquisitely engraved to match. **No Money Down—Only \$2.79 a month for both complete.**

**America's Largest
Mail Order Credit Jewelers**



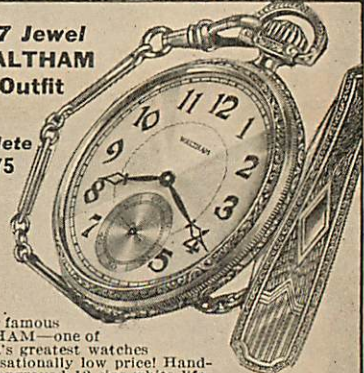
Only
\$19.75

\$1.98 a month

LA-4... A smart, modern, square prong engagement ring of high quality at an amazingly low price. The fiery, brilliant genuine blue-white diamond is set in a richly hand engraved and milgrained ring of 14K Solid White Gold. Specially priced at \$19.75—During this special "new customer" drive our terms are: **Nothing Down—Only \$1.98 a mo.**

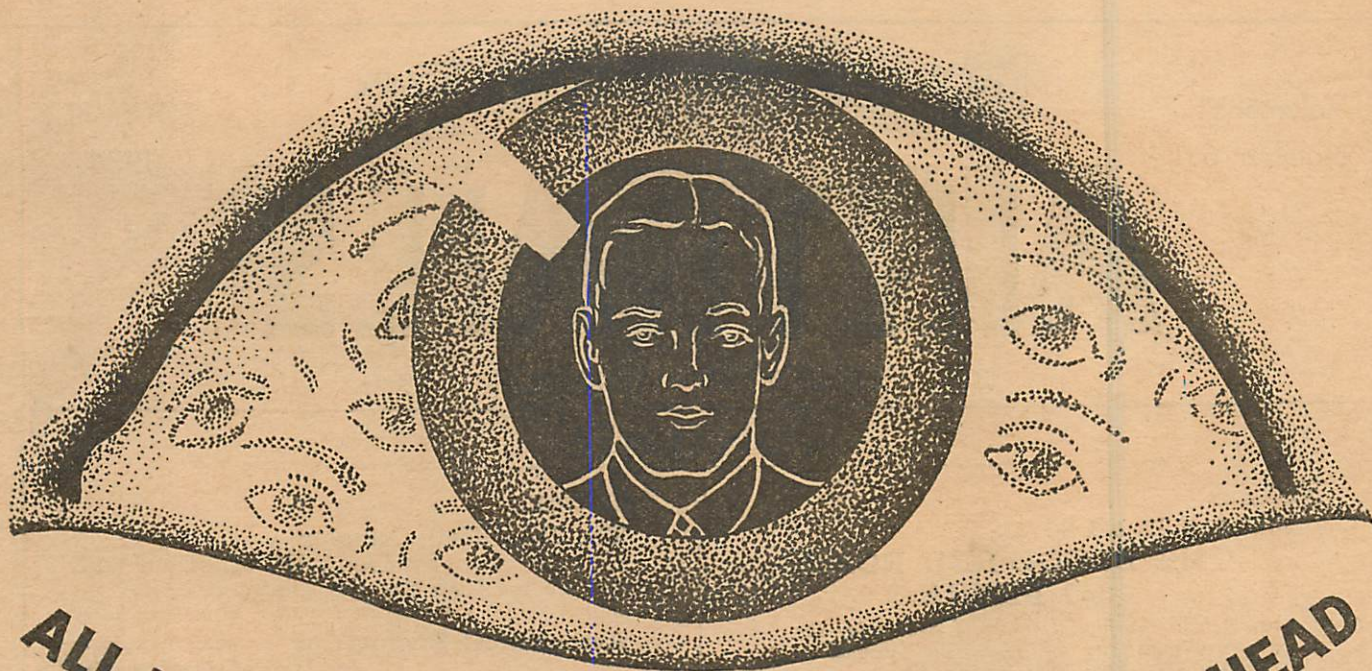
**17 Jewel
WALTHAM
Outfit**

Complete
\$19.75



LA-5... Another famous WALTHAM—one of America's greatest watches at a sensationally low price! Handsomely engraved 12 size white lifetime case; factory guaranteed, accurate and dependable 17 Jewel WALTHAM movement; complete with engraved knife and chain to match. **ALL for \$19.75—No Money Down—only \$1.98 a month.**

ROYAL DIAMOND & WATCH CO., INC.
Established 1895
170 BROADWAY N.Y.C.
Address—DEPT. 52-J



ALL EYES ARE ON THE MAN WHO LOOKS AHEAD

● A man cannot conceal ability. And the man who is determined to go some place and is doing something about it cannot conceal that either. His associates feel it and his superiors recognize it. The man who looks ahead knows the importance of training, and other men who have looked ahead and gone some place know that I. C. S. offers the right kind of training. Look ahead—mail this coupon!

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 4937, SCRANTON, PENNA.

★ Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," ★ and full particulars about the subject *before* which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect
☐ Architectural Draftsman
☐ Building Estimating
☐ Contractor and Builder
☐ Structural Draftsman
☐ Structural Engineer
☐ Electric Engineer
☐ Electric Lighting ☐ Wiring
☐ Telegraph Engineer
☐ Telephone Work ☐ Radio
☐ Refrigeration

☐ Welding, Electric and Gas
☐ Reading Shop Blueprints
☐ Machinist ☐ Toolmaker
☐ Patternmaker ☐ Boilermaker
☐ Sheet Metal Worker
☐ Plumbing ☐ Steam Fitting
☐ Heating ☐ Ventilation
☐ Pipefitter ☐ Tinsmith
☐ Air Conditioning
☐ Automobile Mechanic
☐ Coal Mining ☐ Navigation

☐ Bridge Engineer
☐ Bridge and Building Foreman
☐ Highway Engineer
☐ Civil Engineer
☐ Surveying and Mapping
☐ R. R. Locomotives
☐ R. R. Section Foreman
☐ R. R. Signalmen
☐ Air Brakes ☐ Train Operation
☐ Diesel Engines
☐ Aviation Engines

☐ Mechanical Engineer
☐ Mechanical Draftsman
☐ Steam Engineer
☐ Steam Electric Engineer
☐ Marine Engineer
☐ Chemistry ☐ Pharmacy
☐ Cotton Manufacturing
☐ Woollen Manufacturing
☐ Agriculture
☐ Fruit Growing
☐ Poultry Farming

BUSINESS TRAINING COURSES

☐ Business Management
☐ Office Management
☐ Industrial Management
☐ Personnel Management
☐ Traffic Management
☐ Accountancy

☐ Cost Accountant
☐ C. P. Accountant
☐ Bookkeeping
☐ Secretarial Work
☐ Advertising ☐ French
☐ Salesmanship ☐ Spanish

☐ Complete Commercial
☐ Business Correspondence
☐ Stenography and Typing
☐ Civil Service
☐ Mail Carrier
☐ Railway Mail Clerk

☐ Grade School Subjects
☐ High School Subjects
☐ College Preparatory
☐ Illustrating
☐ Cartooning
☐ Lettering Show Cards ☐ Signs

Name.....Age.....Address.....

City.....State.....Present Position.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

BILL BARNES AIR TRAILS

Reg. U. S. Pat. Off.

A STREET & SMITH PUBLICATION

CONTENTS

3 Stories:

BILL BARNES AIR NOVEL:

THE BLOOD-RED ROAD TO PETRA 8

Behind the jagged peaks of Arabia lay the ancient city of Petra—and winged treachery that struck like a desert sandstorm!

by George L. Eaton

Coyote Killer *by Edward Churchill* 22

A twenty-dollar bounty for one kind of quarry in sky-hunting—only vengeance for another kind—

Headlines *by Harold Montanye* 30

Everything the famous air-line pilot did was news, but the wrong people read it.

8 Features:

This Winged World 4

Notable photos that picture current air events.

Air Progress 7

A page of summarized aviation news.

Parachute Development 17

An easy lesson for the aviation student.

The Flier's Dictionary *by C. B. Colby* 21

Parachute and Pack—twelfth lesson in technical terminology.

Gullible's Travels *Major Hunt* 25

A contest with cash prizes—and plenty of fun.

Air Trails Gallery 33

Pictures of modern planes for the collector.

Cross Winds 37

Can you answer the aeronautic definitions in this puzzle?

Pictorial History of Man in the Air . 38

More episodes for a scrapbook.

2 Departments:

What's Your Question? *Conducted by Clyde Pangborn* 29

A page of interesting, expert information.

Air Adventurers Club *Conducted by Albert J. Carlson* 36

The meeting place of the air-minded.

3 Articles:

The Dare-devil Complex *by Lieut. W. M. Wood* 18

Do you know that your greatest enemy in the air is yourself?

Aeronautical Engineering *by Daniel Jordan* 26

A valuable account of an important job, and how to prepare for it.

The New Boeing Fighter *by Frank Tinsley* 34

About the army's XP-29, undergoing tests—the plane on the cover.

12 Model Building Items:

The Model Workshop *Conducted by Gordon S. Light* 39

Have you tried street-light flying?

The Contest Calendar 39

A schedule of competitive events.

The Biggest National Meet 40

Results, pictures and news of the 1936 contest at Detroit that reached a new level.

Sport Plane *by Louis Garami and Henry Struck* 45

Flying scale model of the Brown B-3.

The Discussion Corner 51

Readers debate the subject of the best airfoil sections for models.

Lazy Taperwing *by Lawrence N. Smithline* 52

Class B indoor tractor.

Model Matters 54

Contest times, club notes, news about modelers' activities.

Tops in Trainers *by William Winter* 55

Solid scale model of the Seversky BT-3.

Added Wings for Better Flights . 58

The Old Timer, an unusual original biplane flying model.

The ? Mark 64

Answers to questions; information for all.

The Most Efficient Plane *by Nicholas E. D'Apuzzo* 65

Solid scale model of the Cessna C-34.

From the Ground Up 66

The Buzzer, beginner's stick R.O.C.

Single Copy, 15 Cents

Yearly Subscription, \$1.50

The entire contents of this magazine are protected by copyright, and must not be reprinted without the publishers' permission. Monthly publication issued by Street & Smith Publications, Inc., 79-89 Seventh Avenue, New York, N. Y. George C. Smith, Jr., President; Ormond V. Gould, Vice President and Treasurer; Artemas Holmes, Vice President and Secretary; Clarence C. Vernam, Vice President. Copyright, 1936, by Street & Smith Publications, Inc., New York. Copyright, 1936, by Street & Smith Publications, Inc., Great Britain. Entered as Second-class Matter, October 10, 1935, at the Post Office at New York, N. Y., under Act of Congress of March 3, 1879. Subscriptions to Cuba, Dom. Republic, Haiti, Spain, Central and South American Countries except The Guianas and British Honduras, \$1.75 per year. To all other Foreign Countries, including The Guianas and British Honduras, \$2.25 per year. We do not accept responsibility for the return of unsolicited manuscripts.

To facilitate handling, the author should inclose a self-addressed envelope with the requisite postage attached.

STREET & SMITH PUBLICATIONS, INC.

79 7th AVENUE, NEW YORK, N. Y.

GET INTO AVIATION *for fascinating* GOOD PAY JOBS



MY FAMOUS COURSE TRAINS YOU AT HOME IN SPARE TIME ... MAIL COUPON FREE BOOK TELLS HOW

WALTER HINTON: Aviation er, Pioneer, Explorer, Trail Blazer, the first man to pilot a plane across the Atlantic Ocean (the NC-4 in 1919), the first man to fly from North to South America. During the War, as a Lieutenant in the Navy, he helped train hundreds of men for the Naval Air Force. Today he offers you the benefits of his long years of experience in practical Aviation to help you find your place in this thrilling, fascinating, good-pay industry—to help you benefit from Aviation's wonderful future.

GET MY BIG FREE BOOK Why put up any longer with a dull, tiresome, uninteresting job? Why sit back and envy the men already in the midst of the adventure and romance of Aviation? If you've got ambition and average intelligence—**YOU DON'T HAVE TO!** "What?" you say. "I can't give up my job and go to Aviation School at some distant airport. I'd like to, but I just can't do it!" All right—you're the man I want to talk to—you're just the fellow I developed my famous home-study training for many years ago. You're just like many other young men I have trained. Furthermore, you don't need previous experience and you don't have to know anything about planes or engines.

YES—MY SCHOOL OFFERS YOU THE OPPORTUNITY TO LEARN AVIATION RIGHT IN YOUR OWN HOME IN YOUR SPARE TIME. I give you knowledge you must have to enter this thrilling industry. I'll train you for many of Aviation's good pay opportunities—and I'll do it in a way that you can afford. Read all about it in my big book. Send for your copy now!

**AVIATION JOBS PAY \$40, \$60, \$75
A WEEK AND UP TO MANY**

Aviation is no "cheap-skate" game. It can't be. It is absolutely necessary to have high type, well-trained men. For only in that way can the Airlines build and maintain the remarkable record for speed, economy and more important, **SAFETY**, that they have today. To get high type, trained men, Aviation must do good salaries. Read in my Big Free Book about the many different types of jobs I train you for—and the salaries which go with these jobs. Mail coupon for my Book NOW.

AVIATION IS GROWING FAST— GET INTO IT NOW!

Aviation is a young industry for young, ambitious men. Aviation is a profession in which a young man like yourself can make good money quickly, with opportunities ahead for bigger and better jobs. Aviation's growing fast. It was practically the only industry to forge ahead during the depression. Millions of dollars are being spent yearly on improvements of airways, apparatus, equipment, and planes. The Government's program for expanding Army and Navy Aviation units; Government contracts for planes and equipment; for the Army and Navy Coast Guard; Air Mail Contracts, etc., etc.; are pouring more millions into Aviation. What does this mean to you? Opportunity NOW! Opportunity for you to get into a prosperous, fast-moving industry, an industry in which work crammed with thrills and romance replaces tiresome, "nose on the grindstone" drudgery. Opportunity for you to get into aviation on the ground floor—while it is still young—when you do not have to replace a lot of older men. My big book tells you much more about the opportunities which exist in Aviation today—**MAIL COUPON FOR IT NOW.**

These Men Made Good With My Training

Course Helped Pass Government Examination

"I am a holder of an aeroplane and engine mechanic's license and a private pilot's license. Your Course helped me a great deal to pass the examinations." **JOHN HALENDA**, 329 S. Balliet St., Frackville, Pa.

Recommends Course To All

"I can honestly recommend your Course to all who are interested in Aviation as worth the time and money spent on it, and much more. I am proud to have been a student of your Institute." **A. J. W. SLABBER**, Darling Road, Malmesburg, Cape Province, South Africa.

MANY TYPES OF JOBS TO CHOOSE FROM

You have over forty (40) types of Aviation jobs to choose from once you get the necessary training. You get information you need to pass the Government's written examinations for mechanic's license in a few short months. Then, if you wish to take up flying, I save you money on the cost of flight instructions at good airports all over the country. My Big Book tells you how.

MY TRAINING IS THOROUGH, PRACTICAL, UP-TO-DATE

I've put my eighteen years of experience—backed by over 400,000 miles of flying—five years of instructing officers and men in the Navy—into my thorough, quick training. And I've made it all so clear that almost anybody can understand it. My Aviation friends know that Hinton-trained men are well qualified to work for them.

GET MY BIG BOOK—NOW!

Now is the time to act! Now is the time for you to get into Aviation! Now is the time to prepare yourself to cash in on Aviation's tremendous growth during the next few years! Get all the facts! Learn how I train you quickly! Read actual letters from my graduates who are already in Aviation. You will find all this, and much more in my **BIG FREE BOOK. SEND FOR IT NOW!**

A few of the Good-pay Jobs in this Fast-growing Industry.
ON THE GROUND
Superintendent
Instrument Specialist
Electrician
Shop Foreman
Hangar Crew Chief
Traffic Manager
Purchasing Agent
Aerial Mail Clerk
Motor Expert
Radio Operator
Airplane Mechanic
Field Work

IN THE AIR
Air Express Agent
Air Mail Pilot
Aerial Photography
Airport Manager
Test Pilot
Private Piloting
Weather Observer
Flight Instructor
Commercial Pilot
Field Manager
Transport Pilot

Walter Hinton, President
Aviation Institute of America, Inc.,
1115 Connecticut Avenue,
Washington, D. C.

AIRPLANE FLIGHT INCLUDED WITH TRAINING

"Give her the gun!" You're off! Yes sirc, as soon as you complete my Course I arrange an airplane flight for you at an accredited air field, near your home. It doesn't cost you a penny extra. It's my graduation present to you.

**Rush Coupon
to Washington
NOW**



Mail for my big FREE BOOK on AVIATION NOW!

Mr. Walter Hinton, President
Aviation Institute of America, Inc.
1115 Connecticut Avenue, Washington, D. C.

913-Y

Please send Free copy of your book, "Wings of Opportunity," telling about my opportunities in Aviation and how you will train me at home for them.

Name
(Print clearly)

Address Age.....

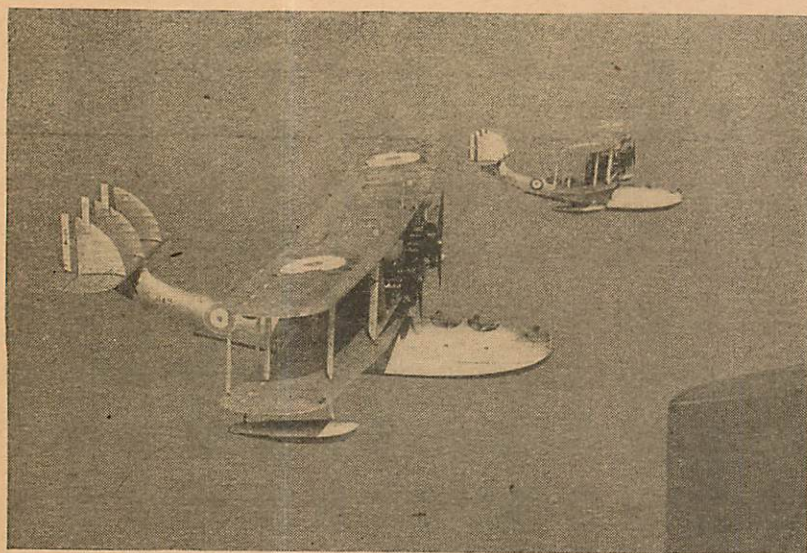
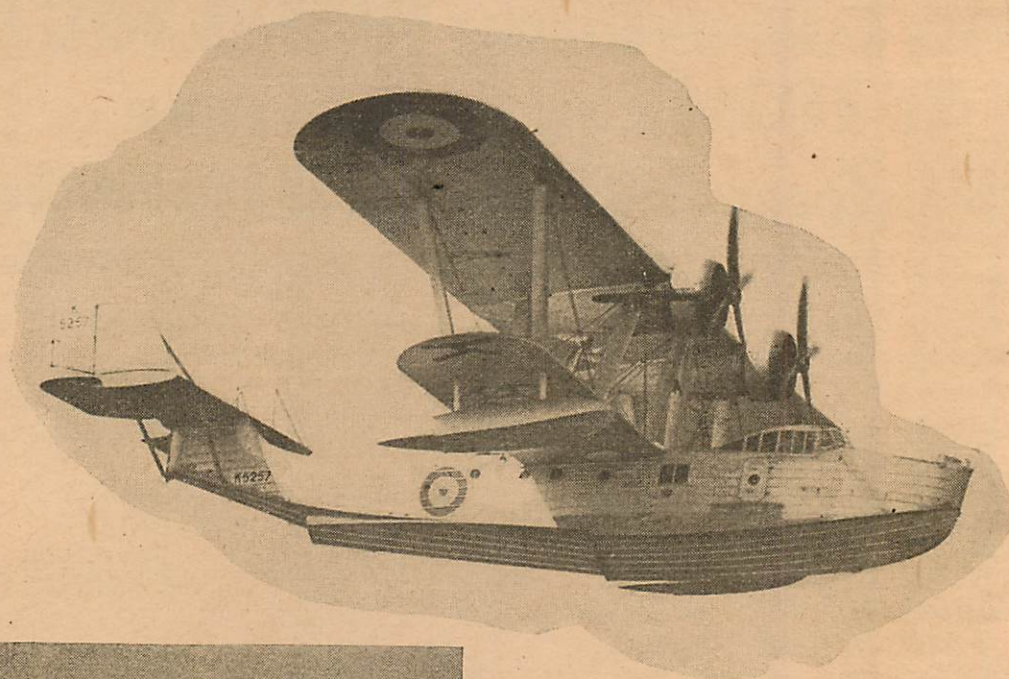
City State.....



ZOOMING in practice for French air show, Milo Burcham, American stunt ace, gives a good imitation of a rocket.

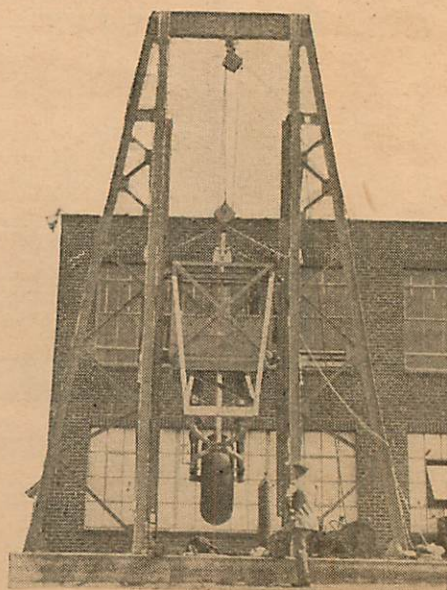
This Winged World

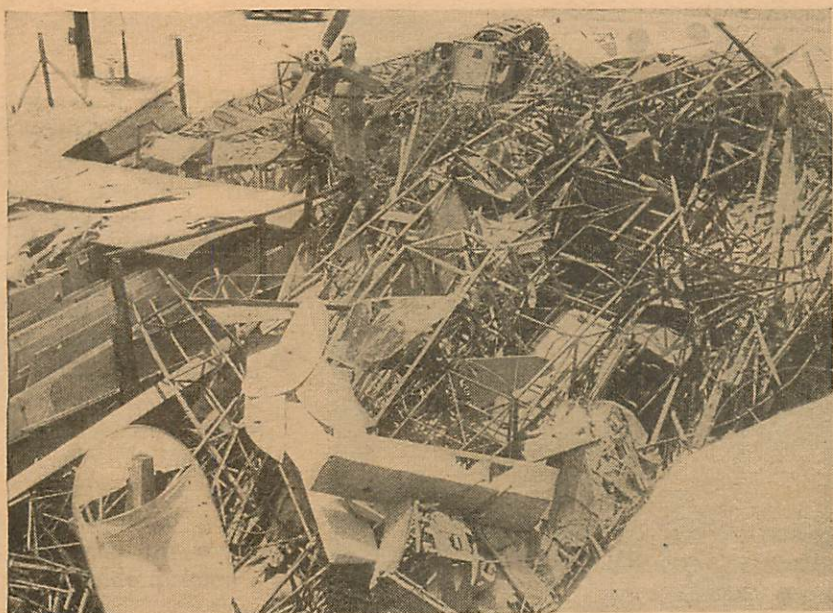
NEW addition to the Royal Air Force is this Saro London boat, powered with two Bristol Pegasus IIIs. Bomber's cockpit is at nose, with gun positions behind wing and at tail.



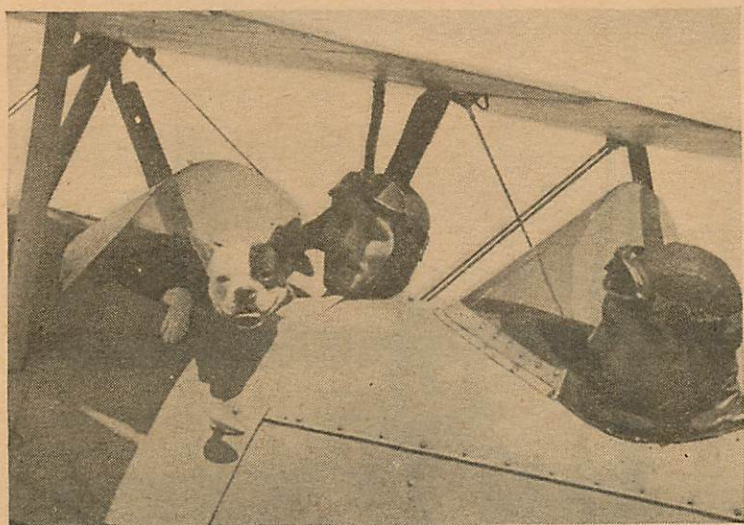
OLD mainstays of British force are these Supermarine Southamptons, first built in 1925, which seat crew in five tandem cockpits.

DROP test shows landing gear of 16-ton Boeing 299 bomber will withstand 80-ton strain.

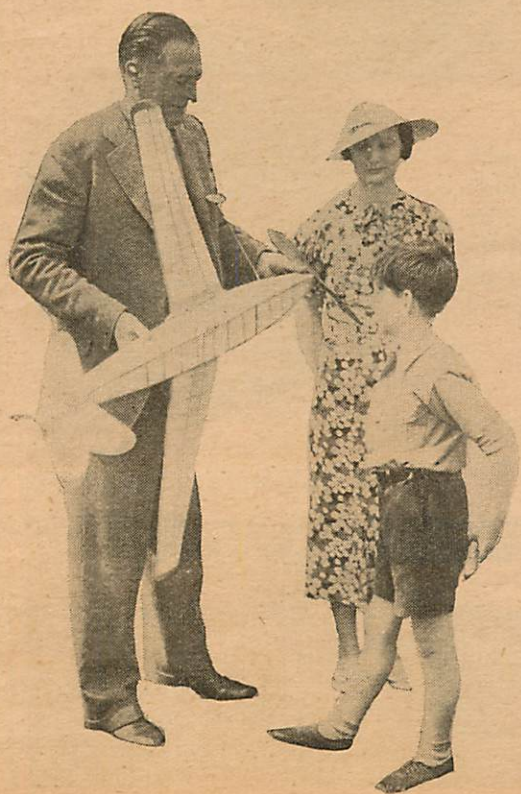




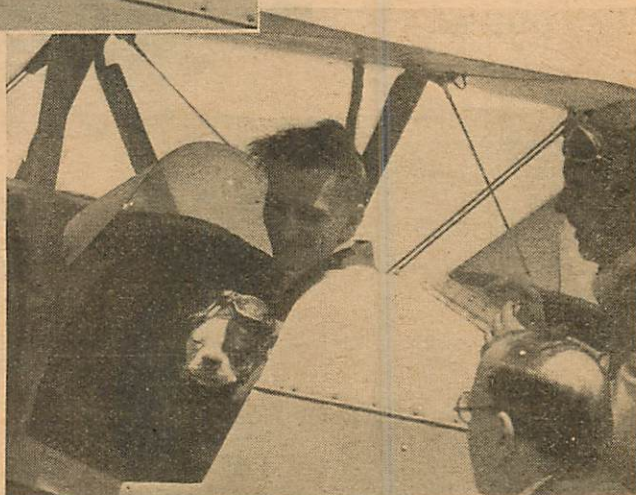
GRAVEYARD of many a famous plane, the Los Angeles wrecking yard of Arrigo Balboni, former war pilot, has received 2,100 ships since 1924. The proprietor, holding a shattered navy seaplane prop, hopes to add the Post-Rogers Lockheed to his mournful collection.

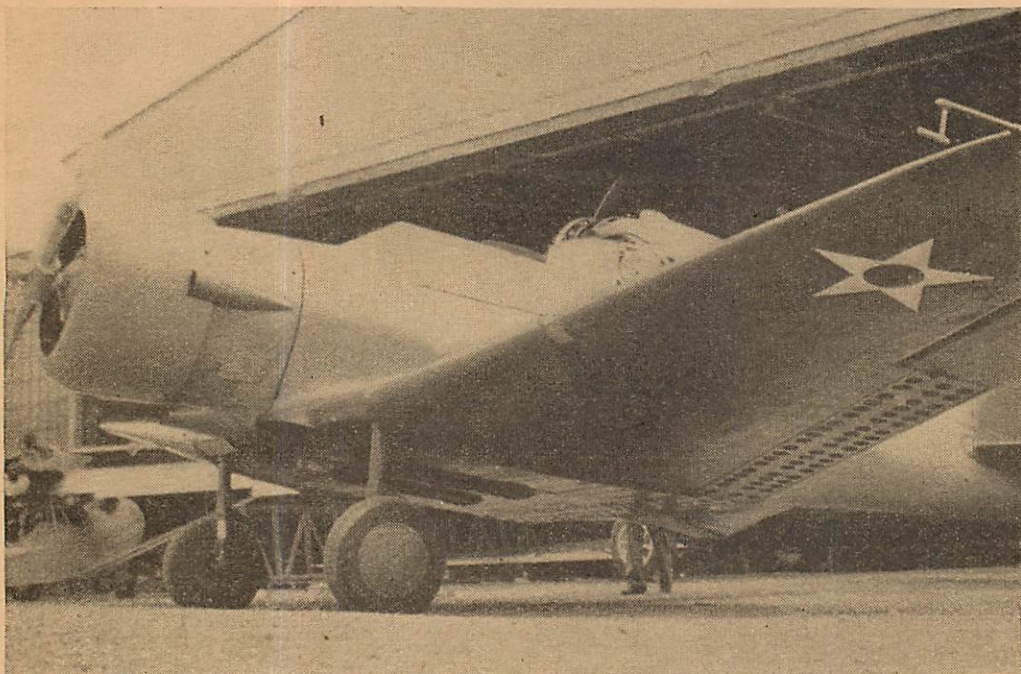


DEAF dog takes plane cure! Piloted by Andy Stinis and held by H. E. Anderson, he went up smiling (left) but came out of 5,000-foot dive looking pretty sick. Doctor reported, however, rapid change of air pressure had partly restored hearing.



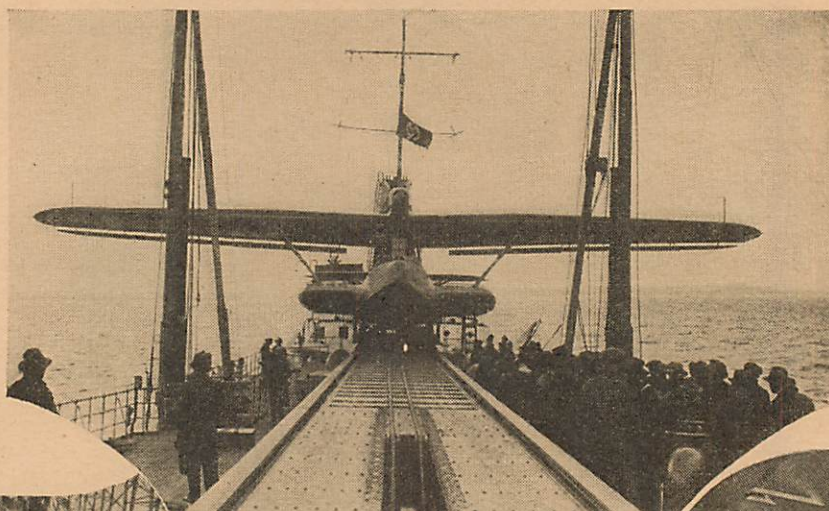
C. R. FAIREY, maker of famous English planes, talks aeronautics with Peter Warwick during trials for Wakefield team, while Mrs. Fairey looks on. We don't know who's responsible, but somebody got that wing on wrong!



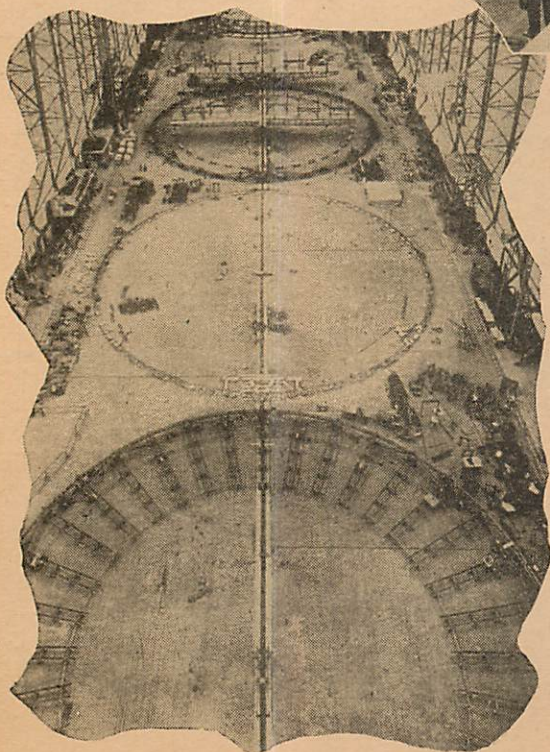
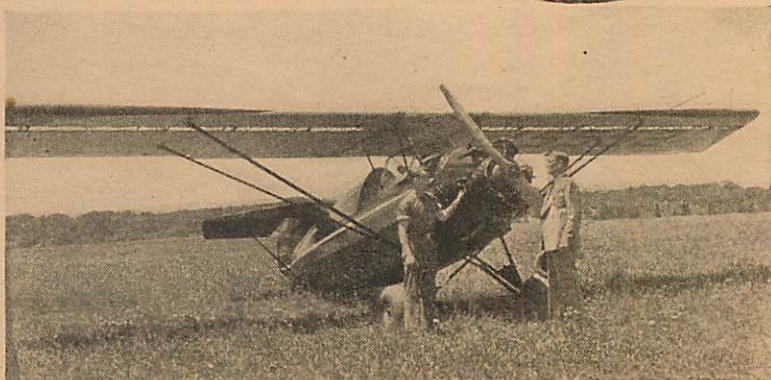


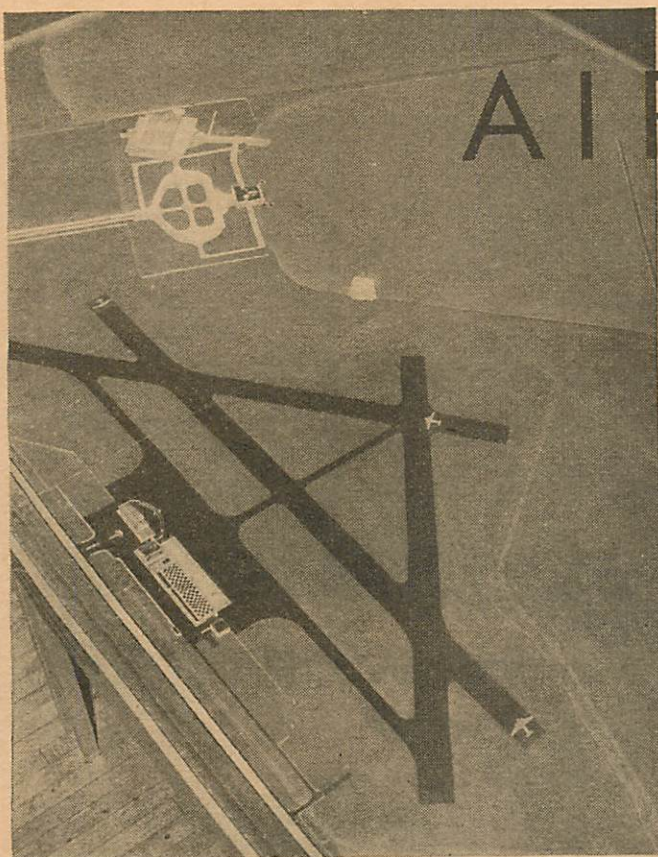
HOLES in flaps of experimental Northrop attack smooth air turbulence behind the wing when flaps are lowered and thereby lessen tail buffeting, without seriously reducing flaps' effectiveness. Although reported rejected by the army, this plane represents an interesting attempt to solve an aerodynamic problem.

ATLANTIC plans of Germany take shape in two forms. Right, plane on page 33 tries new catapult vessel "Ostmark." Derricks lean outward for wings to pass. Below, rings of LZ-130 dirigible being constructed along center line.



SPLIT wing built with permanent slot yields what has been shown by its inventor, W. E. Methvin of Tennessee, to be an absolutely spin-proof plane.





San Francisco municipal airport model shows future base for PAA's transpacific "Clipper" planes at top.

Transatlantic

A new base for Atlantic hops has been started in Newfoundland for the British Air Ministry. It will have hard-surface runways, hangars, machine shops, and a hotel for the passengers which Britain visions for her new Short flying boats.

To blaze a trail via the substratosphere, Clarence Chamberlin acquired a Lockheed Altair and planned a 4-to-6-hour hop at 35,000 feet with 400-mile speed from Newfoundland to Ireland.

The dirigible *Hindenburg* continued to shuttle back and forth, numbering a 6-months-old baby among the passengers on its third trip here, and setting a new east-west record from Frankfurt, fourth trip, of 51h 17m.

Boldest of sea-hop plans were those of Dr. K. Zinner of Germany and Demuytere of Belgium, who hope to drift from Africa to South America in free spherical balloons.

Meets

Glider pilots staged their annual contest at Elmira, N. Y., with such success that an international meet with \$10,000 in prizes is planned at the same site next year for June 26 to July 10. Among outstanding performances this year were Emerson Mehlhose's unofficial U. S. altitude mark of 6,516 ft., duration record for two-seat gliders of 8h 48m set by Albert Slatter and Jay Buxton in the latter's Transporter, and Richard C. du Pont's record round-trip flight of 37 miles from starting point to announced goal and return.

Two important long-distance races have been announced. The French Aero Club's 13,629-mile dash starting Oct. 25 from Paris to Saigon, French Indo-China, and return will offer about \$79,000 in prizes to

AIR Progress

A summary of aviation news

international speed aces. Britain's Royal Aero Club race from England to South Africa starting Sept. 15 for \$50,000 offered by I. W. Schlesinger, Cape industrialist, is limited to British Empire pilots and planes.

Performance

New international and U. S. non-stop amphibian distance records of 1,425 miles, covered from Puerto Rico to Langley Field, Va., in 11h 9m have been established by an air corps Douglas OA-5 piloted by Major Gen. Andrews and Major John F. Whiteley.

Mlle. Maryse Hilsz recaptured the women's altitude record from the Marquise Negrone of Italy, and incidentally broke the French men's record, with a climb to 46,947 feet—only 405 feet below the world airplane record held by Italy's Commander Donati.

Science

Meteorology furnishes the news this month, with Amelia Earhart leading in a demonstration of a new "fog powder" over Union Air Terminal in California. Dusted from the plane she flew by a device operated by its inventor, C. R. Pleasants, the chemical opened holes in 500-foot fog, clearly revealing the ground.

Two-week weather forecasts may be possible by 1940 by keeping records of the rise and fall in solar radiation, according to Dr. Abbott, Smithsonian Institution secretary. He wants ten mountain-peak observatories, and suggests that improved radio-robot sounding balloons might also help. Professor Piccard's latest balloon of this type, a 30-foot cellophane bag, landed after an 800-mile hop, its greatest height undetermined due to freezing of the radio battery.

Air Force

Several legislative bills are now in effect as an outcome of Congress' spring session which mean much to the army and navy. The army bills authorize a maximum strength of 2,320 planes, allot almost 60 million dollars to the air corps, provide for 565 new planes within the next year, and permit up to 1,350 air reserve officers to be recalled to active duty. The navy's bills provide 333 new planes within a year to bring its fighting force to 1,259 and authorize a new air station at Alameda, Calif.

Other bases contemplated for the future include two huge army and navy Alaska bases, and six large army bases within the United States.

Recent army contracts: 77 pursuits and parts for 8 more from Seversky, \$1,636,250. See page 33.

Navy contracts, totalling about 5 million dollars: 54 Northrop dive bombers, 54 Vought dive bombers, 83 Curtiss scout bombers.



*Hideous
treachery fed
embers of hate
that smoldered still
within ancient, evil ruins—
treachery that threatened to
blast Bill Barnes from the sky!*

by George L. Eaton



The Blood-Red Road to Petra

A HALF DOZEN little puffs of dust, that were running ostriches, fled before the slow-moving caravan. Heat rose from the hot desert sands like blasts from a fiery furnace. The only sounds were the rustle of the camels' feet and the dull, dead shifting of the sand as it crept slowly westward before the hot, dry wind.

As the sun plunged toward the sea of sand the breathless wind became a half gale. It whipped sand eddies into the cracked lips and chapped faces of the two men who led that long, thin line of pack camels. The Bedouins astride the baggage and riding camels drew their head cloths tighter across their noses, pulled the brow folds forward like visors, leaving only a slit from which their granular, burning eyes peered.

Their cartridge belts held their brightly colored cloaks tight at the waist to keep out the swirling sands. They wore their long rifles slung across their shoulders, and from their belts protruded the hilts of their ever-present daggers.

There was only the shifting of the sands, the padding of the camels' feet, the creaking saddles, the tinkle of bells to disturb the peace and quiet of dusk. No living thing moved across the desert wastes to disturb the solitude of that lone caravan.

Yet, something that was almost tangible, something like a tangible wave of terror crept the length of that long, thin line of camels, as the blood-red sun disappeared and the desert night plummeted down upon the caravan. The camels, seeming to sense that fear, nervously tossed their heads from left to right and bawled their uneasiness.

The two men in the lead glanced furtively at one another and licked their shriveled lips with tongues that were dry and swollen. They shifted in their saddles and glanced back at the rest of the caravan as the desert night swallowed them up. The long, thin line became a sinuous snake, the head or tail of which could not be seen from the center because of the dungeon blackness.

In an hour the wind died and the sky became calm and black and full of stars. Ahead they could see sand hills coated with tamarisk in the glow of the moon.

Beyond that first rim of sand hills the camels' feet padded on a floor of mud that was baked hard and was as flat as a lake. It extended to the first low hills of limestone that became great peaks against the sky in the distance.

"We shall find water within the Bab es Siq," one of the leaders said to his companion, in Arabic. His words came in the dull, rasping voice of a man who is parched. His companion acknowledged the words with a guttural grunt.

He was thinking of that long, desperate trek across the burning sands of the Great Nefud that lay behind them. He was thinking that now after the finger of Eternity had flicked them a half hundred times they should be safe. He was thinking of the riches they would divide once when they had marketed their cargo, if they got it safely home. His cracked lips twisted into a snarl at that word. *If*. Nothing, he told himself, could stop them now. He touched his hand to the bag of pearls

A Great Bill Barnes Novel of Air Adventure

that had come from the Persian Gulf. Sweet visions of his future life formed in his mind. His snarl became a smile.

In two hours they came to Es Siq, a cleft in the red sandstone hills. A Bedouin carried a blazing torch to lead the line of baggage and pack camels. Stupendous walls, in some places only twenty feet apart, and towering so high that in daytime the caravan would have looked like a line of ants from

the top, hemmed them in on both sides.

Even the camels ceased their grumblings and became quiet, afraid to flaunt their smallness in this gigantic work of Nature. Now and again, a single star twinkled in the dungeon of blackness overhead. The sweet odor of oleander was heavy in the air. It floated down the gorge of the Wadi Musa like the scent of ancient caravans bearing perfumes, frankincense, and myrrh.

They crawled along the bed of the Wadi Musa with weary, aching bodies. The half-conscious riders brought their camels' heads up with a jerk as they stumbled. The only thing that kept the riders in their saddles was the thought that soon they would feel cool, delicious water trickling down their throats. Then they could sleep the sleep of the weary. A few more days would bring an end to their long journey. There would be pay and a bonus, and the soft laughter of women, and that nameless fear would be behind them.

Because they were half asleep, they were unprepared when that first blast of gun fire crashed down the gorge and reverberated against the high sandstone walls.

Es Siq became a place of flaming guns, screaming animals and mad fanatics. Those two in the lead went off their camels with the first fusillade, their heads, literally, ripped from their bodies by a storm of machine-gun bullets.

The Bedouin riders, astride the camels, screamed for mercy as they were shot out of their saddles by the cloaked and turbaned madmen who poured out of the crannies and fissures that lined Es Siq.

The man who led them was tall and slender, with deep-set eyes that burned like twin fires. A black beard covered half his colorless face. His long, white silk robe streamed out behind him as he shouted orders. His brown head cloth, bound with a scarlet-and-gold cord, stood out as torches blazed in the gorge. His face became as mad as the faces of his men as he slashed the clothing off the two leaders of the caravan with his dagger, and searched it for treasure.

The thing that took place in Es Siq that night was horrible to behold. As each man fell from his camel an Arab dagger was slashed across his throat until his blood gushed out and his life departed. Their rifles and daggers and all their belongings were stripped from them.

A solid line of men stood at each end of the caravan, a line of grim, bearded men dressed in the robes of the nomad Bedouin. They were so placed to see that not one man of that caravan escaped to tell the tale.

When the pack and baggage camels were hobbled and quieted, Serj el Said, the leader of the bandits, shouted a command. Two lean, bronzed Europeans, wearing sun helmets, slacks, and automatics strapped around their waists, leaped to his side.

"Kill that dog who is trying to cut the ropes of the first pack!" he directed them.

One of them brought his automatic up. It barked three times. The Bedouin's body jerked as the bullets tore into him. His scream rose above the babble of his mates, then died as he plunged to the ground. The other Bedouins watched his body twitch convulsively. It was their custom that with victory came the right to plunder. They had become a pack of screaming, clawing zealots. Their hands sped toward the daggers in their belts.

Serj el Said watched them with an expression of contempt on his colorless face. Then he lashed them with words in Arabic.

"Are you men or dogs?" he asked them. "Do you snarl and claw and spit in your filthy greed while there is work yet to be done? We must lash those carrion to their camels and take them to the gorge of the Wadi es Siyagh. They must not be found here. Only Douglas, the infidel, will be found here by the British."

The Bedouins, grumbling, began tying the dead camel riders to the backs of their camels. Serj el Said spoke to his two European lieutenants in precise English.

"Bring Douglas," he said, sneering. "He will be what you call a red herring drawn across the trail of your countrymen."

They disappeared into one of the fissures that lined the mighty gorge. When they came into view again they were half leading and half dragging a man between them.

The man's face and head were bruised and discolored. His clothes were in tatters. Any one could see that each step cost him agony beyond description. But his eyes

were bright and unafraid. He carried his head high as he tried to laugh at the men on either side of him. There was an air of youth and courage and clean perfection about him.

"If I must die," he said, "I'm glad I learned what dirty rats framed me. No lower form of life ever existed."

"Shut up!" one of the men snarled. He was a huge bulk of a man with a thatch of sandy hair, and a scar that ran from temple to chin. His voice was a deep roar that became louder and louder as he spoke. His hamlike hands pressed cruelly into the shoulder of Douglas.

"MacTavish and Sneed," Douglas sneered. "A disgrace to their king and country. Two of the foulest traitors that ever wore the uniform."

Sneed's piglike eyes narrowed to mere slits as he banged the back of his hand across Douglas' mouth.

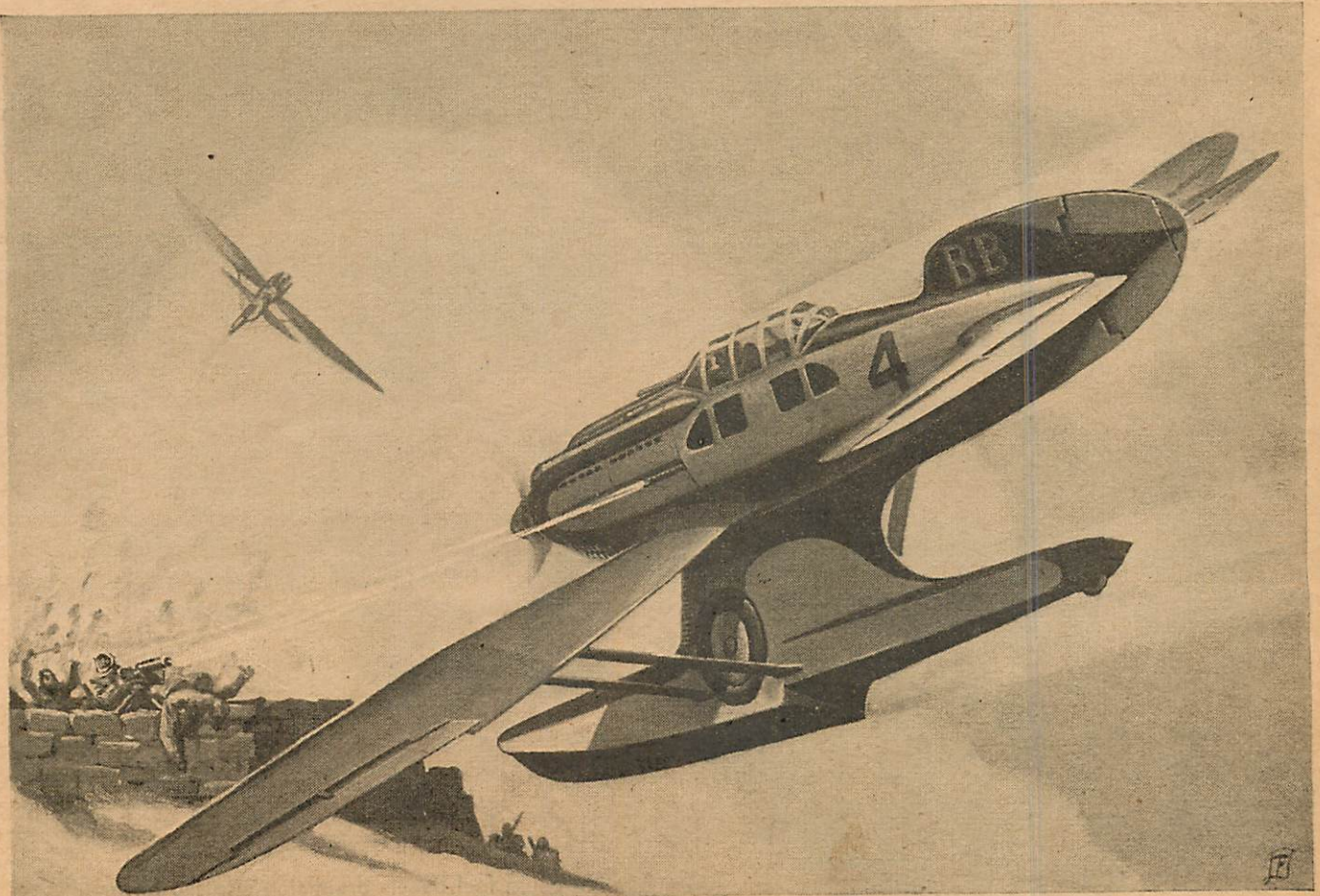
"Shut up, you swine!" he grated. "How would you like to have me turn you over to those mad Bedouins over there? They'd teach you how to be still by cutting out your tongue and staking you down in the desert sand."

They flung the white-faced Douglas against a wall of the gorge as Serj el Said came over beside them. His dark eyes gleamed malevolently as he gazed at Douglas.

"You'll be one less Englishman for me to cope with," he said. He turned to MacTavish and Sneed. "Well," he asked them, "why don't you kill him?"

A smile flitted across Douglas' face as he saw the momentary hesitation of the two Englishmen. He knew it would do him no good to plead for mercy. Nor would he have pleaded if he knew it would save his life. He was cast from a different mold than those other two.

It gave him no little satisfaction to see that they hesi-



Almost in the mouth of the machine guns, Shorty tore their crew to ribbons.

tated to murder a man who had been their fellow officer. He watched them with a smile on his lips and in his eyes. He was determined to die as he had lived, with his head up, afraid to look no man in the eye.

As MacTavish and Sneed drew their guns from their holsters, he spoke:

"A fitting job for two brave and noble officers," he said, almost lightly. "You should receive a citation from your greasy leader. You're not fit to associate with vermin. You——"

His body jerked and spun half around as MacTavish fired two bullets into his heart.

"That'll stop his mealy mouth!" MacTavish roared.

It did.

MacTavish rolled him over with his boot. Blood welled out of the two wounds and spread in a pool around him. His face was serene, as strong and determined in death as it had been in life.

WING COMMANDER Norton Kestrel, M. C., D. F. C., raised his eyes from the book he was trying to read and shook his head angrily. He was aware that

he had read the same paragraph at least a dozen times and did not know yet what he had read. He threw the book down and glanced around his comfortable quarters on the Royal Air Force field at Ma'an in Trans-Jordan.

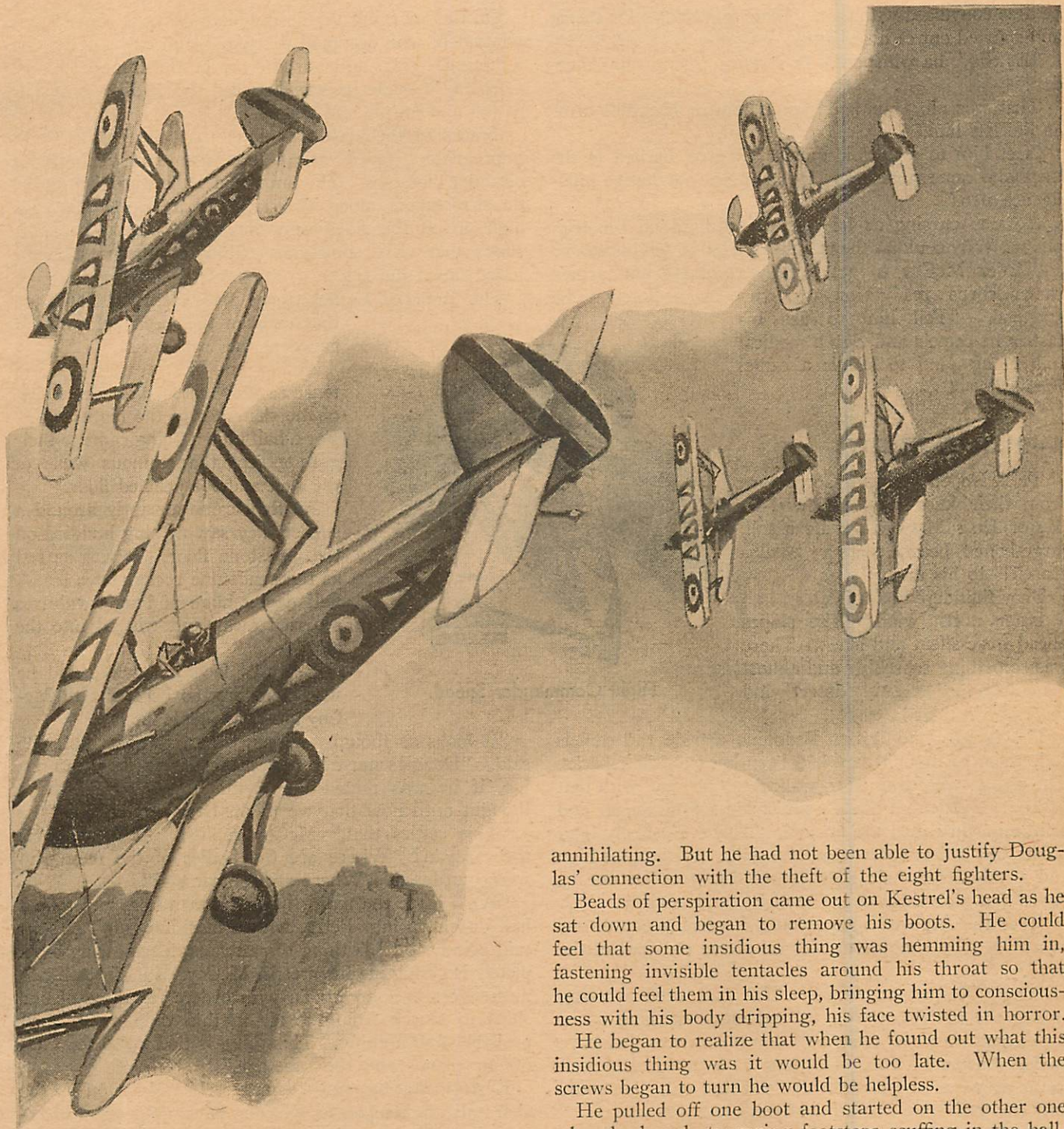
His mind flitted back to the disturbing reports he had received from British intelligence units in his area. Those reports might have something to do with the eight single-seater fighters that had been stolen from under his nose. And for the sabotage that had occurred.

He got to his feet and began to pace back and forth across the room, his rugged chin outthrust, his teeth clenched. He ran a hand through his fast-graying hair and across his lined cheek.

He had turned all of Trans-Jordan upside down trying to locate those eight ships. They had all disappeared at one time while he had been in Alexandria, Egypt, re-



He could feel bullets drumming into the Silver Lancer—could feel the big ship tremble under the impact.



ceiving secret instructions. One night the eight ships had been in their hangars. The next morning they had been gone. Other ships had been damaged. British and native intelligence men had worked on the case—without results.

What, he asked himself, was the connection between the theft of British air force planes and the restlessness of the natives? Who had been able to make those planes vanish like a magician slipping things up his sleeve?

The only result of his investigations had been the cashiering of young James Douglas, a flight officer under his command.

Kestrel's heart ached as he remembered the expression of anguish on Douglas' face when his wings had been ripped from his tunic. He would not have believed Douglas guilty of theft if the evidence had not been

annihilating. But he had not been able to justify Douglas' connection with the theft of the eight fighters.

Beads of perspiration came out on Kestrel's head as he sat down and began to remove his boots. He could feel that some insidious thing was hemming him in, fastening invisible tentacles around his throat so that he could feel them in his sleep, bringing him to consciousness with his body dripping, his face twisted in horror.

He began to realize that when he found out what this insidious thing was it would be too late. When the screws began to turn he would be helpless.

He pulled off one boot and started on the other one when he heard staggering footsteps scuffing in the hallway. He started toward the door, then stopped. It would be one of his men, drunk, he thought. He didn't want any more trouble to think about. He sat down again as something thumped against his door and he heard a scraping sound as it slipped to the floor.

The thing that lay there, when he opened the door, wore the usual mantle and head cloth of the native. But the clothes of this man were saturated with blood. The man's face was twisted in agony.

Kestrel shouted for help and dropped to his knees. When he opened the man's mantle he found that his chest was horribly shot away. He tried to stanch the flow of blood as the man opened his eyes. The man's lips moved slowly, but no sound came from them. He was trying desperately to speak before he died. Kestrel lifted his head and held his ear close to the man's lips. The man spoke to him in Arabic; his swarthy face

became convulsed with pain. Blood gurgled in his throat and spurted out of his mouth.

"Es Siq," he whispered, in Arabic. "Caravan—murder!"

That was all. His body went limp in Kestrel's arms as life left him.

"Get him to a doctor, quick!" Kestrel barked to the men who came running. "He is one of our native intelligence men."

He was cursing as he got his adjutant on the telephone. Why couldn't the man have lived to tell his story?

"Order McCoy to get a fully equipped and armed camel corps ready for departure immediately," he snapped. "Tell him to use his fastest he-camels and take a medical unit along—and to saddle a camel for me."

II—THE ANCIENT CITY

THE Imperial Camel Corps rose from their knees and bellowed as Major Duff McCoy, astride a tall, large-boned beast, roared, "Walk-march!" to his men.

They thundered out of Ma'an into a bitter north wind. The slopes ahead were silent and black. There was something searching and almost dangerous in that steady desert wind that blew in their faces.

The tough, lean desert Bedouins astride the camels rode them as though they had been born on their backs. The camels were trained to walk Arab fashion, with that bent-kneed gait that made their stride a little longer and a little quicker than the normal. They were finely bred beasts, but bad-tempered and half wild. With noses high and wind-stirred hair they jiggled along at an uneasy dance that took them over the night sands swiftly.

"Was the Arab who gave you the warning one of our men?" McCoy shouted at Kestrel above the wail of the wind.

"Yes," Kestrel answered. "He had been working among the natives, trying to find out something about the disappearance of those half dozen caravans that have vanished around Petra. He must have attached himself to this caravan to see what he could find out. He could only say four words before he died."

"He'll never tell what he found out," McCoy said.

It was dawn when the camel corps entered Es Siq, that cleft in the red limestone hills that was a trail of the ancient world. Centuries ago the Romans tapped the wealth of Petra by building two roads to it. When Rome fell, Petra was abandoned except for a few desert tribesmen who lived miserably in its tombs and caves.

A poet sang of ancient Petra a hundred years ago: "The rose-red city, half as old as time." Its first written history is to be found in the Bible when it was the home of the Horites, cave dwellers whose progenitor was Hori, the grandson of Seir.

For centuries Petra was the rich crossroads of the world. The Arabian peninsula was a network of caravan routes. The products of Africa, Arabia, and India were taken through Petra and re-routed to the valley of the Nile, Palestine, Phœnicia, and the Euphrates-Tigris valley.

On this morning the descendants of those same desert tribesmen, who occupied the tombs and caves of Es Siq a thousand years ago, gazed down on the Imperial Camel Corps as it made its way between the massive ramparts of red and purple and yellow.

Traces of the arch and gate, that once made Petra impregnable, faded away into mammoth clumps of oleander blossoms. The unbroken walls were like gigantic skyscrapers along two sides of a street. Caverns high up on the sides were like huge windows. Dark stains that were sometimes red and sometimes purple jetted down the sides.

The Imperial Camel Corps was silent, as had been that caravan the night before, as it gaped at the wonders of Es Siq.

McCoy and Kestrel were taut and tense as they watched for some sign of the slaughter of the night before. For a half mile nothing came to their gaze except the ominous walls of the cleft and the pebbled floor.

As they came abruptly around a corner they saw a thing huddled on the limestone floor. It was as red as the sandstone rocks above it. A half dozen huge and ugly vultures scurried away and winged into the air.

Kestrel's face was white and he was trembling as he spoke to McCoy a few moments later.

"It looks as though our court-martial was right," he said. "Douglas must have been a thief and a murderer, too, if he was mixed up in this thing. I've always thought until now that we might have been wrong."

"This settles that," McCoy replied. "But where is the caravan? Where are the bodies of the men who were murdered? Where are the camels?"

"We'll leave the majority of the men here and take a half dozen on into Petra, with a machine gun," Kestrel said grimly. "This thing of caravans disappearing completely is giving me the creeps, McCoy. I'll dispatch two messengers back to Ma'an with orders for three of our ships to search from the air in this vicinity. They'll probably find nothing. This thing is tied up to the theft of our planes and the sabotage."

Kestrel, McCoy, and six native riders kept on up the cleft until the temple, El Khazna, burst upon them unexpectedly. The sheer beauty and mystery of the place kept them silent. They watched the changing colors of the ancient temple as it became red under the sun.

Something within them stirred as they tried to grasp the significance of the centuries that had raced by since unknown men had cameoed out this temple to an unknown deity. What could the mute figures on its face tell of the past and the present, and of the ancient city of Petra that was lost to man for a thousand years?

They passed the theater that had been constructed in the days of the Romans, and the ruins of the temple, Qasr el Bint, that was once the castle of Pharaoh's daughter.

They were silent, as men will be when they are with their thoughts, as they entered the crumpled ruins of the ancient city. At first sight it looked as though they were within a blind pocket with two ranges of sandstone mountains on the right and the left, and ancient walls to the north and south.



Flight Commander Sneed.

But nature had cracked an entrance to the east through Es Siq and to the west by the Wadi es Siyagh.

They searched the amphitheater and tombs and temples of the city, studied the great high place of sacrifice on the Zibb Atuf through glasses. They stood at the base of the highest mountain in Petra, Umm el Biyara, and tried to find the ancient stairway that made the flat-topped fortress accessible to man.

They turned their glasses on the Holy of Holies, the top of Jebel Harun—the Moslem shrine of Aaron. They knew that within the mosque was the only Dushara still in use, except the black stone of the Kaaba in Mecca. They knew that the site is so sacred that no non-Moslem is allowed to enter or even approach its holy precincts, so they turned their glasses away.

"It seems incredible that we can find only tracks," Kestrel said. "They would have to stop and rest the camels unless they killed them and took the cargo on fresh camels. What did they do with the riders they killed?"

they attempted to defile the sacred image of Dushara."

"That's true," McCoy said. "I think our best bet is to comb the place from the air. You may have a report from the three planes you ordered out."

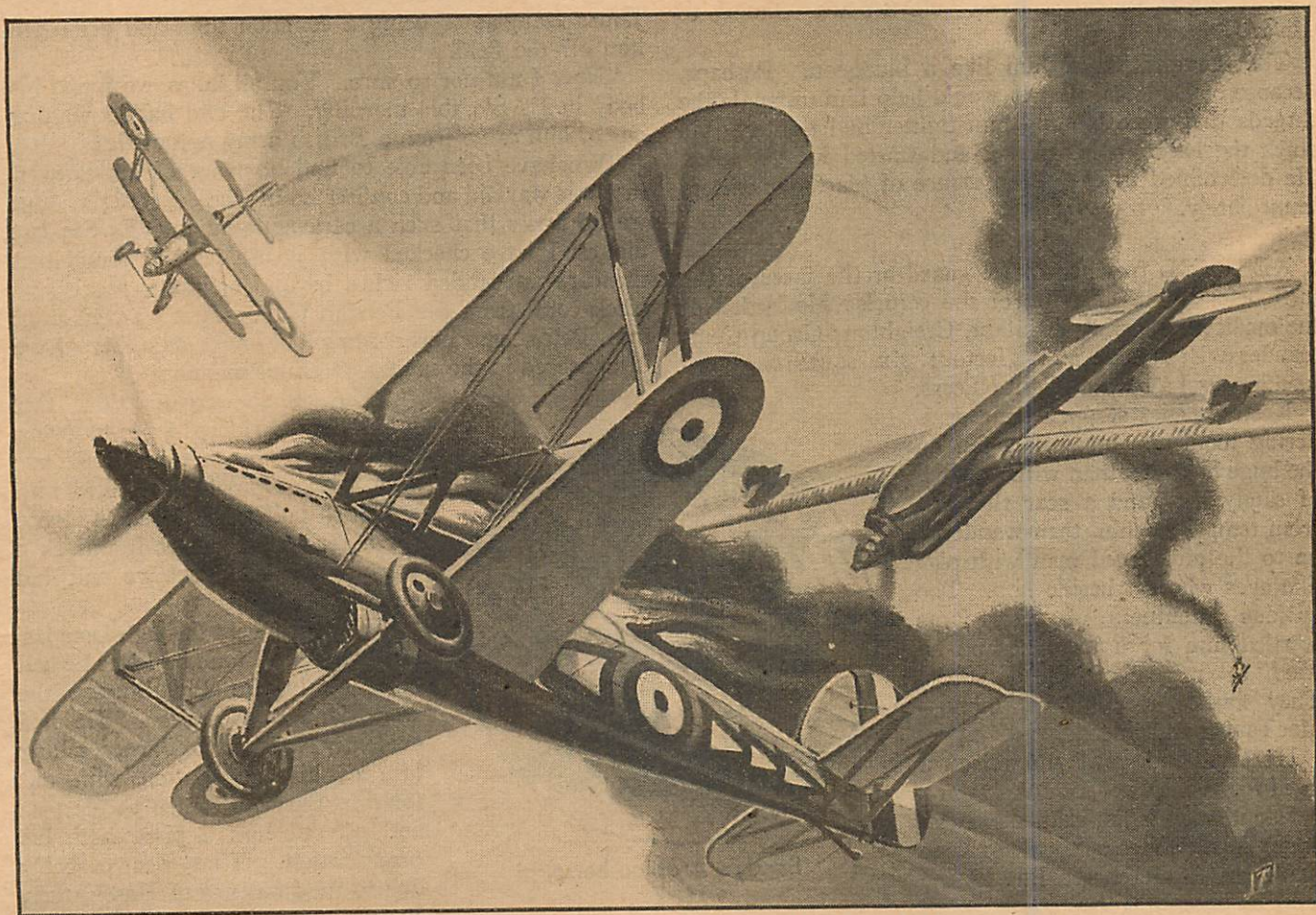
"We'll go back to Ma'an and leave a small garrison in Es Siq," Kestrel said. "We're going to have trouble, McCoy. Hell is going to pop around here. I want to get into the rooms of young Douglas in Ma'an and see what I can find. There may be a clue there."

COMMANDER KESTREL puckered his brow as he read the letter he had found in James Douglas' room. He had gone through Douglas' effects thoroughly, without finding a single thing that gave any clue to his death, until he found that letter.

DEAR BILL:

I don't know whether you will receive this before you leave China. I got your letter yesterday, and I can't tell you how appreciative I am.

But first let me wish you luck in China. I hope you get



Orange flame raced out and back into the face of the pilot.

"Probably threw them into the gorges of the Wadi Musa," McCoy said. "But they couldn't get out of here with camels unless they went out through Es Siq. The Wadi es Siyagh is impassable to caravans now."

"You think they're still in here?"

"I don't know," McCoy answered. "I don't know where they could be unless they are up there on Jebel Harun, the Moslem shrine. And they couldn't get camels up there."

"Nor would they dare," Kestrel said. "An army of a thousand hostile Bedouins would come out of the hills if

an order from the Nanking government for a couple of hundred planes. Good luck to you on that score!

As I told you in my last letter there are queer things going on here. The natives are restless and our Intelligence can't seem to get to the base of the thing. Eight of our fighters were stolen off the Royal Air Force field. Sabotage has been committed again and again. The whole thing remains a mystery. Then I was framed and stripped of my pips and wings and drummed off the field in disgrace.

You say in your letter that you will pick me up on your way back from China. You speak of flying from Nanking to Barnes Field, New York, as though you were going for an evening stroll!

Just one thing: I must clear my name before I leave here. I am going to do that, or die trying. I know you will under-

stand how I feel about this. Our wing commander—Kestrel—is beside himself. There is treachery and danger in the very air. You can almost see it. I know more about it than I can tell you in a letter. When you arrive here I will tell you what I know and, perhaps, you will help me unravel the thing.

I had always wanted to come to Arabia—"the land of mystery and romance." The mystery is still left, but not the romance.

I can't tell you how this thing is burning inside me, Bill.

There was a lump in Kestrel's throat as he came to the point where Douglas had stopped writing. He could picture young Douglas writing it, ready to pour out his soul to relieve his feelings. He wondered if a man could write a letter like that and still be guilty. He doubted it. Yet, stolen articles had been found in Douglas' rooms. He wondered for the first time if, as Douglas had claimed, he had been framed.

What, he asked himself, did Douglas know that he, Kestrel, didn't know? Was that the reason his dead body had been found in Es Siq?

He shook his head, angrily, as his thoughts jumped from Douglas to Bill Barnes. Barnes was coming to Ma'an!

The thought struck him like a bludgeon. Perhaps, because of Douglas, Barnes would help him untangle the threads that were binding him tighter and tighter. He stuck the letter in his pocket and started for his office. He determined to call a conference of his flight officers immediately.

KESTREL frowned as he gazed at the faces of the men before him. McCoy of the camels; McCardell of the medical; Kestrel's adjutant, Creighton; Group Commanders Braddock and Hector; six squadron commanders and a bevy of flight officers.

Kestrel's eyes stopped their wandering momentarily as they fell on the huge bulk of a man with a thatch of sandy hair and a scar that ran from temple to chin, then wandered on to the pink-faced man with pig-like eyes who sat beside him. The curious intentness of their faces startled him for a moment and he tried to remember their names. They flashed through his mind—MacTavish and Sneed.

He leaned forward and raised a hand for silence.

"Gentlemen," he said, "you no doubt have an idea as to why I have called this conference. But let me impress upon you that you have no inkling of the seriousness of the situation confronting us.

"I think it is best if I am frank with you. I was in receipt to-day of a communication from Sir Ronald, high commissioner of Trans-Jordan. He points out to me in no uncertain words that the Arabs in Palestine, Trans-Jordan, and Arabia are preparing to revolt.

"Some faction has aroused them. Trans-Jordan seems to be the center of their activities.

"Sir Ronald goes on to say that he knows we must constantly keep an eye on developments in the Mediterranean and the Red Sea and that we are in no position to withstand an Arab revolt with conditions as they are all over the world. We must nip the thing in the bud."

Kestrel stopped speaking, cleared his throat and ran his anxious eyes over the men before him.

"Anyway, that puts it up to us. I've known that something was brewing from the reports I have had from our intelligence men scattered over this area. Now I know why we had eight planes stolen from under our noses, and why others have been damaged. Also, I know why a half dozen caravans have mysteriously disappeared within the past few months. The goods those caravans carried can be traded for guns and bullets. The sacking of those caravans helps build up the illusion in the minds of the fanatical Bedouins that all the desert and anything that moves on it belongs to them."

Kestrel raised one hand and shook a finger at his men. His face was suffused with color and his eyes were spitting fire.

"Gentlemen," he went on, his voice rising, "whoever secured those eight planes from our field could not have done so without help from inside the field. Some place among us there are traitors. We must find them. I thought we had found the beginning when we convicted James Douglas of being a common thief and drummed him off the field.

"Now I am not so sure. You all know we found his body in Es Siq this morning. The two bullets we dug out of him came from a British army automatic!

"We have been able to find no trace of the caravan that was waylaid and confiscated in whole last night. But we do know that such a caravan went into Es Siq last night. I have checked with Jerusalem and found that the caravan carried riches beyond estimate, pearls and black coral from the Persian Gulf. That caravan went into Petra, but never came out—just as others have disappeared in the same mysterious manner.

"The same organization that looted our field looted those caravans, with help from some one inside our own lines. Douglas was killed with a British bullet. He was left there for a reason. Perhaps it was as a warning to us. That we will find out in due time.

"When we went through Douglas' effects to-day I found a letter he had been writing to Bill Barnes, the world-famous American. He had evidently written to Barnes telling him of his degradation with our forces. Barnes listened to his plea and offered him a place with his organization. That was probably due to the influence of Hassfurth, Barnes' chief of staff. He flew with

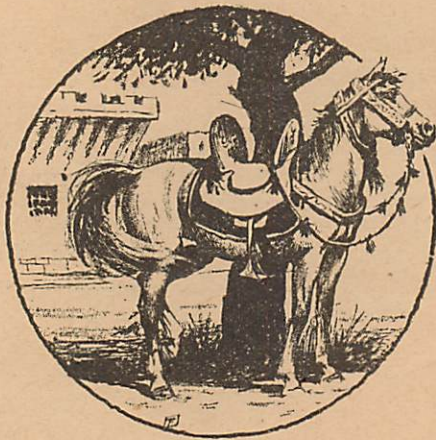
Douglas' older brother in a British squadron during the World War.

"Barnes is on his way here now. He is coming to pick up Douglas on his way home from a business transaction in China."

"Sir," Group Commander Hector said, "what has Barnes to do with us?"

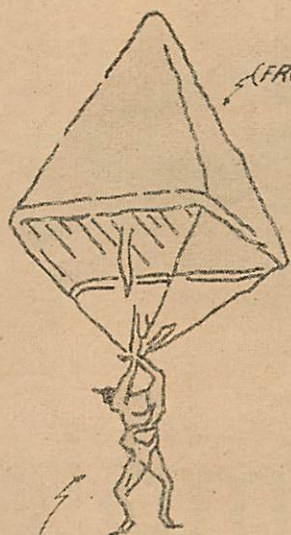
"I'm coming to that," Kestrel said. "You know our situation here. You know that any overt act on our part will have the Arabs on us, slitting our throats. We must keep an eye on the situation at Alexandria and Port Said constantly.

"It is possible that we may interest (Turn to page 68)



Sandy's Arabian horse.

Parachute Development



(FROM COPY OF DA VINCI'S
ORIGINAL SKETCH)

LEONARDO DA VINCI INVENTED
AND SKETCHED THE FIRST
PARACHUTE IN ABOUT 1490



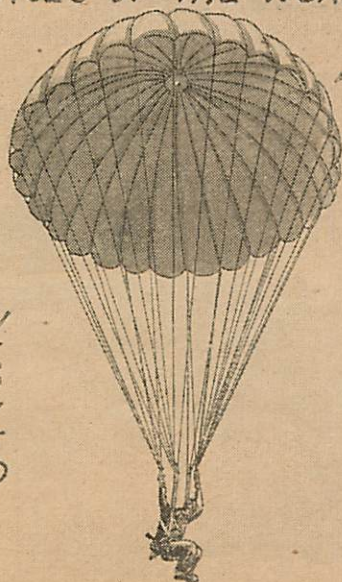
THE FIRST ACTUAL
PARACHUTE DROP
WAS MADE BY THE
FRENCHMAN, GARNIERIN,
AT PARIS, OCTOBER 22, 1797



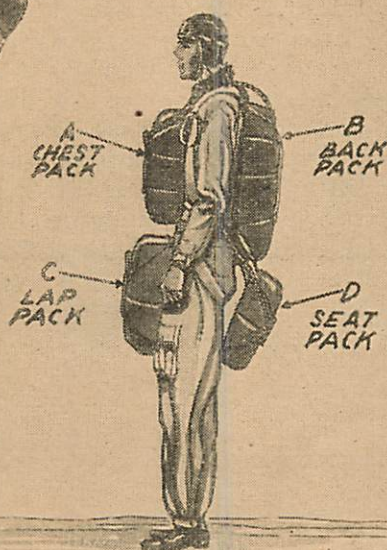
THE RUSSELL "LOBE"
CHUTE PRODUCED IN
'28 IS NONOSCILLATING



THE IRVIN CHUTE, USED BY
PRACTICALLY ALL THE AIR
FORCES OF THE WORLD



THE "GUARDIAN
ANGEL" CHUTE,
USED IN WORLD
WAR, PACKED IN
TUBE ON SIDE OF
SHIP. PILOT HAD
TO JUMP FROM
SAME SIDE OR
LINES FOULED



PARACHUTES MAY BE HAD TO BE
WORN AT "A" AS SECOND CHUTE FOR
TRAINING WITH CHUTE AT "B", OR
AT "C" FOR EITHER GUNNER OR
OBSERVER. THE USUAL TYPE FOR
PILOT OR CIVILIAN FLYERS IS
"D" WHERE IT ACTS AS A CUSHION

by Lieut.
W. M. Wood,
Air Corps
Reserve



The Dare-Devil Complex

THE airplane has been perfected to the point where danger from forced landings in well-maintained aircraft is almost non-existent. Modern airplanes do not flat-spin; in fact, they are inclined not to spin at all. They practically never come apart in the air when flown normally. They are stable at landing speeds, and even the fast planes of to-day, by using flaps and brakes, can land at speeds within the limits of safety. Considering these things, it may be said that technology has triumphed over the traditional dangers of flying.

At the same time, the airplane's unique and incomparable safety advantage remains as effective as ever. For aircraft are still, and always will be, the only vehicles which can do practically all of their traveling thousands of feet removed from any hard substance into which they might disastrously crash.

Why, then, should not the airplane be the safest of all fast means of travel? What keeps all this potential safety from being realized? What is behind the fatal accidents which are still much more numerous than they should be?

In the air transport field, where pilots, equipment and maintenance are of the best, a large proportion of accidents occur in bad weather, particularly at night. Modern methods of beating bad weather are marvelous, but by adding to the chain of personnel involved, they increase the chances for human error. For instance, the accident in Missouri which took five of the nine lives lost in the first half of 1935 was attributed to bad weather which proved disastrous because of four seemingly trivial errors on the part of personnel.

But why so many crashes in miscellaneous flying, where pilots can, and generally do, sit in

the hangar until the sun shines? Freed of the necessity of taking weather risks, why don't non-schedule fliers realize the tremendous potential safety of dependable craft operating far above the risk of crashing into something?

There is still, of course, the problem of the badly maintained airplane and the sloppy pilot in miscellaneous civilian flying. The plane can be licensed and the mechanic licensed and the pilot licensed, but if the mechanic is lazy and the pilot rusty and careless, the way is paved for one of those often-reported crashes:

"The engine faltered at about 200 feet, spectators said, and the plane fell in Mrs. Jones' back yard, despite valiant efforts of the pilot to right it. His skill did, however, keep it from hitting the house where the family was eating an early supper."



Your greatest enemy in the air is yourself. Flying safety doesn't come from the hand that moves the stick, but from the mental attitude that controls the hand. Read this wise, serious article—and then think it over.



Pictured in the photos above are professional stunters. They know their danger, and they take their risks deliberately. We couldn't show any amateurs stunting "for fun," because there's usually nothing left when the photographer arrives except a scene like that on the opposite page, below.

The truth was that the pilot had been flying all afternoon with his engine acting a bit "falterish," and when it stopped he had pulled his nose up and tried to climb in a glide while he thought what to do. The plane had stalled and spun, hitting the ground completely out of control before it had time to tighten up or complete the first turn.

But there is a more serious and fundamental cause of miscellaneous and private flying accidents than bad maintenance and unskillful piloting. There is a danger that strikes most frequently at the kind of pilot who is perfectly competent in handling a ship.

Any one who looks at the figures can discover that about half of the fatal accidents in miscellaneous flying result from flights definitely determined as having been contrary to regulations.

For instance, in the first half of 1935, out of 124 fatalities, 56 occurred in 37 fatal accidents in which a violation was involved. Here was the score of various violations: illegal acrobatics, 8 accidents; illegal acrobatics and low flying, 4; illegal acrobatics and licensed pilot flying unlicensed aircraft, 2; illegal acrobatics, low flying and other violations, 2; low flying, 4; low flying and miscellaneous violations, 4; various other violations, 13.

Examining those figures, one might say: "Everybody knows that recklessness and rashness on the part of pilots causes accidents. What of it?"

Quite true. It is obvious. But less obvious is the fact that those figures are the key to the fundamental reason why flying, though inherently and potentially so safe, remains dangerous.

That reason is this: the airplane is more likely to be handled dangerously than any other vehicle, because of the peculiar psychological effect it has upon the man at the controls. The airplane is the master producer of what may be called the "dare-devil complex."

One factor in acquiring this dangerous mental condition has its origin, strange to say, in the airplane's one superlative safety advantage. Traveling several thousand feet above the nearest solid, visible substance is very safe indeed—but it is very dull. Not speed itself, but the sensation of speed

is the thing that gives us pleasant excitement. And at 3,000 feet or more, the earth creeps under your wings with exasperating slowness. You look at your air-speed indicator, but it does no good. You may *know* you are traveling at 180, but you *feel* like you're getting no place at all. And without a "quitty" engine to keep you anxious, you simply

get bored. You keep getting more bored all the time.

Soon you feel an impulse to register a protest. You want to pitch the plane around a bit, to throw it into a sudden steep bank and pull it out again, or to push the stick forward and feel yourself lift excitingly against your safety belt. You may indulge these innocent initial whims. Then, if you have a plane built for it and have a parachute under you, you may perform certain acrobatic maneuvers above 1,500 feet and still be within the limits laid down by regulation and good sense.

But these sensible acrobatics seldom satisfy you. Even if you are equipped for them and do them, the novelty of looping and rolling so high off the ground soon wears off and you begin to hanker after a little real action. Or rather, I should say, the adventurous element in you (and in me and everybody else) is very much stimulated by flying. I never saw any but very mature and experienced pilots who didn't play now and then—and even the oldsters who didn't, wanted to sometimes.

And that is how safety grows into danger. For if the airplane may be the safest and most boring of vehicles, it can also be the most exhilaratingly exciting—and the most dangerous. And the temptation to change boredom into excitement is very strong.

You can hedge-hop. You may feel that you aren't traveling at all if you are up 3,000 feet or so, but when you go down to only 10 feet off the ground (as you are very likely to do sometimes) you get the full sensational benefit of your speed. Even at a little more than a hundred miles an hour, the ground whips by in a streaked blur. You have to look far ahead for trees and power lines and mountains and other things it might be uncomfortable to hit.

I knew a pilot once who enjoyed flying under telephone lines. Another liked to find two trees just the right distance from each other so he could fly between them and brush the branches with each wing. Another liked to do "contour" flying in hilly country. He hit a power line and literally burned up before he struck the ground.

Another diverting amusement is to dive straight at the ground and level off as close as possible and go skimming along the surface at almost twice your usual speed. This is quite exciting sometimes, especially if you start to pull out a little later than you should. A plane "pancakes" downward a bit at the bottom of a dive, and the quicker the pull-out, the farther it drops.

And of course, there is the whole list of forbidden acrobatics. The "dodoes" of my class, newly arrived at the Air Corps flying school, were unnerved a little by the newspaper accounts of two army pilots being killed. They had been looping a bomber, and fragments fluttered down over an area of several square miles. Some time later another pilot, during a fall of several thousand feet, finally fought his way out of the cockpit of a pursuit plane over which a collapsed wing had jammed. He had been trying the expressly forbidden outside loop.

Another flying acquaintance of mine enjoyed flying along the surface of a river, especially if it had trees on each side and the "canyon" thus formed was narrow and crooked enough to make the business interesting. He failed to see a telephone line. The poles were hidden among the trees.

And it's fun, too, to imagine you are an automobile with wings, and to go roaring down a curved highway, making all the bends with precision. It means a wild succession of almost vertical banks, gone into instantly and jerked out of with full control after a fraction of a second. This violent tossing about, combined with the fun you have jumping automobiles which startled and paralyzed drivers are trying to stop or get to the side of the road, plus the life-and-death matter of watching for telephone lines and so on, makes "playing auto" a very amusing and fairly exciting occupation for the erstwhile bored pilot. If he stays away from houses and sticks to his road, he won't even have to be worried much about being reported. For the motorists are too startled and really don't have time to get the plane's number.

ANOTHER factor in the dangerous psychological effect of flying on the pilot is this: in an airplane a man can be a fool and feel like a hero.

One might think that if excitement were all a man wanted, he could get it by driving a car at 60 as close as possible to the edge of a mountain road. He doesn't do it, because he would feel like a fool. He does do many other risky things in automobiles, however, which are foolish. Chiefly, of course, he drives fast. That is something that gives him the excitement of a sense of

personal power. And as his sense of power increases, his sense of risk, hence of foolhardiness, is held in check. He feels he is powerful enough to meet any situation.

Now the airplane, being the fastest and most marvelous of all vehicles, is unique in its capacity to give its operator a sense of personal power. The juvenile ego, in an airplane, can feel itself a veritable god. Diving down, shooting along the ground and then leaping straight up, with a magnificent surge into the heavens—it is an experience calculated to make one feel a bit supernatural and superior to the dangers that beset ordinary mortals. The airplane makes one feel physically more powerful than anything else, hence flying permits one to be extremely foolhardy without feeling like a fool. In other words, flying is liable to play the devil with your common sense.

WITH this false feeling of superiority to danger comes another phase, which might be called the "winged-god complex." Young pilots, especially, like the idea that they are being wondered at and admired. They like to display their power and glory before the gaping earthlings. It even gives them pleasure to know that some of the poor earth-bound creatures consider them fools. What they think subconsciously is: "It looks dangerous to them, but then they don't know how powerful and skillful I am."

Especially do young pilots enjoy "buzzing" the home folks. In an effort to astonish their relatives and friends (who knew them when they were mere humans), they will go to all lengths. Acrobatics are indulged in as close to the ground as possible—and sometimes closer.

With a powerful ship it is perfectly possible to skim along five feet above the ground and then to pull directly into a loop and come out flying level and right side up quite a distance over the starting point. A young army pilot I knew was doing that to astound the home folks. Something happened. Perhaps he was thinking more about how he looked from the ground than about how the ground looked from the ship. Anyway, he didn't pull out of his dive after the loop and buried the nose of his plane five or six feet in the earth of the airport. Disaster so frequently befalls newly fledged army pilots on their first cross-country visits to home that some post commanders prohibit these flights outright.

The Air Corps flying school class of which I was a member numbered about 225 at the beginning. Only one was killed during a year of student flying, much of which was solo work by students later washed out for lack of flying aptitude. Frequently more than one of a class are killed during the year of training, but almost invariably the next year is the more disastrous of the two. Of the 102 who graduated in my class, for instance, 8 were killed during the year that followed, mostly in "avoidable" crashes.

The secret of the low fatality during the student year is, of course, the rigid discipline of student flying maintained by the instructors, and the fact that the students are kept always conscious of their faults and immaturity. Therefore, they don't get too cocky, and they try their best to be as careful as possible.

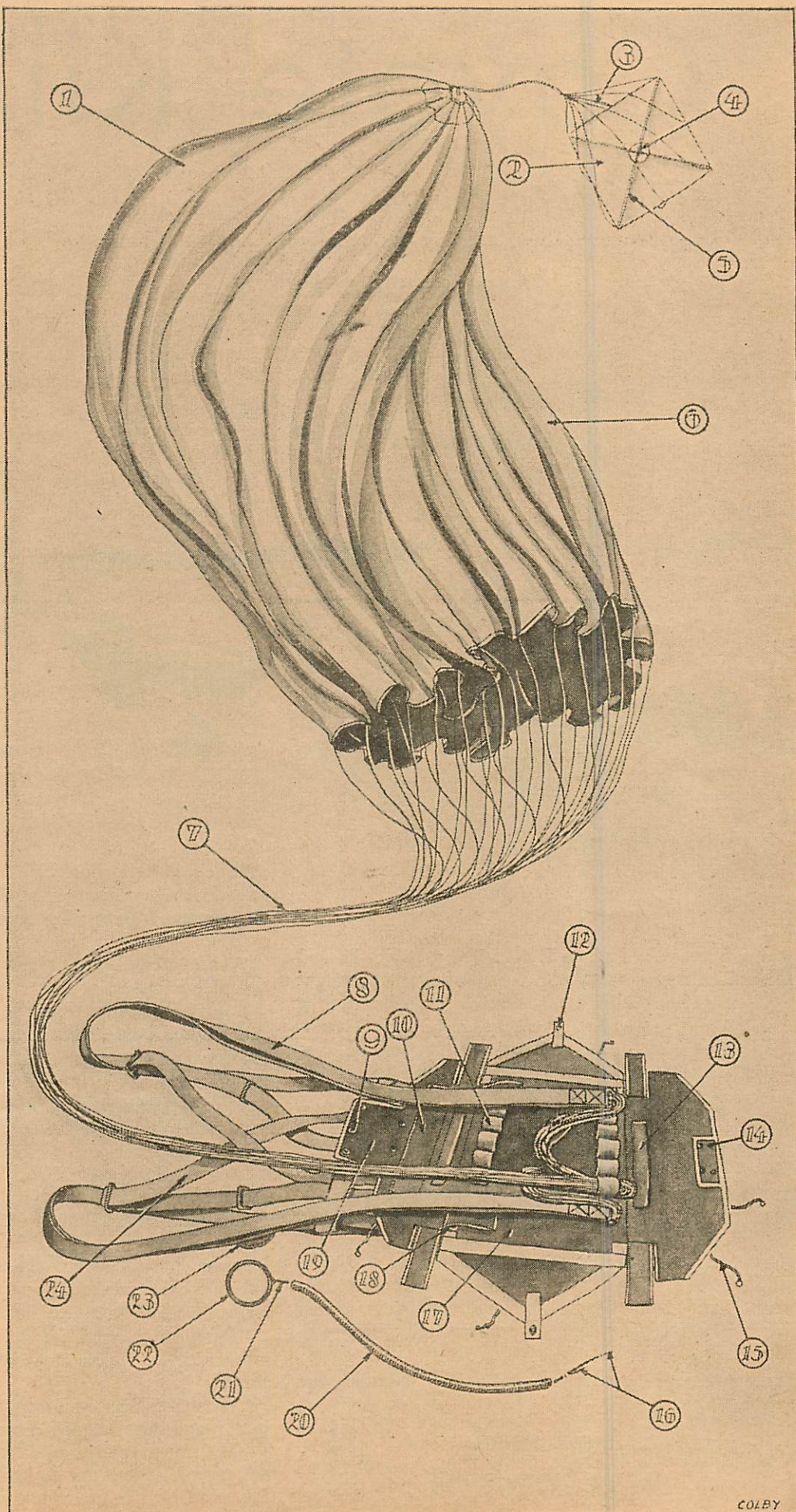
When graduation time comes at Kelly Field, the gray-haired senior officers tell the new A. P.'s that if they will make themselves observe air discipline, there is no reason why they shouldn't fly until their white beards tangle in the tail assembly. The (Turn to page 87)

THE FLIER'S DICTIONARY

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

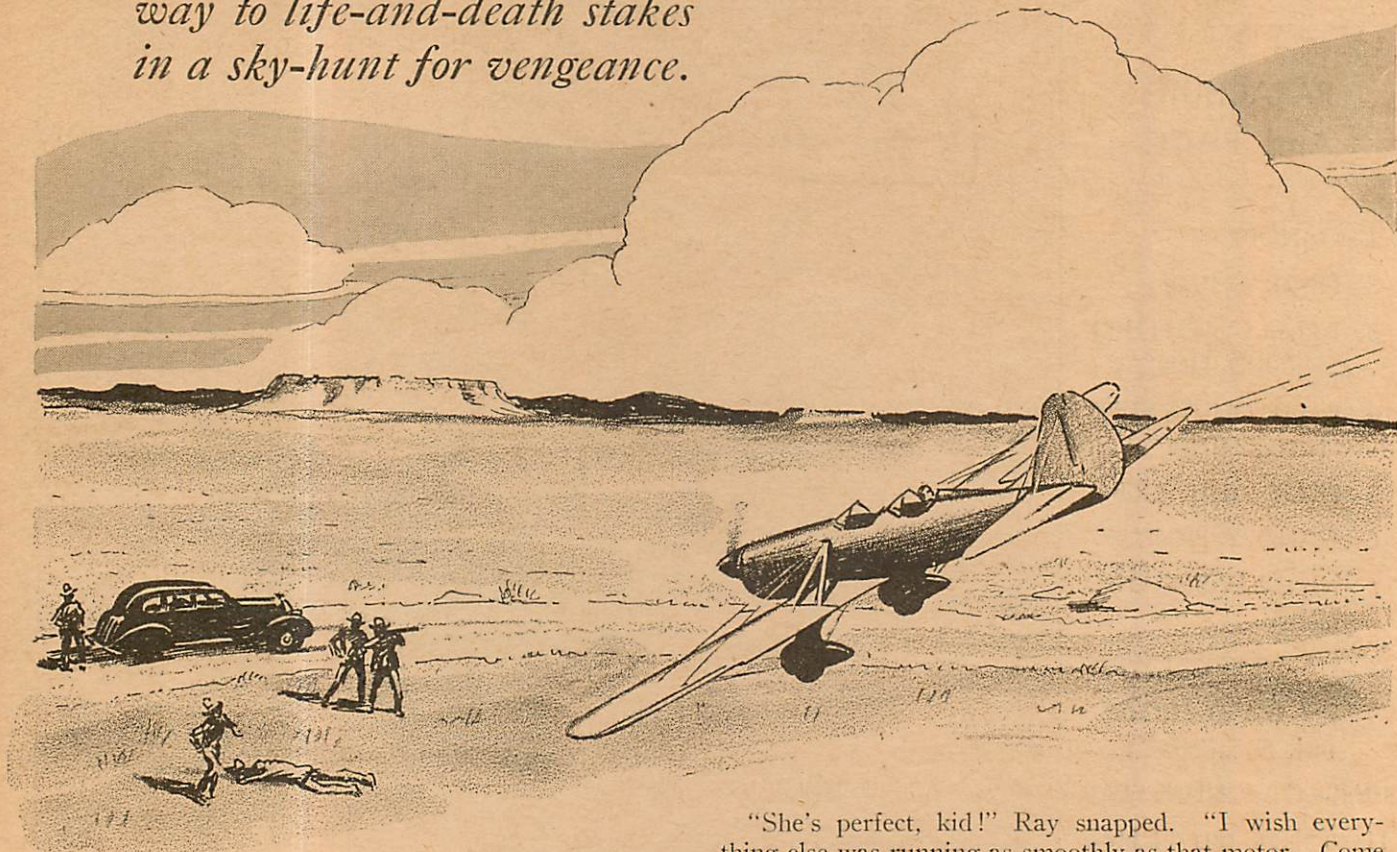
PARACHUTE And PACK

- 1 CANOPY
- 2 PILOT 'CHUTE
- 3 PILOT 'CHUTE SHROUD LINES
- 4 PILOT 'CHUTE STIFFENER SPRING
- 5 PILOT 'CHUTE RIB
- 6 CANOPY PANEL
- 7 'CHUTE SHROUD LINES
- 8 HARNESS LIFT WEBS
- 9 RIP CORD PROTECTOR FASTENERS
- 10 PILOT 'CHUTE FLAP
- 11 SHROUD LINE POCKETS
- 12 PACK END GROMMET
- 13 STIFFENER
- 14 LOCKING CONES
- 15 ELASTIC PACK OPENERS
- 16 RIP CORD LOCKING PINS
- 17 PACK CONTAINER
- 18 LIFT WEB GROMMETS
- 19 RIP CORD PROTECTOR FLAP
- 20 RIP CORD TUBING
- 21 RIP CORD
- 22 PULL RING
- 23 PULL-RING POCKET
- 24 'CHUTE HARNESS



Coyote Killer

Twenty-dollar bounties give way to life-and-death stakes in a sky-hunt for vengeance.



THE narrow red plane looked like a projectile and sounded angry as the devil as the inverted straight eight engine whipped the stubby propeller into a metallic blur. It trembled, rocked eagerly on its chocks, fighting its brakes in front of the weather-stained, corrugated iron hangar at Fort Hilton. Dust whipped behind it like a loose brown scarf.

Larry Balmer, youngest of the three Balmer brothers, wearing grease-smear coveralls, fists on hips, body stiffened, leaned forward to let the rhythmic blasts bark against his expert, critical ears. Ray Balmer, red hair beaten into a flaming bush, clamped his feet on the brakes in the cockpit, studied the instruments, held the throttle forward. He turned his head, looked at Larry, nodded grimly, eased back on the throttle until the motor idled. Then he cut the ignition switch, pulled himself from the glass-enclosed rear cockpit, jumped to the ground.

His hand rested on the cowling, partly concealing the legend:

MISTER JONAH

Fort Hilton Flying Service
Fort Hilton, Texas

"She's perfect, kid!" Ray snapped. "I wish everything else was running as smoothly as that motor. Come on into the hangar. I want to get the 'chute and talk to you."

"Going to test the crate?"

"In a minute."

Ray Balmer sent his long lean legs, encased in breeches and leather boots, pounding over the sun-baked field. He brushed the tangles out of his auburn hair with a large strong hand. His blue-gray eyes had a far-away look of preoccupation. His jaw, massive framework for a wide, thin-lipped mouth, was set by knotted muscle. Pioneer stock, which had formed the boundaries of west Texas and the border along the muddy Rio Grande, had given him a six-foot, two-inch frame, a certain wide-open, honest friendliness and the heart of a fighter.

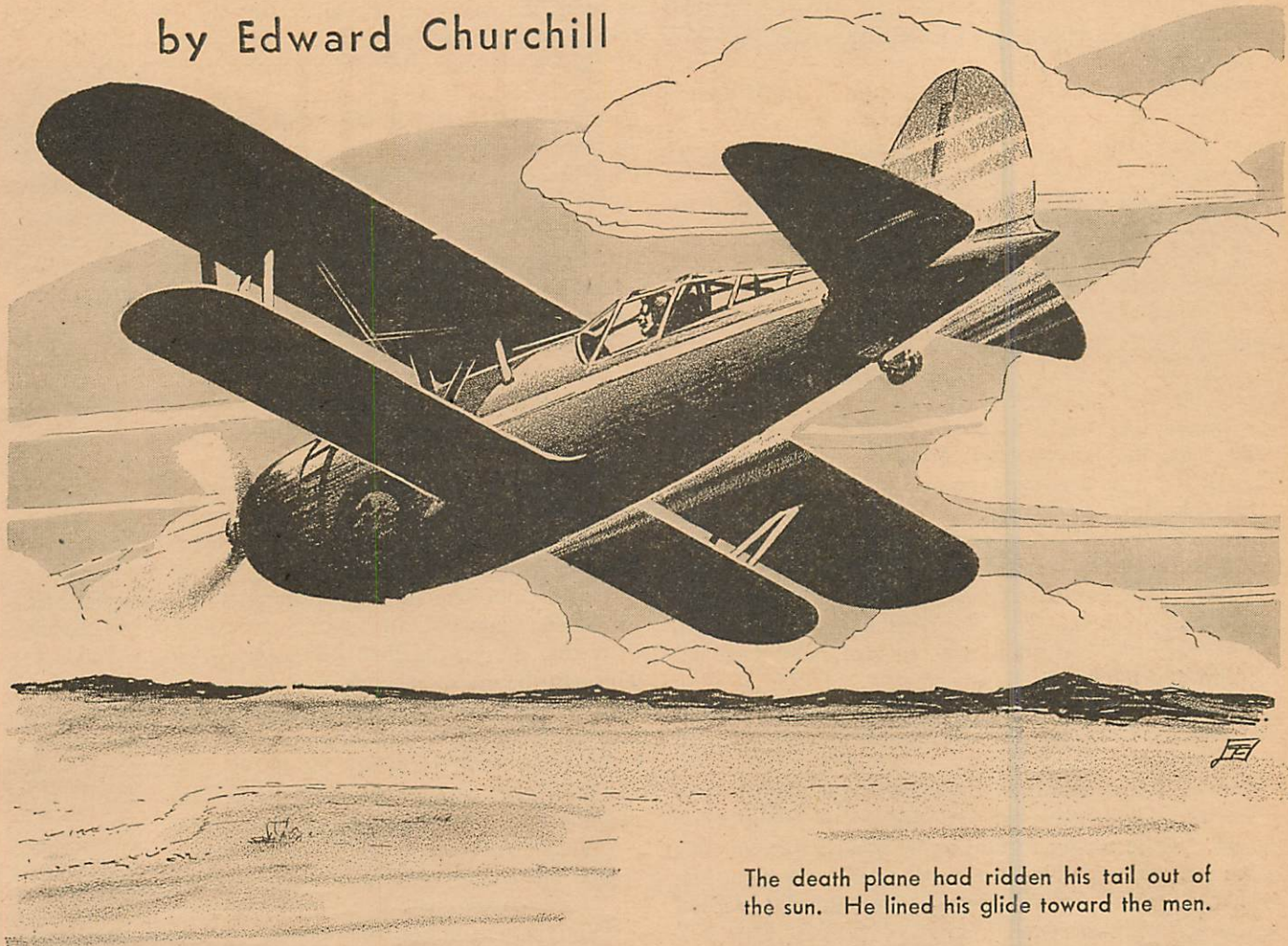
He stalked into the dusty, photograph-lined office, plopped into a swivel chair behind a battered desk, swung so that he could look through windows into the big shed. He motioned Larry to another chair.

"I'm testing her," he said, indicating the two-place racer with his thumb, "and then you've got to carry on alone."

"What?" The younger brother, five years Ray's junior and just turning twenty-one, leaned forward.

"My transportation to Washington, and orders, came this morning from the Federal Bureau of Investigation," Ray said. "I've got to leave at six ten to-night. I

by Edward Churchill



The death plane had ridden his tail out of the sun. He lined his glide toward the men.

take the training course and come out a G-man. Reading law turned out to be a good idea, after all."

"And that makes me——"

"The Fort Hilton Flying Service, punk. We knew a year ago, with the oil boom dying and the field settling down to steady production, that it wouldn't support three of us. That's why Kirk got into the Narcotics Division. Then the dust storm started. You know how students quit until the only money left was hunting coyotes for the twenty-buck bounty in the Curtiss Junior.

"Pumping lead into their tails financed *Mister Jonah* until that twister put her on her back and broke the spars. Now, here's the line-up.

"If *Mister Jonah* tests O. K., you close up shop here and see if you can knock off some dough with her in the national air races. In the meantime, there's a new wing for the Curtiss Junior up at the freight office. Snap the wing on and knock over some more coyotes. Kirk's dough has helped feed us.

"As soon as I get some, I'll shoot that to you. You haven't a thing to worry about."

Ray paused, looked into the hangar, surveyed the coyote ship and the two-place training monoplane, a reliable low-winged job. Then his gaze went to the red racer.

"*Mister Jonah's* a good airplane," he said, half to himself. "What gets me is who put the rap in against her with the department."

He rose, stretched his long body, went to the other

side of the office, picked up a pack 'chute, slowly and deliberately stepped into the harness and adjusted it.

He shot a quick look at Larry.

"There's something sour going on in San Blas County," he snapped. "We left the Curtiss on the field. A little wind came up. When we came back she was wrecked. Then somebody gets the Department of Commerce on our tails. Looks to me like somebody around here doesn't want us to fly. There's a motive. We've been using the ships to help Kirk try to smash that border drug gang. I've flown Kirk plenty—long after you were in bed—you didn't know——"

Ray saw that the heavy webbing was adjusted to suit him.

"Let's skip it and test this ship," he said, waddling across the field, the seat pack slapping his thighs. Larry, a puzzled, alarmed look on his face, followed.

Then the telephone rang.

Larry turned, ran back into the office while Ray stopped, looked after him.

Larry emerged from the office a minute later.

"It's Kirk calling from Rio City—wants to talk to you—says it's important."

"What's it all about, Bud?" he asked. "What's that? . . . Sure, I can get right over. I'm just testing *Jonah*. . . . Yep. If she's O. K. . . . The .45? . . . It's here in my desk. . . . Sure, I'll bring it. . . . Well, *Jonah* will catch anything on wings. I'll be with you in a couple of hours. . . . Right."

Ray replaced the receiver. Larry stood at the door when he turned.

"What's the matter with Kirk?" he asked. "If that bunch of Mexican hop runners is getting tough, I'll——"

Ray brushed by him.

"Keep your shirt on, kid. He wants me to fly *Jonah* over there. Says we may need him."

Ray reached the ship, jockeyed himself onto the step, swung a leg into the cockpit.

"Where do I come in? It's always been three of us against——"

"If you can figure how to get three in this crate, you can come along."

He stepped on the starter. The motor coughed a couple of times, barked, caught.

"Pull the chocks!" he barked. Lifelessly, Larry jerked the wooden blocks from the front of the wheels. Ray jazzed the motor a couple of times, released the brakes, got the tail up and streaked across the field. He eased the thin-winged racer into the air, climbed slowly, circling the dusty plain. At two thousand he felt satisfied with normal performance. The ship was light on the stick, easy to control. No wing or tail heaviness. He leveled off, opened the motor, made an easy banking circle. The air-speed indicator crept up to 240. He grabbed off a few hundred more feet, decided to try a dive.

To feel her out, he gave her about forty-five degrees. The motor revved up, the air-speed indicator leaped to 300.

Then he felt a gentle tug, followed by a flutter. Experience told him there was trouble on the right wing. He went white for an instant as he looked, just in time to see the aileron whip backward, torn from the wing. He felt a second tug, this time to the left. The second aileron jerked into space.

The dive steepened. The motor whined.

He jerked back on the stick. The ship screamed out of the dive, leveled off and then started to roll onto its back. Ray knew that this meant curtains if he and the ship didn't part company. Feeling sick at the thought of losing what amounted to his only real asset and the product of months of toil, he drove back the glass and metal panel above his head, pulled himself onto the top of the seat, hoisted his feet, after him, looked down at the field, which seemed to leap, twist and whirl first above and then below him, and jumped. He counted a long five as the apparent terrestrial gyrations continued, anchored the rip-cord handle in his heavy fist and jerked. The 'chute cracked behind him. The earth took its accustomed place beneath him. He looked up at the shimmering silk above him and sighed with relief.

He choked as he saw the red hornet plow downward, heard the thudding crash, watched it leap into the air as dust billowed around it. A moment later his feet jarred on the clay and he took the shock with his knees flexed. The 'chute dragged him off balance, then collapsed. He was stepping out of the harness, cursing, when Larry streaked up to him in his small coupé.

"I saw——" Larry began. "Both ailerons——"

"Get me over to that ship!" Ray ordered, leaping onto the running board.

A brief examination of the tortured mass of wood, wires, cloth and metal told him all he wanted to know. A quick look at the aileron hinge bolts was enough. He saw where each had snapped. A small bit of rough metal at the edge of each bolt, raw and fresh, told the

story of the break in the air. But the balance of the transverse sections was darker, shinier and smooth.

"Sawed the bolts three-quarters through!" he growled. "Now I *know* there's something wrong in San Blas County—and there's going to be trouble. Larry, let's go. I'm going to get out the trainer and hop over to Rio City right now. Kirk's waiting—and there's going to be a fight!"

He and Larry got into the car.

"There's more than Mexicans mixed up in this, Ray—that's the work of a man who knows something about mechanics."

Larry headed for the parachute. Ray got out, rolled it, tumbled it into the baggage compartment in the rear of the coupé. They were streaking across the field when both spotted a series of dust clouds coming down the highway.

"The mob from Fort Hilton," Ray mumbled. "Damn 'em! Must've seen the ship go in—or heard the crash."

Cars were already turning into the parking space behind the hangar when they arrived. More than a score of friends and acquaintances wanted to know what had happened, clamored for details. Others were racing their cars across the field to the wreck at the far end. Through the question-hurling group pushed a raw-boned man, the high heels of his cowman's boots kicking up little puffs of dust. His wide-brimmed hat was on the back of his head, revealing his heavy features, his sun-reddened face. A .45 swung at his hip beneath his flapping coat. A cartridge belt restrained his paunch.

"What's goin' on here?" he demanded of Ray's back.

The tall aviator swung around, glared at him.

"*Mister Jonah* just lived up to its name, sheriff."

"You better gimme th' details. I'm empowered by law t' make a report on all plane accidents in San Blas County."

"Shed her ailerons." Ray's terse explanations revealed his dislike for the heavier man. "Two thousand feet in a dive. What's left's in that pile over yonder. Help yourself."

Ray had reasons for his attitude. Six months before, after he'd taught the burly official to fly, the latter had shown his gratitude by trying to muscle in an out-of-town flying service. Ray wasn't telling him what really happened. He didn't trust him.

"I knew this would happen. I——" snorted the sheriff, then checked himself. Ray's quick brain had registered. He hadn't forgotten what the fellow had tried to do. Only an official, air-tight contract for exclusive use of the field had saved him from ruinous competition.

"You cracked to the Department of Commerce!" Ray finished, sudden color leaping to his face, causing it to crimson beneath its tan. He stepped forward. Larry grabbed his arm.

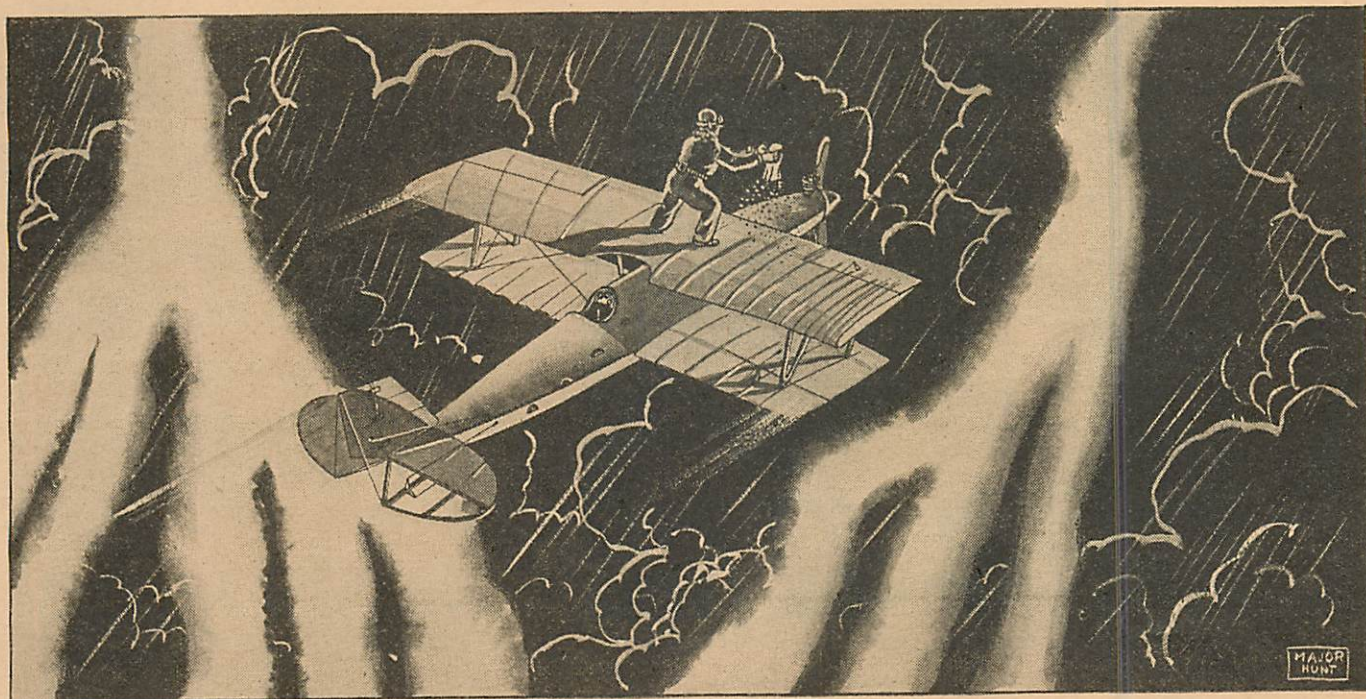
"Steady, Ray——"

"Blakeslee, that's just about your speed," he snapped. "If you didn't represent the law around here, and if I didn't have more important business on hand, I'd smack that blabbing mouth of yours."

"That stuff you fly is junk—all of it," Blakeslee charged. The motley crowd began to circle, stiffen, ready for action. Blakeslee's hand fell over the butt of his .45. His eyelids narrowed to slits. Ray's fists clenched.

The flier's blood boiled and he saw the sheriff through a red haze. Larry's hand and fingers (Turn to page 90)

GULLIBLE'S TRAVELS—Major Hunt



HAVING recovered my landing gear, as you read in last month's episode, I once more settled down to charting my route across the country in a bee line for Chicago by way of Florida and Maine. I was kept busy running back and forth from the chart room to the cockpit alternately plotting my course and flying the ship.

In fact, I was so busy doing this that I failed to notice a dark cloud dead ahead of me from the depth of which angry flashes of lightening darted to the earth below. It was only after I had tripped over a huge bag containing five hundred pounds of sand, for lightening the ship in an emergency, and being knocked unconscious, that I saw it. Being unconscious, I went up on the top wing for a bit of fresh air to revive myself.

By this time I had flown directly into the heart of the thunderstorm and terrific gusts of rain and large bunches of lightening were all about me. I decided to rise above the storm and escape the flashes that might strike the little monoplane any moment.

I leaped back into the cockpit and shoved the stick

for a zoom, but nothing happened. In fact, I was sinking lower all the time. The rain beating down upon me was forcing the ship lower, while the crackling lightening was getting closer with every flash.

Quick as a flash my marvelous brain saw a solution to the entire situation. I would not only rise above the storm, but protect my ship from the lightening at the same time.

I seized the huge bag of sand or "lightening" for the ship and rushed back to the top of the fuselage. Here I inverted the bag and poured the entire contents over the ship, completely covering it from nose to tail. At once, having taken the sand ballast out of the fuselage, the ship began to rise.

As every bit of the plane had been struck by some of the lightening sand, I knew I was safe from the bursts of electricity about me, for every one knows that "Lightening never strikes twice in the same place." I soon rose above the storm and continued safely upon my flight, once more saved by quick thinking and plenty of grit—which every one should have in an emergency.

Prizes for Mistakes!

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

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

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

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

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

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

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

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

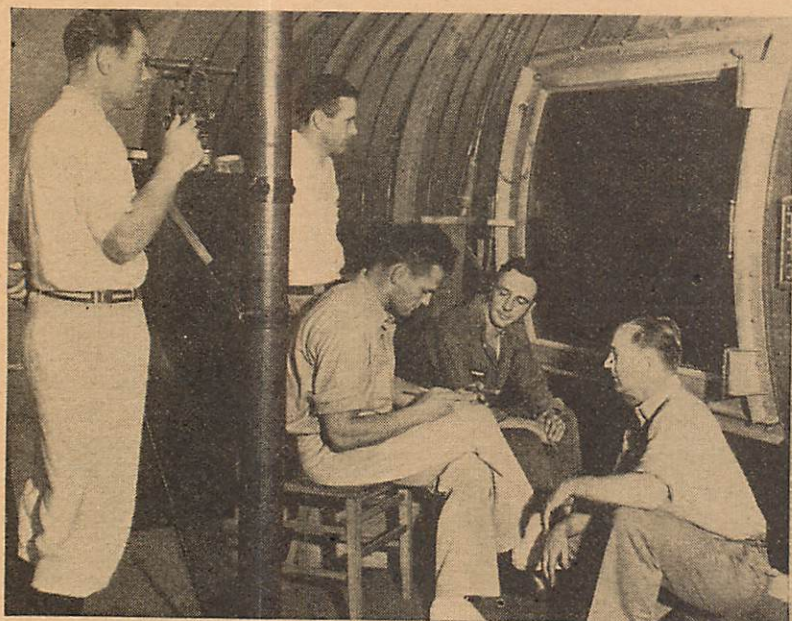
8—No entries will be returned.

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

10—Prize checks will be mailed not later than October 15, 1936.

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

Aeronautical



Engineers check their calculations with wind-tunnel tests.

What's the work of the aeronautical engineer? Where is he trained? What education is needed? These frequent questions are answered in this interesting article.

by Daniel Jordan

DESIGNING and building airplanes is like a delicate surgical operation. It requires the skill of trained specialists. Engineers who build bridges, skyscrapers, tunnels, or highways cannot build airplanes. Specialists are needed, and this has resulted in a demand for airplane engineers.

This profession is the baby of the engineering family. It is only 15 years old, but in such a short time the work that has been done gives it a position of importance among the engineering branches. Young men are turning to aeronautical engineering just as their fathers turned to mechanical and automotive engineering.

Aeronautical engineering is divided into two main divisions—the technical, or design, branch; and the transport, or operations, branch. The technical men build airplanes, engines, and all the other flying equipment, and the transport men operate the equipment. This does not include actual piloting, but rather the laying out of airways, operating airports, and taking care of the infinite number of ground details necessary to airline operation.

The technical engineer creates the airplane, thoroughly tests it in every respect and turns it over to the operations engineer who puts it into service. Most airplanes are designed and built to definite specification. When airlines are renewing equipment they state definitely what sort of air-liner they'd like and the designer is required to fill these specifications. Since an airplane must support itself in the bookkeeper's accounts as well as in the air, it must be built so some one will buy it.

There are three factors of greatest concern to the buyer—speed, safety, and economy of operation. If the finished plane qualifies in these respects, the buyer usually cares very little about the design details. The designer is allowed a free rein as long as the finished plane delivers a good performance.

Before an airplane is built, the designer must decide

if it is to be low-wing or high-wing, biplane or monoplane, have retractable or permanent landing gear, and what airfoil section should be used, how much tail area is necessary for stability, and make scores of other important decisions. He will probably draw up specifications for as many as 25 possible designs, each one slightly different, having a different wing shape, a slightly longer fuselage, or some other trifling difference.

Like candidates for a football team, the poor designs are eliminated and the most promising are retained. Then small models are built and tested in wind tunnels. From the wind tunnel the engineer can learn what sort of performance the finished airplane will deliver. When a design is finally decided upon, thorough and exhaustive tunnel tests will be carried out. Changes in design that add miles per hour to the top speed are sometimes the result of careful tunnel testing.

After tests are completed, actual construction will begin. Tens of thousands of blueprints must be made. Each part of the airplane must be drawn up and calculations performed to insure ample strength in the structure. During construction there must be close cooperation between the engineer and the shop. By working together they can produce a plane that shows good performance at low operative and construction costs.

After the plane is built, it is turned over to the test pilot for actual flight-testing. It's a high spot in a designer's life when his brain-child leaves the ground for its first flight. Imagine the thrill of seeing a plane of your own design fly successfully after watching it grow from a small three-view sketch.

However, the designing of large airplanes is such a complex job that it usually requires the work of a group of engineers rather than the effort of one man working alone. Thus the present trend is for an engineer to specialize in one particular phase of design such as land-

Engineering

ing gears, tail surfaces, or propellers. Companies undertaking the design of a new plane call in these experts rather than rely solely on their own general engineering staff.

One outstanding example of specialization in aeronautical engineering is the work that Stephen Zand of the Sperry Gyroscope Company has done in soundproofing of airplanes. He's developed it to such an art that he's certain to be called in whenever an airplane needs soundproofing. Recently he returned from Europe where he directed the soundproofing of planes on many foreign lines.

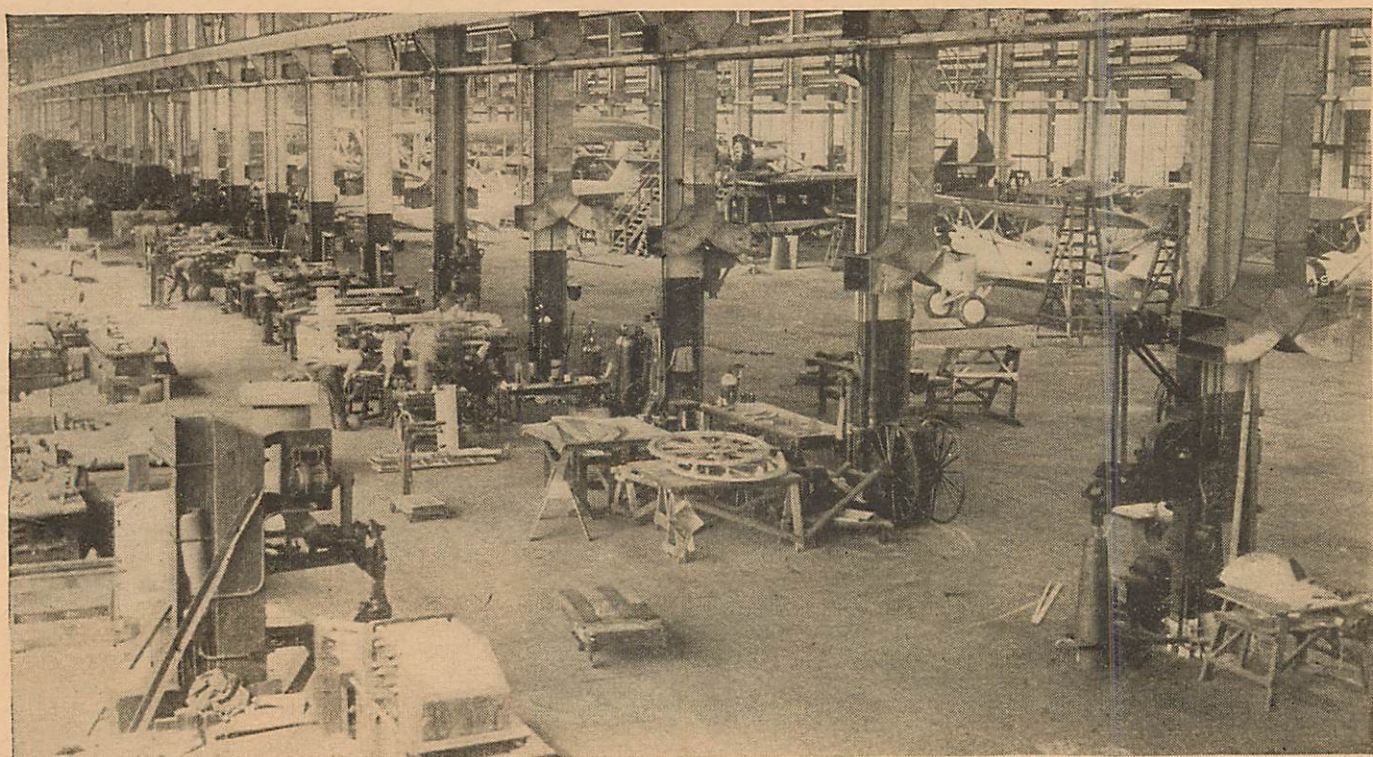
There are several fields of aviation that require highly specialized engineers. Aircraft engines, aviation fuel and oil developments, propellers, instruments, and aircraft radio are only a few of the fields. Experts in these branches of engineering are highly paid and there will be a constantly growing demand for their services. Sensitive altimeters that record accurately the distance above the ground must be developed. Likewise blind landings must be perfected before air lines can maintain 100 per cent schedules. These are two of the problems the engineer must solve as aviation progresses.

Engineers employed as plane designers, however, are faced with the prospect of unsteady employment. After a new airplane is designed and tested, it is turned over to the factory for production. The greater part of the engineering staff is no longer needed until another new airplane is designed. Thus the aeronautical engineer will find himself unemployed part of each year, unless he trains himself to fill some job other than designing. He

might take a job in the factory supervising actual production. Or if he's had business training, he can take a job in the office. If he's an experienced pilot, he could demonstrate airplanes to purchasers. The more training and experience he can get in branches other than designing, the easier it will be to stay on somebody's pay roll.

Four years at a first-rate engineering college which offers courses in aeronautics is necessary training for the engineer. The expenses for a year at college are about \$800. This can be reduced by part-time work and economical spending. There are approximately a dozen colleges in this country offering good aeronautics courses. The outstanding ones are New York University, Massachusetts Institute of Technology, University of Michigan, University of Minnesota, California Institute of Technology, and Georgia School of Technology. Bulletins describing courses and entrance requirements can be obtained from these colleges merely by asking for them.

There are other technical schools giving courses in aeronautical engineering that tie in actual shop work along with instruction, such as Curtiss-Wright Technical Institute, Boeing School of Aeronautics, Parks Air College, and several other schools which give excellent training in airplane construction and maintenance. A four-year course at a good engineering college, however, will probably take you farther. The apparently useless subjects which seem unrelated to aviation that the university courses include have the advantage of rounding out your education and making it more complete than a strictly technical training would be.



Where the engineer's designs take shape—the aircraft factory. This one is the navy's own plant at Philadelphia.

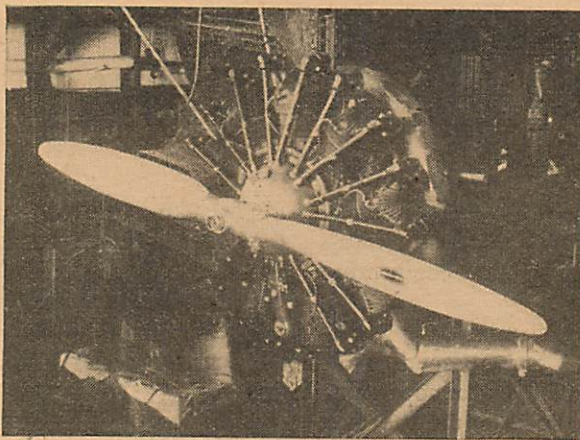
The entrance requirements to an engineering college are a high-school diploma and a good average grade in mathematics, physics, and chemistry. Other courses, such as mechanical drawing, shop work, or engine mechanics are not essential for entrance, but prove very helpful in college work.

It's usually disappointing for the high-school graduate who has decided to study aviation to learn that the aeronautical engineering course does not include any aviation subjects until the second half of the junior year. The first two years of the college course are spent in studying analytic geometry, advanced algebra, calculus, chemistry, mechanical drawing, and physics. In addition, aeronautics includes the same courses given to other engineers, such as electricity, strength of materials, and operation of machinery and engines.

In the senior year courses are entirely aeronautics. Airplane designing, aerodynamics, airplane engines, and the materials and methods of aircraft construction are studied. Finally, the student actually designs an airplane, carrying out the work in much the same manner as is done in the industry. These planes seldom develop past the drawing-board stage, but they do acquaint the student with the problems and technique of actual design.

The courses for the transport engineer are more varied. In addition to studying the theory and construction of airplanes, he takes up economics, accounting, aviation, and commercial law, and other subjects that will acquaint him with the business end of manufacturing and air-line operation.

In addition to the courses at a university, many en-



A mechanic's license is more important than a pilot's license to the would-be engineer.

gineer, who usually begins work in the overhaul shops of the air line and in this way learns the organization of the company and acquaints himself with its methods of operation.

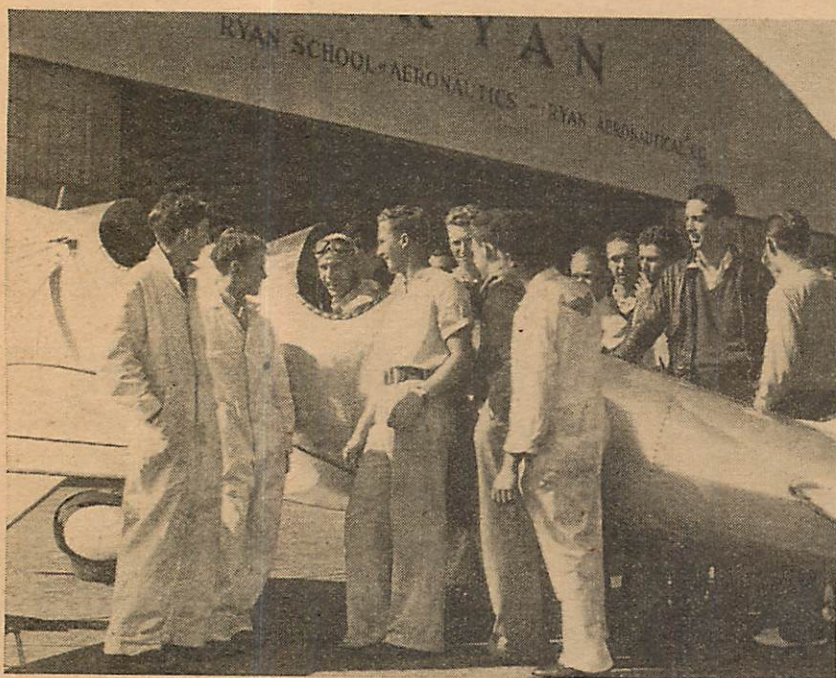
The problem usually confronting the high-school student is whether he is fitted for aeronautical engineering. Aptitude for mathematics is probably the greatest single requirement. If elementary algebra troubles you, and you don't enjoy working out difficult problems, it is more than likely you would fit better into some other branch of aviation.

Another qualification that's a necessary companion to mathematical ability is a real enthusiasm and desire to become an aeronautical engineer. (Enthusiasm that makes you look overhead at every passing airplane and talk about them every chance you get will carry you far.)

As soon as you've decided on aeronautics, begin your training. Read every available aviation textbook and magazine you can lay your hands on. Join the model club or glider club in high school. An example of the progress you can make is shown by the boys and girls of the Teaneck, New Jersey, high school who formed a flying club. Many of them have soloed in their two-place Aeronca. Any of these students who intend to continue their aviation studies will find themselves far ahead of the rank-and-file student.

Keeping abreast of the present-day developments in aviation will help give you a talking knowledge of aviation. (Many engineering students have a poor knowledge of airplanes.) They are not familiar with the different types and have little knowledge of the persons in the industry. Make sure you're well read and up to date on every aeronautical development.

Within the last year jobs have become more plentiful both in the technical and transport phases of aeronautical engineering. Many students have been placed directly from college into the airplane companies, which are busy filling orders for commercial and military ships. The whole industry is looking up and promises to be even better within a short time.



Peter Dana, holder of San Diego-Boston and Canada-Mexico lightplane records, greets fellow students of the Ryan flying and technical school.

What's Your Question?

By CLYDE PANGBORN

Wing Commander



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

Question: What is a Venturi tube? T. E., Milwaukee, Wis.

Answer: That short tube that you've seen, often fastened along the side of the plane's fuselage behind the engine, pinched near the middle and with flaring ends, is a Venturi tube. It's named after the Italian physicist who discovered its fluid principle more than a century ago. Air blows into it; squeezing through the narrow part, the air gains speed there, with a resulting proportionate decrease of sideward pressure. This lessened pressure produces a partial vacuum or suction in another long, smaller tube that runs from the cockpit instrument board and opens into the side of the narrow part.

The suction is used in several ways. Its usual uses are to help operate recording air-speed meters in conjunction with a Pitot tube (which produces pressure instead of suction), to activate air-distance meters, and to drive the gyroscopes for the turn and pitch indicators.

Question: How should I make an application to enter the Coast Guard Academy? What is a Coast Guard flier's salary? Does he get a pension? J. K., Atlanta, Ga.

Answer: For information on Coast Guard Academy applications, requirements, etc., write to Commander Pine, superintendent of U. S. Coast Guard Academy, New London, Conn. I suppose you know that they don't give aviation training there. After your four-year course, I believe you put in a request for flying duty and later take the navy flight course at Pensacola. I'm sorry that I haven't information at hand regarding salaries and pensions. You can probably get it from Coast Guard Headquarters, Treasury Dept., Washington, D. C.

I understand that there is right now, and will continue to be, plenty of opportunity for flying with the Coast Guard. You can't jump into it at once, of course, but the training you get and the service that you enter offer a fine career for a young man.

Question: Why is too much landing speed undesirable? R. O., Chicago Heights, Ill.

Answer: A fast landing covers a lot of ground. That's the chief reason why it's undesirable. The speed and resulting roll mean that you need a large field, and not all fields are large. Speed also exposes you to the hazards of any other vehicle, after you're on the ground.

Rough surface gets dangerous. You can't avoid obstacles or make turns as quickly.

Question: Which are the three or four best flying schools in the U. S.? What do you study in the ground school before you start flying lessons? What do you have to do to fly the mail after you get your license? E. A., Laconia, N. H.

Answer: I must decline an answer to the first question, because any choice that I might make among the many good flying schools would be unfair to the others. Write to the Bureau of Air Commerce, Washington, D. C., for their list of government-approved schools. You can't go wrong with any of those.

Ground subjects include theory of flight, airplane and engine construction, and air regulations. Thoroughness of such study and the addition of other subjects such as instruments, meteorology and aviation depend on what grade of license you're trying for.

To fly the mail after you've got the necessary transport license, you need one thing: a job. Your success in getting this will depend on available openings and on how good you are.

Question: Can the Macchi-Castoldi MC72 be useful for a round-the-world flight? Would it be possible for this plane to use a Diesel engine and go at the same speed? H. C. Z., Bayonne, N. J.

Answer: The Macchi-Castoldi world speed record plane would do well if it flew one or two hundred miles without having to land. A plane that would have to circle the earth in one-or-two-hundred-mile hops is not what I would call useful.

The Macchi's biggest drawback is its fuel consumption rate—to say nothing of the risky 130-mile landing speed. The 2,300-2,800 h.p. Fiat engine uses up gas about as fast as it can be poured from a can. Furthermore, the heat developed is so great that much of the plane's surface is covered with radiators for cooling the engine and the oil, and I doubt if the cooling system would stand prolonged use. The Macchi's records of 440 and 391 m.p.h., remember, were made over $1\frac{7}{8}$ and 62 miles respectively—just short hops.

A Diesel engine probably could be substituted for the Fiat, if it could be kept down to the same weight, and could probably produce the same speed. It would have the advantage of using fuel more economically and thus extending the range.

HEADLINES

Publicity Irks Steve Harkins—Famous Pilot Worried Over Attention Given His Exploits

STEVE HARKINS threw the control wheel of the big twin-motored transport to the co-pilot and pressed the button on his radio transmitter.

"Trip Number Five—Trip Number Five," he chanted, "Calling Station WEZZ—WEZZ."

The voice of the "goat head" on the ground came back to him. "WEZZ—this is Station WEZZ. Calling Trip Number Five. Go ahead!"

"What is the surface wind? What is the surface wind?" Steve asked.

"WEZZ to Trip Number Five—surface wind ESE. Surface wind ESE ten-one zero. Go ahead! Go ahead! All clear! All clear!"

The hostess pressed a button in the tail of the ship and a small electric sign over a bulkhead read: "Passengers May Unloose Their Safety Belts."

She moved into the aisle and served the ten passengers with sandwiches wrapped in cellophane, hot bouillon, cake and fruit.

In a minute another sign appeared—"Smoking Now Permitted"—and she offered the passengers cigarettes.

Steve Harkins pushed his earphones back a trifle and spoke to co-pilot Johnson.

"Ride the beam, kid," he said. Johnson nodded his head and listened to the long interlocking A and N that told him he was on his true course.

Steve Harkins' bronzed face was a grim mask of disgust as he gazed ahead at the great bank of clouds forming. On top of everything else that had happened that day, he thought, we'll probably have no ceiling when we sit her down at Newark.

"How," he growled to himself, "did I know they didn't have any clothes on?"

He turned to Johnson after scrutinizing the clouds ahead and growled, "Get upstairs, redhead!"

A sea of mist closed in on the ship as she stuck her nose into the filmy clouds. The great wings stretched away into the fog with the wing tips hidden from sight. Steve pressed the button of his transmitter again and made contact with the "goat head" at WEZZ.

At four thousand feet the ship whipped out of the cold drab fog and stuck its nose into the glorious sunlight. Above, the sun glowed like a ball of fire in its bed of blue. Beneath, the clouds stretched interminably into spires and turrets that were white and pink and sometimes orchid.

An old lady in Seat Number Four on the port side stopped being sick and looked out the window. Steve grinned as he looked into the mirror that gave him a view of the passengers. He knew that if the old lady was like other old ladies he had flown, she was under the

impression that she had died and was entering the portals of heaven.

The "goat head" on WEZZ chanted his "Go ahead!" into Steve's ear. "Station WEZZ—WEZZ. Calling Trip Number Five. Calling Trip Number Five. All clear. All clear. Wind ESE—unlimited. Go ahead! Go ahead!"

"Goat head! Goat head!" Steve growled under his breath in answer.

He jabbed a forefinger toward the deck of the compartment and Johnson cut his throttles. The big ship plunged into the dripping dampness of the clouds again and the windowpanes became clouded with condensed moisture.

Far below, the long white terminal building burst into sight as they nosed through the clouds. On the roofs of the hangars were painted TRANSPORT, VISITING, PRIVATE, in large letters.

As a sign inside the cabin flashed, "Passengers Please Fasten Belts," Steve Harkins leaned toward "Red" Johnson and asked him the question he had asked himself only a few minutes before.

"How," he snarled, "did I know they didn't have any clothes on?"

Red Johnson looked at Steve out of the corners of his eyes and his mouth cracked open in a wide grin. He cut his gun and a whirring noise in the compartment reminded him to put down his landing wheels.

The big ship glided down into the wind until her wheels and tail skid floated above the ground as though they were on a traveling crane. They settled gently to skim lightly across the field.

"There wasn't any way you could tell they didn't have any clothes on," Red said above the roar of the motors as he taxied toward the ramp. "You better get ready to talk to the newspaper boys."

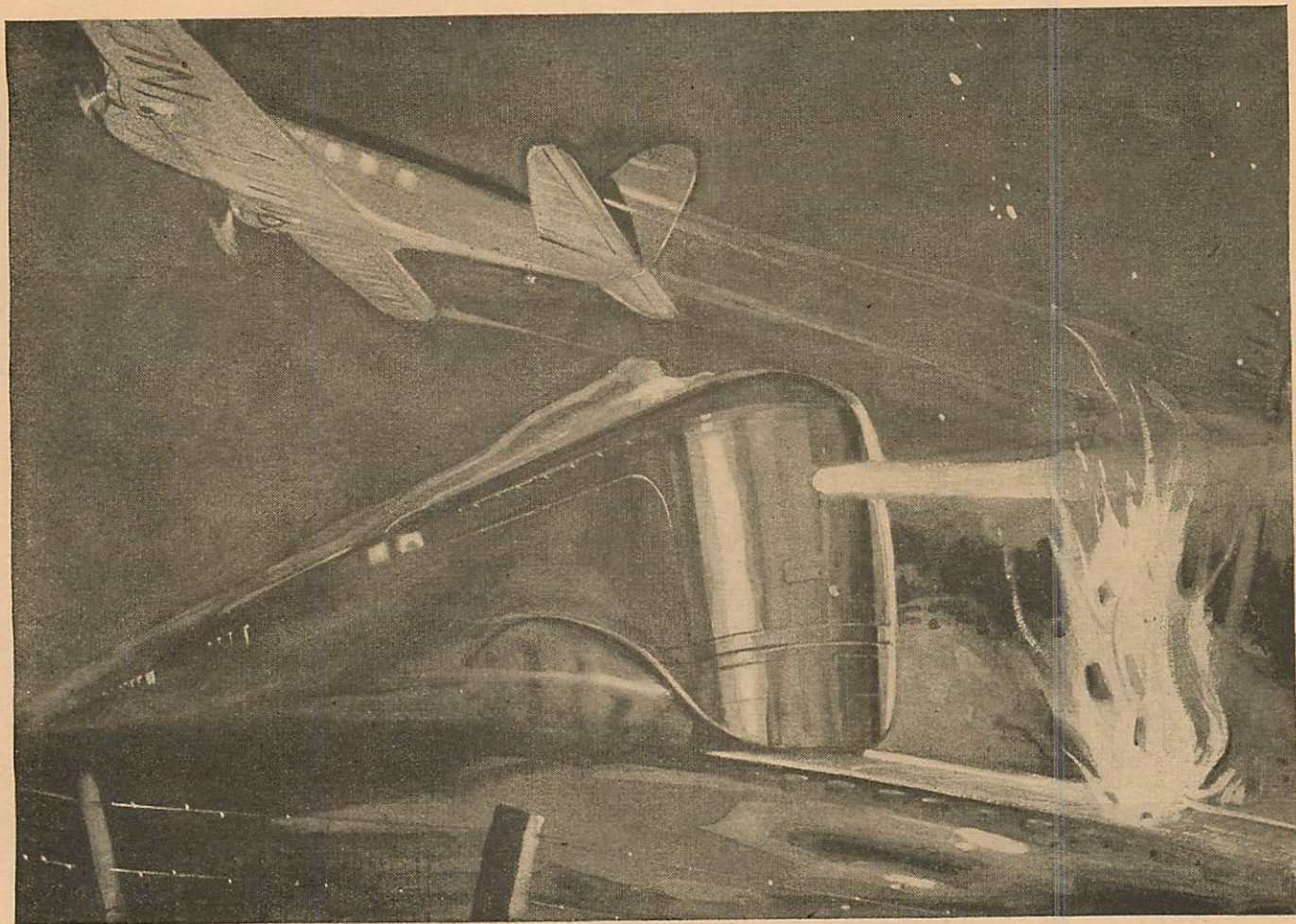
"Talk to 'em!" Steve shouted, his face red. "I'll reach down their throats and pull out their tonsils if they even speak to me!"

"You just have a knack of making the headlines," Red answered. "You're what they call good copy. You'd better make up your mind to make the best of it."

Countless thoughts rushed through Steve's mind. And they began with that day in May in 1929. The day he took his single-motored monoplane, *The Cranberry*, off Curtiss Field on Long Island and sat it down on Croydon Airport, a few

A short

Harold



The two flares landed directly on the tracks. Steve eased the nose of the big ship up.

miles south of London, England, some thirty hours later.

He was only twenty years old then, below voting age. The youngest pilot ever to fly the Atlantic in one hop. The attendant publicity had been too much for him. Reporters and photographers followed him everywhere. He couldn't escape them. And he began to loathe the sight of them.

He had refused all kinds of lucrative jobs. He refused to sign testimonials saying that Zebra cigarettes steadied his nerves and granulated sawdust was good for growing boys. He refused to take a position with a transport line as technical adviser.

He managed to drop out of sight for a year and do what he wanted to do most. He flew *The Cranberry* all over South and North America, landing in small out-of-the-way places where he wouldn't be recognized and asked to speak at Rotary dinners and be photographed.

Then an old pal, Bill Walters, gave him a chance as a co-pilot with the Amalgamated Air Lines. He started the job without any fanfare of publicity.

But not for long. The second month he was flying he managed to land a twin-motored passenger ship with only one motor. The other one came loose from its moorings while he was in flight. He managed to bank the big ship over and dump the loose motor into the Gulf of Mexico and land his passengers safely.

The papers picked it up.

Steve's name went on the front page again.

Another time he brought in his ship when one of his landing wheels had buckled. Not a passenger was scratched. Again the newspapermen were in his hair.

He threw up his job with Amalgamated and got one with Combined Airways. A month after he got the job he had to subdue an insane man with a revolver while he was flying his leg. He knocked the man out, quieted the passengers and landed his ship safely.

It was about this time that Steve first met Miss Martha Randall. He liked her freckles, he liked her smile. In fact, he liked everything about her. Within three weeks he told her so. She was more than a little glad to hear it. That made everything all right. But the newspapers—

Because Martha was the sole heir of Cyrus K. Randall, a conservative old New York banker, she was good copy for the newspapers. And Steve Harkins was excellent copy at any time. They immediately became plastered all over the rotogravures and the tabloids.

Steve wouldn't have minded so much having his picture taken with Martha. But Martha's family objected. They objected to any kind of publicity. They avoided it the way any sane person avoids the smallpox. Bad taste was the least objection they had to it.

At first they had thought that Steve Harkins was a very fine young man. But because of the publicity he had brought them they were beginning to doubt it. They had thought that Steve's spanning of the Atlantic in one hop was quite a feat. But it was too close to exhibitionism to have their full approval. Anything that included fanfare and trumpets they regarded with distaste.

story by

Montanye

When Martha announced her engagement to Steve and the newspapers rehashed all the things he had done in the air, they began to regard him with suspicion.

When Steve volunteered to make a dash above a dangerous stretch of Arctic waste to take supplies to some marooned explorers, it was too much for them. The newspapers and the radio reported his every move during those two tense days. The whole country held its breath until Steve came winging back out of the Arctic with his old confident grin on his face.

After Steve located the marooned explorers he led a flight of three planes in to rescue them. Again the world held its breath. When they came back without a mishap, Steve's name again adorned the front pages in large letters. And coupled with it now was the name of his fiancée, Martha Randall.

Mrs. Randall had a talk with Steve after that episode was over. She was a severe woman who held her head high and looked down her nose at him while she talked.

"It isn't that we object to the things you do, Stephen," she said. "They are all quite commendable. 'Thrilling' is the word Martha uses. But you see, for generations, our family have avoided anything that might be called sensational. We are a quiet, old, conservative family. When Mr. Randall and I were married we forbade the papers to publish a word about it."

"But Mrs. Randall," Steve said, hotly, "I can't help it if the papers pick this stuff up! I don't do it to get in the papers. I got so I hated the sight of a newspaper man after my hop to Croydon. But you can't get away from it in this day or age."

"You will have to get away from it, Stephen," Mrs.

Randall said, looking down her nose at a more acute angle, "or——"

"Or else," Steve muttered to himself. He wanted to tell Mrs. Randall that he was not thinking of marrying her, but her daughter. He wanted to tell her a lot of things, but he knew it would be just that much tougher for Martha if he did.

"I'll certainly try to keep out of the papers," he promised her. And he meant it.

That is why he was worried now.

"There they are," Red said, as he swung the big ship close to the landing ramp. Steve gazed out the window with wild eyes and groaned. At the end of the gayly colored canopy where the passengers and pilots would enter the terminal building were a dozen men with cameras. Steve knew, only too well, what that meant. They were waiting for him.

After the passengers had debarked Red Johnson grinned at him and said, "The papers picked it up all right. Better make up your mind to take it and like it."

"Get out of here, you grinning hyena," Steve said. "But say, wait a minute! Tell 'em I went up the other ramp. Maybe they'll fall for it. Then I'll stay here until they jackass the ship over into the hangar. O. K.?"

"O. K.," Red said. "I'll try it."

Steve watched anxiously while Red spoke to the newspapermen. Then heaved a sigh of relief as they faded away from the gateway.

Fifteen minutes later he was safely in the pilots' quarters looking at a newspaper Red Johnson had shoved into his hand. He didn't pay any attention to the kidding of the other pilots. He didn't even curse at them when they called him "Headline Harkins."

He opened up the newspaper and saw a picture of himself and then the headline. He gasped as he read:

HARKINS DISTURBS NUDE BATHERS

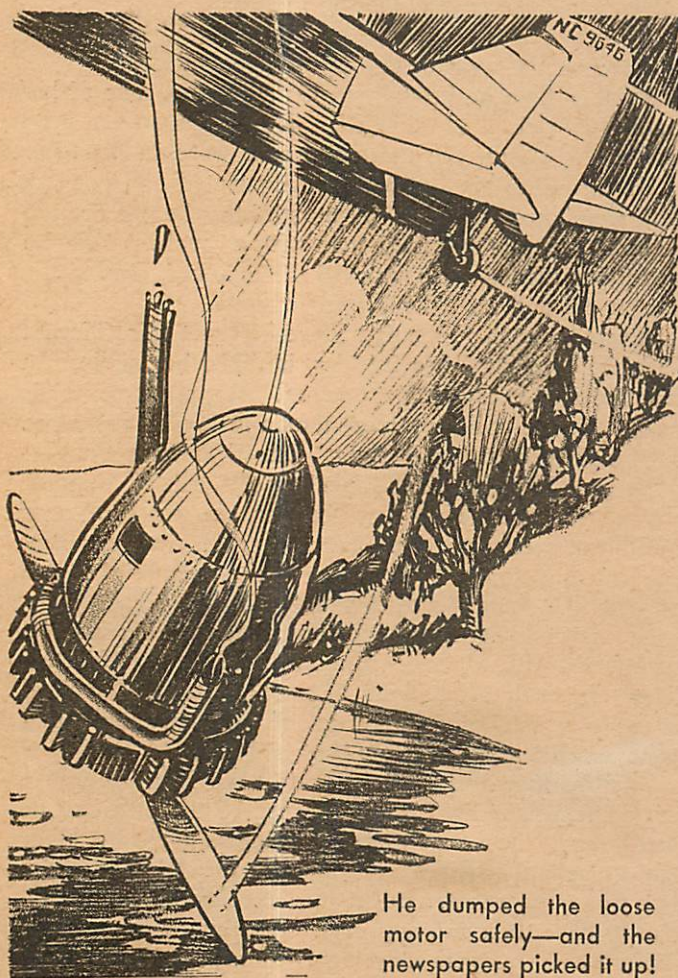
His eyes flew down the half column of print underneath. When he had finished he groaned and went into a telephone booth. He called a number and when he heard a voice on the wire he asked for Miss Randall. Perspiration ran down his face while he waited for her to come on the phone. He knew as soon as she spoke that she had seen the thing in the newspapers. He tried to be casual when he asked her if she had seen it. Her voice was cold when she told him she had seen it.

"It's terrible, Steve," she said. "Mother is having one of her spells about it. She tells me I've got to break our engagement. I'm pretending I will because I don't want her to get one of her heart attacks. You know the way she gets."

"I know," Steve said, grimly. "Now wait a minute. Let me explain how——"

"That won't do any good, Steve," Martha said. "You know mother doesn't pay any attention to explanations. I——"

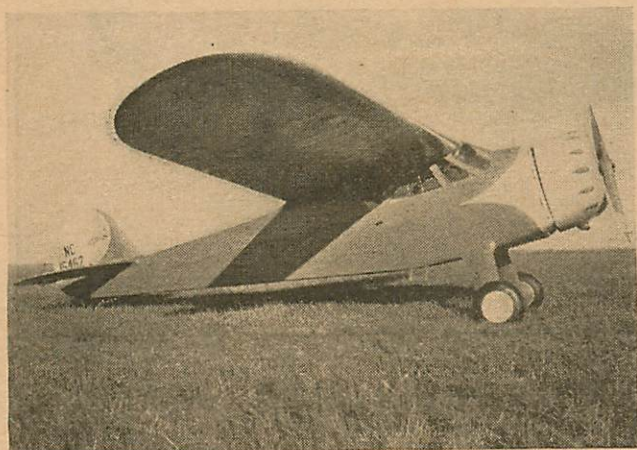
"I want to explain to you!" Steve shouted. "I was trying to be a Boy Scout when it happened. Now listen! We were only a few miles east of Chicago, some suburb about fifty miles away. There is a private lake on one of the estates out there. I've flown over it fifty times and usually there has been some one bathing in it. Yesterday when we went over we were lower than usual. I saw a girl out in the middle of the lake in a canoe. I saw the canoe upset. Then, I saw (Turn to page 88)



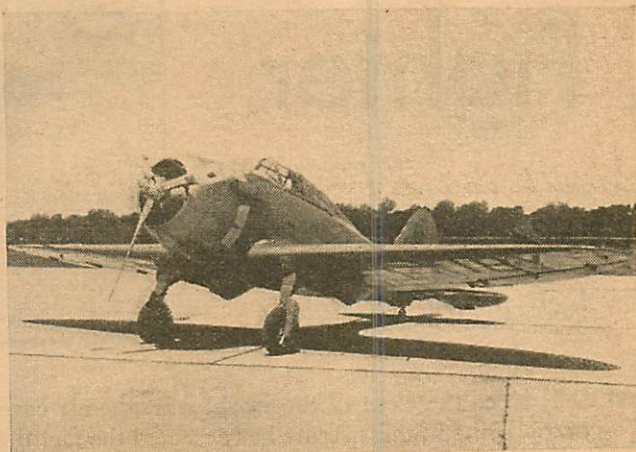
He dumped the loose motor safely—and the newspapers picked it up!

AIR TRAILS GALLERY

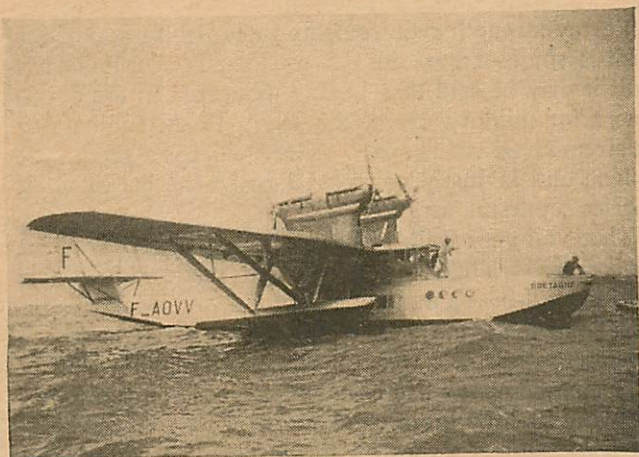
A Picture Page of Modern Planes for the Collector



CESSNA C-34 ranks high on points of comfort and performance for private owners. Specifications and solid-model plans are given on page 65.



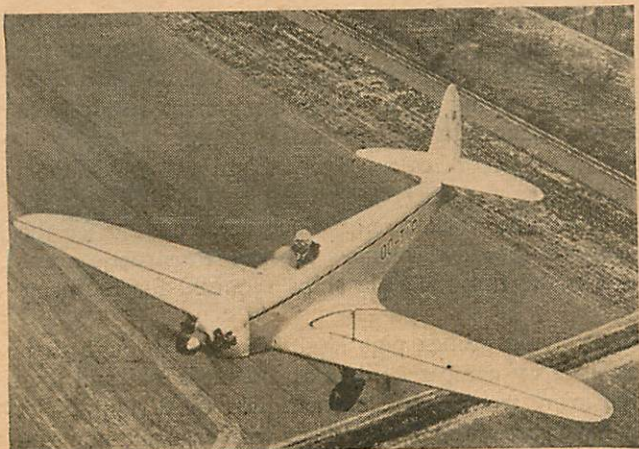
SEVERSKY newest model is this retractable-gear all-metal pursuit with twin-row P. & W. engine, controllable prop. The army has ordered 77.



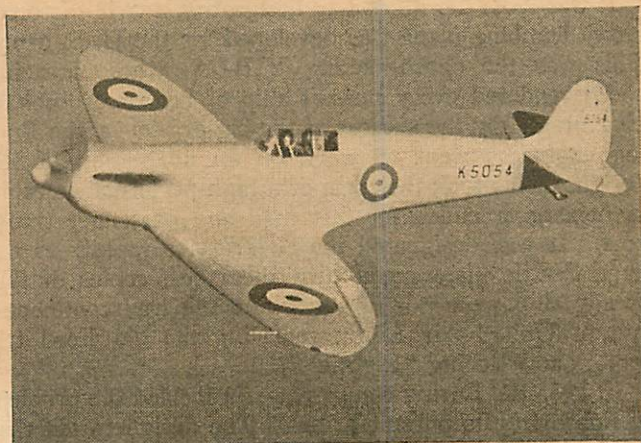
LOIRE 102 "Bretagne," France's bid for Atlantic mail, weighs 39,680 lbs., has four 720 h.p. Hispanos, 2,640-mile range, 192 top speed, 170 cruising.



DORNIER Do. 18 tandem-engined Atlantic boat "Aeolus" tested for catapulting from German vessel "Ostmark" on page 6, cruises 2,765 miles at 124.



TIPSY S, Belgian light plane of wood construction, weighs only 287 lbs. empty and cruises 70 m.p.h. on 1½ gals. of gas with 18 h.p. engine.

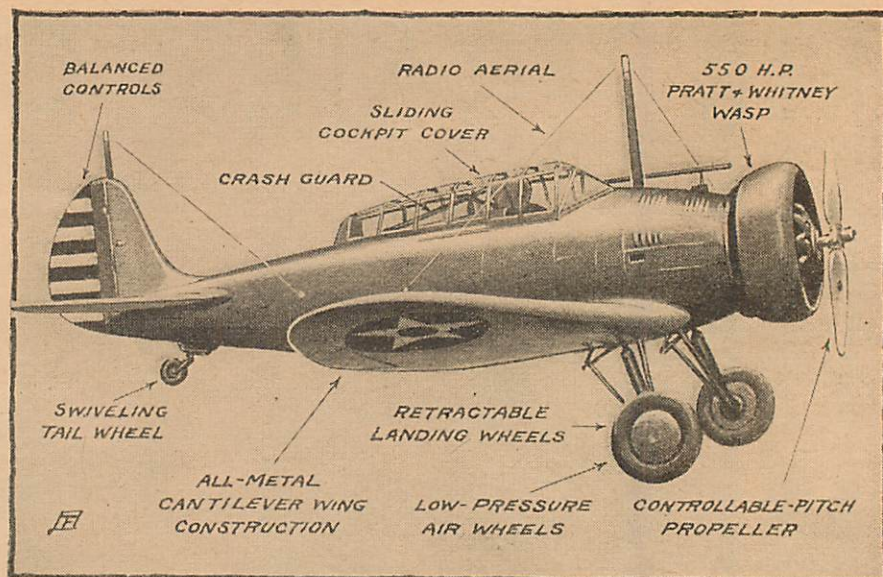


SUPERMARINE Spitfire I, latest British fighter, Rolls-Royce steam-cooled engine, is called "world's fastest military plane." Details are guarded.

The New Boeing Fighter

About the XP-29—the plane on the cover.

by Frank Tinsley



EVER since the close of the world war, the air corps of the United States Army has accepted the fact that a large percentage of Uncle Sam's fliers take to the air on wings built by Boeing.

This attitude is an eminently sensible one, for the military aircraft produced by the Seattle organization have long been rated by fighting pilots as among the fleetest and most efficient war planes in the world. Beginning back in 1920 with their first pursuit job, a 140 m. p. h. biplane, Boeing engineers have set a stiff pace for their competitors in the international race for better military aircraft.

Not content with excelling in the field of pursuit aviation, the Boeing company designed and built a series of fine passenger transport planes. Prominent among them was the old "Forty," as sturdy and dependable a ship as ever carried Uncle Sam's air mail. The "Eighty" was the largest of the fleet and a distinguished pioneer in the field of luxury air-liners. She was capable of carrying 18 passengers and a generous load of mail across the continent in tri-motored comfort at a speed of 138 m. p. h. The famous Monomail is already historic as the ship which inaugurated a revolution in American airplane design. She was the first of the current procession of all-metal, cantilever, low-wing monoplanes that have been copied all over the world.

It was from the Monomail design that a twin-motored, heavy bombing plane was developed for the U. S. army. This was the epoch-making Y1B-9A, whose amazing speed rendered every pursuit ship of her time obsolete. Encouraged by the success of the big egg-layer, the Boeing engineers went to work on an adaptation of the design. This took the form of a high-performance cabin monoplane intended for fast mail and passenger transport. It was designated the "247." As rapidly as the huge Seattle plant could turn them out, copies of this speedy ship were put in service on the transcontinental run of United Air Lines, replacing the old Ford tri-motors and Boeing "Eighties."

In 1933 the Boeing company again tackled the problem of improving its pursuit planes. The designers felt that the biplane fighters of the "12" series had pretty nearly reached the limit of their development. The P-12E's top speed of 189 m. p. h. had been overshadowed by several foreign interceptor types, notably the British Hawker

Fury. The Boeing engineers decided on a radical forward step in pursuit design. They drafted plans for an all-metal monoplane fighter.

It was the now famous P-26A, a trim little single-seater which has become the pride of the U. S. army air corps. Her top speed of around 235 m. p. h. hopped old Uncle Sam back into the front ranks and her conformance with army strength requirements rated her as one of the huskiest single-seaters in the world. To her builder's credit it may be said that Boeing pioneered in the development for military use of the N. A. C. A. engine ring and streamlined wheel spats. The P-26A is a great little airplane and is justly considered to be the backbone of America's pursuit aviation to-day.

"That's all very well," I hear you say, "but how about to-morrow?" That, my air-minded readers, is a fair question, and here's a fair answer:

Realizing only too well that to-day's aerial backbone becomes to-morrow's weakest rib, the designing skill of the Boeing company has been turned loose on the job of improving its little brain child.

A few rough sketches on the leaves of a scratch-pad outlined some of the possible improvements in the design. Among them was the elimination of the external system of bracing wires by the use of a cantilever type of wing. Another was the elimination of the head resistance caused by the fixed under-carriage. This could be effected by the adoption of retractable landing gear. A glance at the two front-view drawings will quickly demonstrate what a decided lowering of parasitic drag must result from these two changes in the layout of the ship.

It took months of calculation, design, and wind-tunnel testing before the correct answers to the problems involved could be worked out. Then more months for the drafting of the final plans. At last construction was begun on the three sample ships required for the army tests.

These flying guinea pigs have been put through their paces, first by company pilots at Boeing Field and then by the army trouble-shooters assigned to Wright Field. They have passed the difficult tests with ease and now you will find them, garbed in the colors of a fighting squadron, diving across the cover of this issue of AIR TRAILS.

Very little may be divulged concerning the technical features of the XP-29. A careful study of the few pub-

lished photographs, however, reveals certain facts. It is established practice in practical aircraft design to incorporate in a new type many of the features of previous models that have proven their worth under the grueling test of service conditions. This is true to a large extent in the case of the new Boeing.

An examination of the side-view drawings plainly demonstrates that the XP-29 is really not much more than a very thoroughly "cleaned up" version of the present P-26A. The Boeing engineers have designed the new model around the same 550 h. p. Pratt & Whitney Wasp engine used in the former ship, and have retained the old fuselage pattern almost line for line. They have made slight changes in the shape of the entering edge of the vertical fin and have replaced the old streamlined tail-

wheel housing with an exposed, fully swivelling wheel in a castor-type mounting.

The draughty open cockpit which was such a characteristic feature

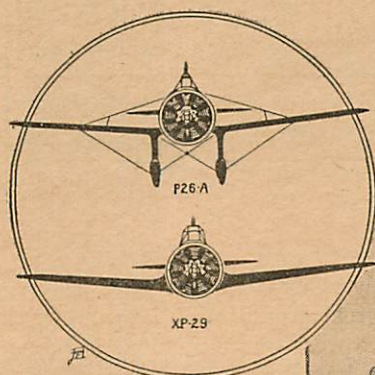
ance of the XP-29. She has been said to hit a high speed of over 300 m. p. h. This, however, seems to me to be an excessive claim when we consider that the P-26A with an identical motor, has an established top of not more than 235. While the increase in speed due to enclosing the cockpit plus elimination of bracing wires and landing gear is undoubtedly great, I question whether it would amount to 65 m. p. h.

Even at that, it seems pretty clear that the XP-29 will hit a fast enough pace to come close to the performance of the newly revealed low-wing interceptor-fighters of the British air force, and do it with much less horse power.

I'd give a lot to see one of the new big Twin Wasps stuck into the business end of the Boeing. This would bring it up to the probable power range of the Rolls-Royce Merlin with which these latest British planes are fitted. Then I, for one, would be willing to back the stubby little Yankee craft against John Bull's Hawker any day in the week—even if the Hawker has speedier-looking lines. After all, don't let's forget the old saying, "Handsome is as handsome does," for admitting, as I

freely do, that the Boeing is not quite as pretty a plane as the Hawker, the new XP-29 certainly looks like a "doer" to yours truly.

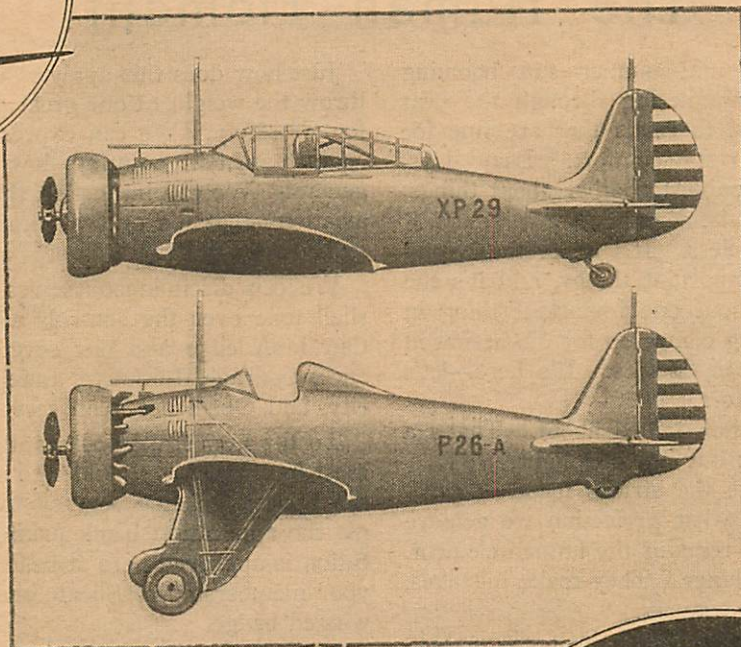
Boeing has once more put us in the military speed race. In the past, each new Boeing enabled American army and navy airmen to regain lost ground and forge ahead to a point where they could more than match the skill and fighting efficiency of any air corps on earth. Given proper power, the XP-29 will probably do that thing again.



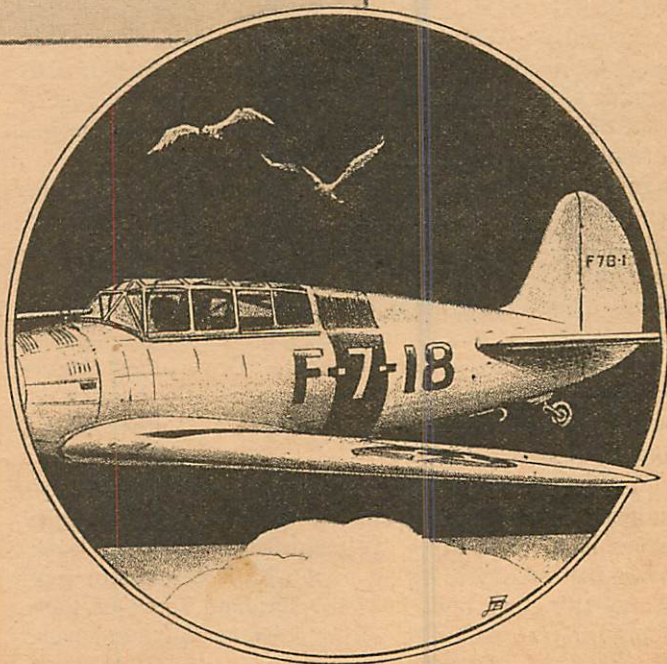
of the P-26A has been covered with an elaborate transparent enclosure of the sliding-hatch type. In the army model of the new bus (XP-29) this cover is cut off at a point midway between the cockpit and the fin, while the navy's version (F7B-1) is provided with a rear deck reaching to the rudder post. This is required on all navy fighter models in order to provide the necessary stowage space for the regulation emergency life-saving equipment. Directly behind the cockpits of both versions of the new ship we find the crash-guard head-rest of the P-26A present in skeleton form. The radio masts and equipment of both the old and the new types seem to be identical.

The main departure in the new Boeing design is the clean cantilever wing. This is placed a little lower on the fuselage than the externally braced wing of the preceding model. Due to the nature of its construction, it has a thicker section and a larger fillet. The general shape of the wing and the design and placement of the ailerons appears to be similar to those of the P-26A. In place of the familiar streamlined spats of that ship we find a simple and efficient retracting mechanism provided with long-stroke shock-absorber struts of Boeing design. The wheels are of the same type as those used on the older ship and are fitted with brakes and regulation low-pressure tires.

Nothing definite is divulged regarding the perform-



Differences and similarities between three related planes.





The Human Element

DOG days, these—the mid-summer sun booming down, the horizon shimmering through the heat waves, the air full of thermals that are fine for model-flying but not much for comfort. Lazy days, when it seems too much trouble to bother about things, and certainly not a time to be serious.

Let's be serious, nevertheless. It's never the wrong time to be serious about important things, and it's the right time to be serious about one important thing in particular, because that thing comes up for discussion in this issue of Bill Barnes-AIR TRAILS. It's here—let's face it, fellow Air Adventurers.

It's something that's seldom talked about. That's a good reason for bringing it out into the light.

No matter how great are the strides made in aeronautical science, no matter what perfection we achieve in mechanical devices, there remains the human element. Human beings are not machines. They make mistakes, they forget, their judgment wavers.

Lieutenant Wood discusses the human element in flying in a splendid article in this issue. As Air Adventurers, we should take more than ordinary interest in what he says. To us, above others, his message is important. For we are the pilots of to-morrow.

Like every other means of transportation, airplanes can be instruments of death. The distinctive characteristic of airplanes, however, is the grand feeling of freedom and power and exaltation which flying gives to the flier. That exhilaration can numb our judgment and lead us into a state of mind that scoffs at common sense. And that's when accidents occur. Government statistics show that private fliers crash mostly because of themselves rather than their machines. In other words, because of carelessness.

For this reason, the present campaign which the government is conducting for the development of "safe" planes is a good one. Although even the best "safe" planes can be crashed by a pilot who is careless or foolish enough, they will help to eliminate some of those casualties that will keep on as long as the human element in flying remains undisciplined.

Just how does this apply to us? In this way: we can throw the weight of our great organization into the fight for air safety. We can express our individual opinions against amateur stunting, low flying, "showing off" in general. We can insist that there's nothing wrong with aviation—that it's only a comparatively small group of stubbornly careless aviators who are wrong.

We can discipline ourselves for the future when we shall take over the controls along the world's airways. Our knowledge and our seven-point Creed—Self-Reliance, Courage, Initiative, Independence, Loyalty, Integrity, and Obedience—can serve to strengthen us.

To the new readers, I want to say that you can help most by marching shoulder to shoulder with us. If you can honestly pledge yourself to uphold our Creed, send me the application blank printed below. If your application is approved here at headquarters, you will receive your membership certificate and be entitled to wear our winged badge.

Forward, Air Adventurers!

Your Flight Commander,

Albert J. Carlsson

(MEMBERSHIP COUPON)

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

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

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

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

Address

☐ Check here if interested in model building.

(This coupon may not be used after October 15, 1936.)

CROSS WINDS

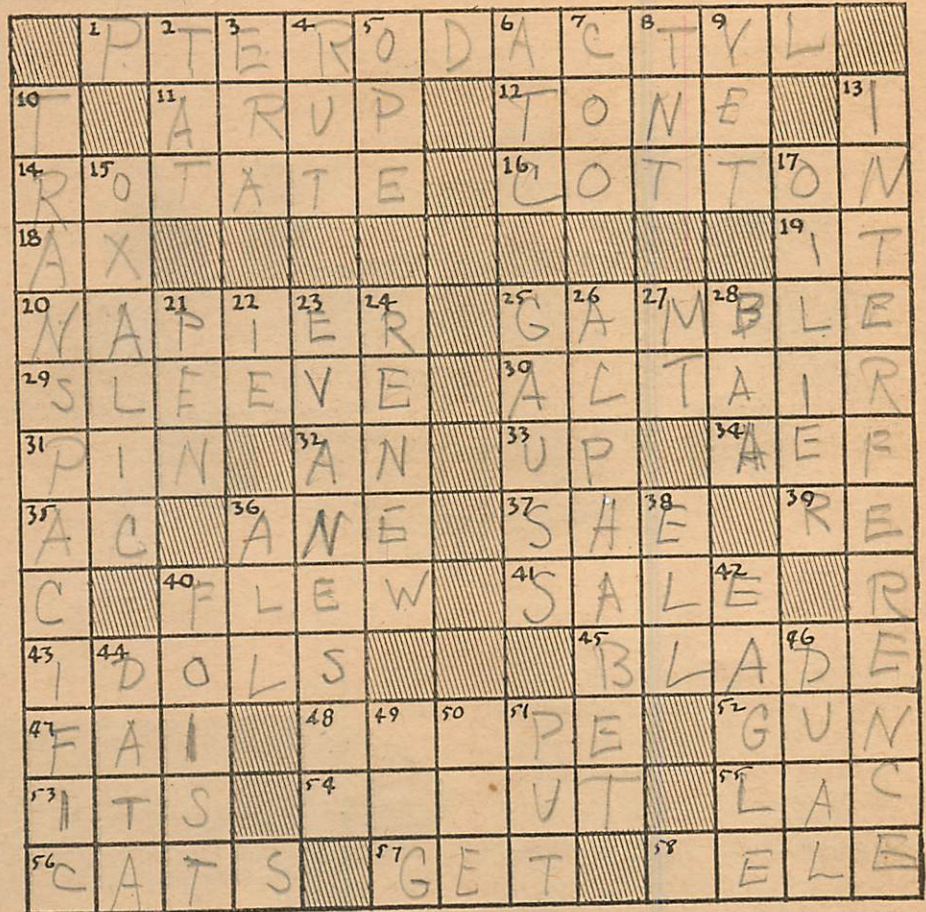
*Can you answer
the aeronautical
definitions in
this puzzle?*

Across

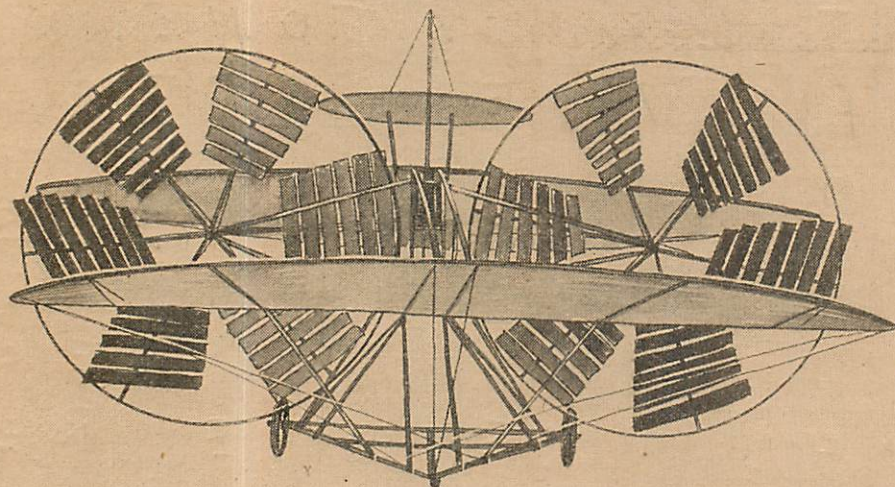
- 1—Name of British tailless plane
11—Name of American tailless plane
12—Musical sound
14—What propellers do
16—Air slang for fog
18—Hewing tool
19—That thing
20—Make of British aero engines
25—To wager
29—Fabric tube on balloon for passage of gas
30—Type of Lockheed plane
31—Wire fastener
32—Article
33—Aloft
34—Initials of U. S. army in France
35—Short for kind of electric current
36—How a Scot might say "one"
37—Feminine pronoun
39—Concerning
40—Took flight
41—Commercial transaction
43—Religious images
45—Element of propeller
47—Initials of international aeronautic regulating group

- 48—To end
52—Explosive weapon
53—Neuter possessive
54—Kind of heron
55—Resinous substance used in finishes
56—Feline animals
57—Acquire
58—Erase
2—To make lace
3—Period of time
4—Groove
5—Poetic for open
6—Initials for what good planes get from the government
7—Pigeons' cry
8—Abbreviation for powerful explosive
9—Up to now

- 10—Route of "China Clipper"
13—Interruption of air flow, particularly between biplane wings
15—Poisonous acid
17—Greasier
21—Writing instrument
22—Abbreviation for "that is"
23—Vanish
24—Regenerate
25—Unit of electrical magnetism
26—Our letter system
27—Abbreviation for mountain
28—Sheep's utterance
36—Total
38—Measure of cloth
40—Interpolate
42—King of nature's fliers
44—Technical details
46—Type of controls for two
49—Source of life
50—Existing
51—Place in position

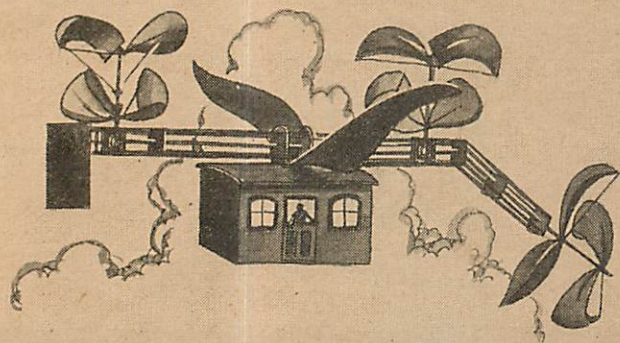
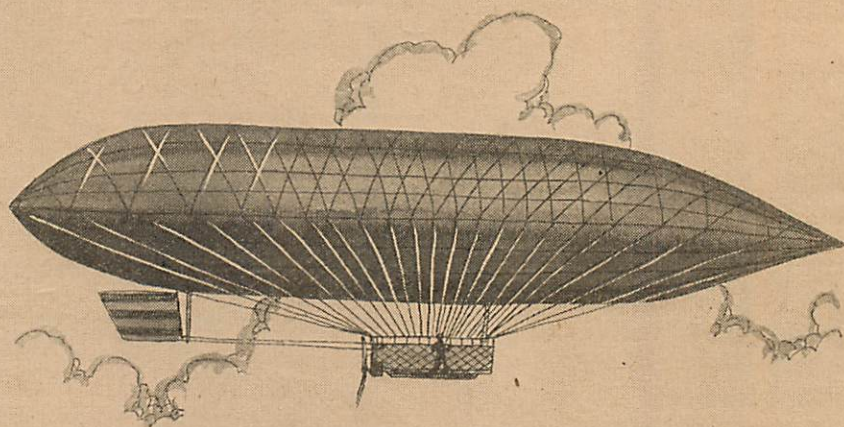


Pictorial History of Man in the Air

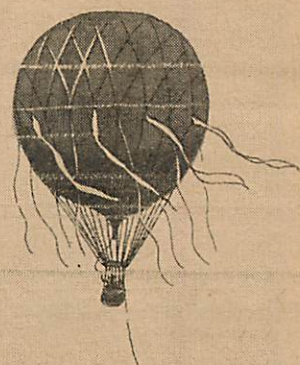


1875 THOMAS MOY
INVENTS AN "AERIAL
STEAMER" WHICH
ACTUALLY LIFTS ITS
WEIGHT WITH ITS
THREE HORSEPOWER
STEAM ENGINE !

1875 IN GERMANY,
PAUL HAENLEIN,
FLIES FIRST AIRSHIP
POWERED WITH AN
INTERNAL COMBUSTION
ENGINE RUN BY THE
COAL GAS FROM THE
BAG OF THE AIRSHIP



1876 W.J. LEWIS, OF NEW YORK,
PRESENTS A "FLYING CAR". IT
HAD FOUR HELICOPTER AIR-
SCREWS, TWIN PROPELLERS,
AND TWO WINGS AMIDSHIPS.



1875 SIVEL, TISSANDIER,
AND CROCE-SPINELLI
RISE 27,950 FEET. ONLY
TISSANDIER RETURNED ALIVE



The MODEL WORK- SHOP



Conducted by

Gordon S. Light

ARE you a "street-light flier"? Most builders are. The thrill of gliding a model, practicing take-offs and landings in the street under the light late at night holds some fatal attraction few of us can resist. Fatal, because the party seldom breaks up before the models do. But the thrill of seeing a model narrowly miss a telephone pole, barely flick the branches of a tree, or wobble along hard pavement in a safe landing is what makes street-light flying such good sport.

Recently I had a new thrill when a model enthusiast demonstrated the flat-gliding ability of his gas model. It dusted in for as sweet a landing as any street light was ever privileged to see. And all this took place at 1 o'clock in the morning. It must have been rather confusing to late home-comers to see an eight-foot plane landing on the city streets.

Rubber-powered models are the ones really at home under the street lights. The usual procedure is first to glide a model. Soon you become a little more daring; you put a few turns in the motor and try a power glide. The next step in the model's destruction is to try a take-off with the idea of catching it before it climbs too high. After each take-off you add a few more turns, and soon the model climbs so steeply that you can't catch it, and you stand helpless while it crashes into some obstacle. If you're lucky and the model lands unharmed, it is just a temporary delay before the model gets out of con-

trol again. This time you'll certainly not be so lucky, and you'll retire to the workshop to repair the damage.

Automobiles are the chief ogres. One night a small stick model made a longer flight than we expected. As it came in for a landing an automobile met it as it was several feet off the ground. We looked for the pieces as soon as the car passed, but couldn't find a trace. However, the driver stopped a block away and found the model underneath the car. It had been pinned to the radiator by the wind force and had fallen off when he stopped. The interesting point is that the model was undamaged and ready for more flying—and we flew it again.

Street-light flying does have its good points. The night air is usually calm, and you can make your minor adjustments without troublesome gusts and currents. Then, too, a few glides and rough landings will quickly bring out the weak spots in the model's construction; you can correct these and save yourself trouble when you really go to the flying field. The street-light airport is a sort of rough proving ground.

But these reasons are merely a half-hearted and semiscientific attempt to explain away the weaknesses that are part of the nature of practically every model builder. The desire to fly a model under all sorts of handicaps is something the best of us don't even try to resist. We're all just dyed-in-the-wool street-light fliers.

The Contest Calendar

MISSISSIPPI VALLEY Model Airplane Tournament, St. Louis, Mo., Aug. 21-22. Annual event, with attractive prizes, open to all in this section. Information, entry blanks from sponsor: Stix, Baer & Fuller Model Airplane Club, St. Louis, Mo.

LEBANON Third Annual Outdoor Meet, Lebanon, Pa., Aug. 29; rain date Sept. 7. Complete list of outdoor events, including gas-model contest. Trophies, airplane rides, medals, sweaters, other prizes totalling 35 awards. N.A.A. rules. Open to all modelers from Eastern States. Information: Contest Director, Exchange Club, Lebanon, Pa.

AMERICAN LEGION Fourth Annual National Model Airplane Contest, Indianapolis, Ind., Aug. 29-30. Full list of outdoor and indoor events. Rules, entry blanks: Director, Aeronautics Commission, 777 No. Meridian St., Indianapolis, Ind.

JUNIOR AVIATORS OF AMERICA National Junior Air Races, Buffalo, N. Y., (changed from Cleveland, O.) Aug. 30-Sept. 2. Sanctioned by N.A.A. Open to winners of Junior Aviator wing-city elimination contests sponsored by Scripps-Howard newspapers.

CANADIAN NATIONAL CONTEST, Toronto, Ont., Aug. 31-Sept. 2. Outdoor, indoor and gasoline events. United States modelers eligible. Information: Contest Director, Canadian National Exhibition, 705 Lumsden Building, Toronto, Ontario, Canada.

JUNIOR AVIATION LEAGUE of Boston, outdoor summer contest, Sept. 5. Open to J.A.L. members in Boston and vicinity. Information: Junior Aviation League headquarters, Jordan Marsh Co., Boston, Mass.

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

The Biggest

*More entrants, more models,
Detroit event that saw
depart and new*

Wakefield
victor—Al-
bert A. Judge
of England.

Chester Lanzo,
winner of open-
age fuselage.

It's Ray
Wriston of
Tulsa, let-
ting one
go.

THE WAKEFIELD TROPHY—the grand old mug of model building—is back in England. The team of six British builders sent over to Detroit had what it took to relieve America of the cup.

Winning it this year gives the British five victories out of nine contests. It means that next year American builders will invade England in a determined effort to even the count.

Just seven seconds' difference in a three-flight average decided the outcome. The British model of Albert A. Judge piled up a 4-minute 9-second average flight compared to 4 minutes 2 seconds by the entry of Ray Wriston of Tulsa, Okla.

America fared even worse in the Moffett International Contest. This four-year-old trophy goes to far-away New Zealand after a three-year-stay in this country. The winner, Vernon Gray, shipped his model by express to the contest, where it was flown by Bertram Pond, an old-time modeler from Peru, Ind. Pond turned in the amazing time of 44 minutes 14 seconds. No other entrant came near this time, and that means the Moffett will take a long jaunt to the other side of the world for a year's stay.

No one was sorry to see Vernon Gray win the trophy. He's been sending models to these contests for several years, and his victory is a pleasant climax. His ships have always flown well, even after their 10,000-mile trip, which is a tribute to his cleverness and ability.

Despite the loss of two international trophies, no one will deny that the 1936 contest was a wonderful event. There were more entrants and more models than at any previous contest. The event was truly an international

Stout Trophy
victor Ervin
Leschner.

A Canadian flier
tries for the Moffett.

National Meet

*long flights marked the 1936
two international trophies
champions arise.*

one. There were entrants from practically all parts of the United States, including Florida, California, Oklahoma, Texas, Nebraska, New York, and North Carolina. Michigan, Ohio, Indiana, Illinois, and other States near Detroit all sent big delegations. Canada was well represented by twenty-six builders from Toronto, Ontario, British Columbia and several other provinces. England sent a team of six. Andre Vincere, national champion of France, was present with his own models and those of five other French builders. Then, to really round out the international aspect, there were models shipped from New Zealand and Australia.

On Monday, June 29, models and model builders began to converge on Detroit. Bus lines, railroads, airlines, and automobiles all brought their share.

The large Book-Cadillac Hotel was soon turned into a model hangar. Each room became a miniature workshop with propeller carving, wing covering, and last-minute adjustments being carried on. By Monday noon so many model builders had registered for the contest that the late-comers were forced to take rooms at the Y. M. C. A.

Detroit was a fine host to the modelers. Headed by the *Detroit Times*, which sponsored the contest, all the industries and civic organizations did their bit to make the contest a success. General Motors, Ford Motor Company, Stinson Airplane Company, Berry Brothers, and A. C. Spark Plug Company are only a few of the organizations that provided a continuous round of sight-seeing and amusement. Trips around Detroit, visits to the General Motors Exhibit and the Ford Motor Company and Ford's Greenfield Village, free movies, swimming, river boat rides, visits to amusement parks, and

Bert Pond, who
flew for Vernon
Gray.



Frank Tlush, Texaco
gas model winner.

Bruce Lockett,
winner of the
Mulvihill.



General view of the
busy contest scene.



Judges checking
John Ginnetti's
Wakefield entry.

trips to Selfridge Field are samples of what the builders were doing when they weren't occupied with their models.

The contest lasted three days, from Tuesday to Thursday, June 30, July 1 and 2. The first day's flying included the Mulvihill stick model contest, the Stout cabin fuselage, and the elimination contests to pick the teams which would represent America in the finals of the Wakefield and the Moffett International.

Monday night there was a heavy rainstorm. It rained steadily all night and did not clear until Tuesday noon. Plans for the outdoor flying, however, went ahead. Before the afternoon was many hours old, the air currents were good enough to take a model away for a 48-minute flight. This was the best time recorded for the day, although there were many other really long flights. The light breeze blowing across Wayne County Airport made ideal flying conditions. The airport was smooth and grass-covered, and the surrounding country was free from trees and other obstructions, with numerous roads making ideal model-chasing terrain.

The officials and timers at the contest were flying officers from the U. S. army air corps division at Selfridge Field. They kept after the models with remark-

able enthusiasm, considering the hot sun. Every contestant was grateful to them for their work. The thrill of watching the models fly, however, offset the tedious task imposed on them.

The boys from Tulsa soon proved who was going to take the Mulvihill Trophy this year. With their fast-climbing tractors, they soon had turned in flights of 41m 41s, 23m, and 10m. Bruce Luckett, Jr., Alvie Dague, Jr., and Jesse L. Vint, all from Tulsa, won the first three places in the order named. The type of model they flew was a small stick tractor equipped with a landing gear. The model had the steepest climb of any on the field. During the 40 seconds of propeller duration, the model climbed until it was nearly a speck in the sky. And then the good glide of the model stretched this duration into a long flight.

The boys from Tulsa proved themselves true champions, winning high places in every contest. Their club consists of only thirty-odd members, yet the trophies and models they took home with them would do credit to an organization many times that size. They were as enthusiastic and as pleasant a group of modelers as we ever met, and it was fun to have them win.

Winners and Ranking Contestants at the National Meet

OUTDOORS

WAKEFIELD International Trophy, fuselage models (Average of three flights.)

1—Albert A. Judge	England	4m 09s
2—Ray Wriston	Tulsa, Okla.	4m 02s
3—Robert Copland	England	3m 23s
4—Richard Everett	Elm Grove, W. Va.	2m 59s
5—J. B. Allman	England	2m 43s
6—Gordon S. Light	Lebanon, Pa.	2m 40s
7—Dennis Fairlie	England	2m 05s
8—Andre Vincere	France	1m 49s
9—G. Dubois	France	1m 47s
10—John Ginnetti	Atlantic City, N. J.	1m 36s

MOFFETT International Trophy, fuselage models

1—Vernon Gray	Auckland, New Zealand	44m 14s
(Flown by Bertram Pond of Peru, Ind.)		
2—Robert Jeffrey	Findlay, O.	10m 58s
3—A. Worley	England	9m 45s
(Flown by Robert Copland.)		
4—Bruce Luckett, Jr.	Tulsa, Okla.	8m 40s
5—W. Worden	England	7m 40s
(Flown by Albert Judge.)		

STOUT Trophy, fuselage models

1—Ervin Leschner	Philadelphia, Pa.	36m 01s
2—Robert Copland	England	20m 07s

OPEN-CLASS (over 21) Fuselage Contest

1—Chester Lanzo	Cleveland, O.	48m 45s
-----------------	---------------	---------

MULVIHILL Trophy, stick models

1—Bruce Luckett, Jr.	Tulsa, Okla.	41m 41s
2—Alvie Dague, Jr.	Tulsa, Okla.	23m 03s
3—Jesse L. Vint	Tulsa, Okla.	10m 00s

BALFOUR Trophy, stick models (open class)

1—Sheldon Bell	Toledo, O.	6m 30s
2—Richard Korda	Cleveland, O.	5m 32s

TEXACO Trophy, gas models

1—Francis J. Thush	Lyndhurst, N. J.	45m 34s
2—Hewitt Phillips	Belmont, Mass.	30m 12s
3—Joseph H. Buehrle	Little Rock, Ark.	27m 50s
4—Michael Graneiri	Newark, N. J.	26m 40s

OPEN-CLASS Gas Model Contest

1—Mike Kostich	Akron, O.	36m 52s
2—Melvin Yates	Joliet, Ill.	27m 32s
3—Dick Bodle	Akron, O.	26m 27s
4—Raymond E. Podolsky	St. Louis, Mo.	24m 59s
5—Vernon Boehle	Indianapolis, Ind.	24m 39s

INDOORS

STOUT Trophy, stick models

1—John Haw	Philadelphia, Pa.	18m 10s
2—Bruno Marchi	Medford, Mass.	18m 01s
3—Wilbur Tyler	Boston, Mass.	17m 52.5s
4—John Ginnetti	Atlantic City, N. J.	17m 52s
5—Roderick Doyle	Alameda, Calif.	17m 20s

SPRINGFIELD Trophy, stick models (open class)

1—Carl Goldberg	Chicago, Ill.	19m 26s
2—Ray Wriston	Tulsa, Okla.	17m 56s
3—Joseph P. Matulis	Chicago, Ill.	17m 55s
4—Ira J. Fralick	Syracuse, N. Y.	16m 45s
5—Gordon Johnstone	Detroit, Mich.	16m 23s

BLOOMINGDALE Trophy, fuselage models

1—Alvie Dague, Jr.	Tulsa, Okla.	16m 17s
2—John Haw	Philadelphia, Pa.	14m 54s
3—Albert W. Courtial, Jr.	St. Louis, Mo.	14m 31.8s
4—John Ginnetti	Atlantic City, N. J.	14m 00s
5—William C. Gough	Chicago, Ill.	12m 55.8s

OPEN-CLASS Fuselage Contest

1—Joseph P. Matulis	Chicago, Ill.	11m 21.5s
2—Jesse Bieberman	Philadelphia, Pa.	10m 25s
3—Ted Becksted	Chicago, Ill.	9m 37.5s
4—Ira J. Fralick	Syracuse, N. Y.	8m 05s

NON-FLYING SCALE

MODEL AIRPLANE NEWS Trophy

1—Louis Casale	Syracuse, N. Y.	98 per cent
2—Bronik Soroka	Cleveland, O.	97.9 " "
3—Harry Walker	Cleveland, O.	96 " "
4—Carroll Krupp	Akron, O.	95.8 " "
5—Fred Mayfield	Akron, O.	95.4 " "

In the contest for the Stout Fuselage Trophy, Ervin Leschner of Philadelphia, Pa., turned in a winning time of 36m 1s. Robert Copland, of England, worried the American boys when his model was clocked at 20m 7s. However, his plane was lost, making additional flights impossible.

One incident proved how model flying has advanced in the last few years. We saw a builder bringing his model back after a flight. He was downcast, and from all appearances it seemed his model must have flown poorly. He tossed his plane to the ground and disgustedly told his companion that the confounded ship flew only 7 minutes! Seven minutes is still a good flight at any contest, yet his standard was so high he couldn't think of anything less than 30 or 40 minutes. Later in the day he did turn in a flight of this length, to place among the winners.

In the two other events run off on Tuesday—the elimination contests for the Moffett and the Wakefield International contests—teams of six U. S. entrants had to be selected to represent this country in the final events. Last year's winners automatically became members, so in reality only five boys were picked for each team. Of the five picked for the Wakefield, Ray Wriston of Tulsa turned in the best record with a three-flight average of 14m 54s. Ray's plane flew away after being timed at that figure, leaving him without a model to fly in the next day's finals. Needless to say, he didn't get any sleep Tuesday night, but he did have a new model ready for the event on Wednesday.

In the Moffett elimination, Donald Krause, of Erie, Pa., turned in the best flight of 16m 32s. The excellent flights of the United States ships during these eliminations seemed to indicate that both the Wakefield and the Moffett trophies would remain in this country for another year. But during the events of the next two days there were disappointments in store.

The second day of flying, July 1, was for the finals in the Wakefield event and the gasoline-powered contest for the Texaco Trophy. The weather was practically perfect. The Wakefield event was slow in getting started, due to confusion about interpretation of the English rules. After several Americans had made minor changes in their models to conform to the English viewpoint, there was further delay in measuring the wing area. Failure of the English judges to calculate the wing area properly caused more than one American entrant to think perhaps his model was not eligible. Finally these errors were discovered, and, after checking and re-checking the American entries, they were found to be well within the requirements.

When the American team seriously started their flights, they found that A. A. Judge of the British team had turned in a flight of about 8 minutes. American hopes sank pretty low until Ray Wriston revived them with a flight of 9 minutes, when the model disappeared. The model continued to fly for 20 minutes and was later recovered for another flight. American hopes soared even higher when we learned that Judge's model had been damaged when he was winding up for his second flight. Meanwhile, Wriston, who was leading the American team, had taken his three official flights. Two of his flights were poor, pulling his average down to 4m 2s. Judge had his model repaired by this time and was ready to fly. He needed a flight of about 1m 30s to beat Wriston. He won the Wakefield with a flight of not

Side Lights

A 300-pound lady spectator dashing madly out of the path of Ben Shershaw's wild-flying gas model.

* * *

The Florida and California entrants forgetting models to argue about the climate and the size of grapefruit grown by their home states.

* * *

Francis Tluth's gas model landing in the only tree in the middle of a large cemetery, after a flight that won the gas-model event.

* * *

A mother-and-son combination of model builders from St. Louis. Both good modelers and entered in several events.

* * *

A gas model that completed two full loops high in the sky and then resumed its flight in normal nonchalant fashion.

* * *

Two girl entrants—Barbara Maschin of Westfield, Mass., and Mary Roll of Detroit, Mich.—both old-timers. Good enough to give all of the boys a genuine worry.

* * *

Gas-model motors running in the hotel at 3 a. m. the morning before the contest. They annoyed the manager, who was interested in maintaining quiet for the other people who were trying to sleep.

* * *

Frank Ehling's gas model, which took off with bad adjustment. It climbed and then turned and dived viciously at Frank, its wing giving him a hard whack across the middle of his back.

* * *

Andre Vincere, the French entrant, whose well-built models and pleasant spirit attracted every one.

* * *

During the presentation of trophies, when Carl Goldberg was receiving the Springfield Trophy for the third time, some one called, "Why not let him keep it?" That's good advice, since Carl has been at the top in indoor flying for the last six years and allowing him to keep the trophy would save the needless trouble of the annual presentation.

* * *

A team of six should be sent to England to win back the Wakefield Trophy next year. Sending the builders is a quicker and surer method than shipping the models and having them flown by proxy.

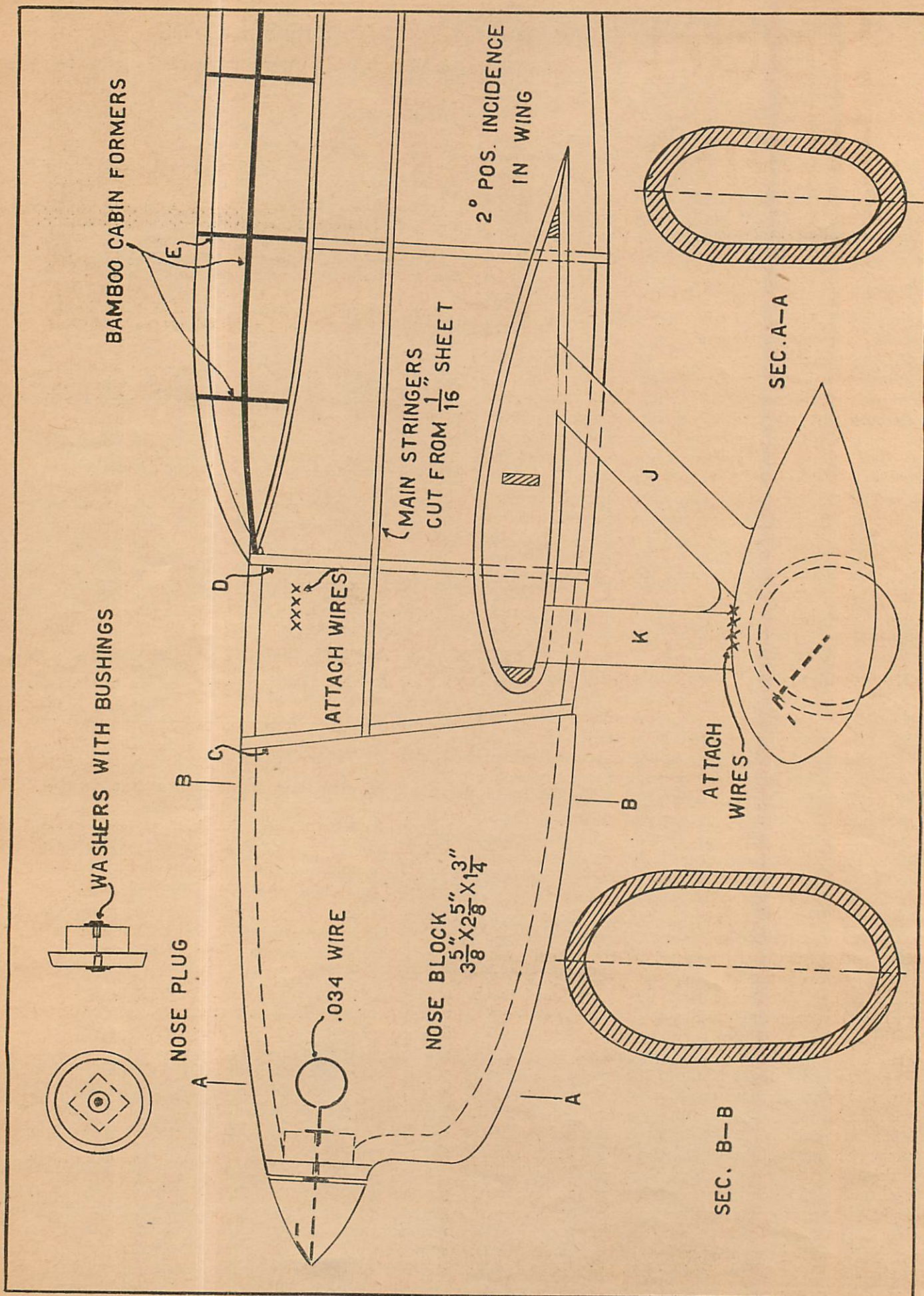
quite 2 minutes, beating Wriston's average by 7 seconds.

While the Wakefield contest was being decided at one end of the airport, the gas-model contest was under way at the other end. At all times throughout the day there was at least one gas model in the sky. At many times there were so many that it seemed a miniature pursuit squadron had come down from Selfridge Field.

The old days when it was considered a triumph to get the motor running and the model into air without a crash are gone forever. Most of this year's crop of gas models performed nicely, and the motors were reliable. When the models made rough landings it was usually a matter of only a few minutes before they were in the air again.

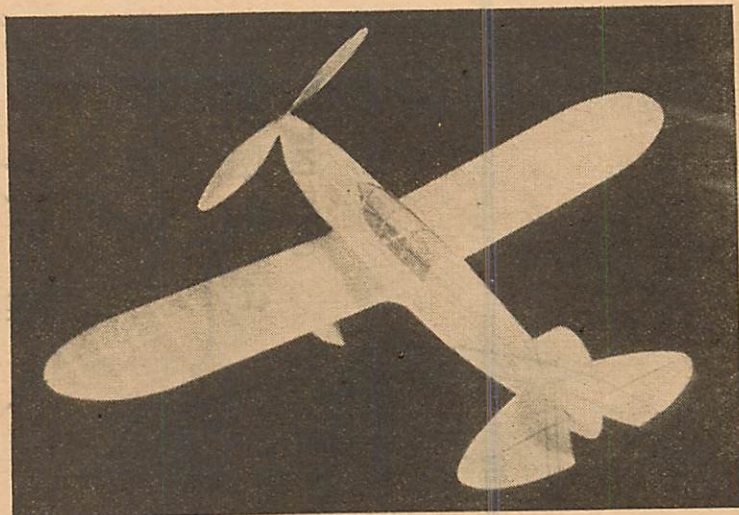
William Atwood from California was present with a whole fleet. One interesting little ship of his had a small single wheel mounted inside the front of the fuselage. He ran alongside to balance the wing on the take-off. It showed a remarkably steady glide because of the clean design.

Hewitt Phillips of Boston, Mass., had an interesting gas model. Single-motored, it was built along the same general lines as the Lockheed Electra, with twin fins mounted near the ends of the elevator. In addition it was equipped with a retractable landing gear which snapped up into the wing the instant the model left the ground. After a flight of 30m 12s, which was good enough to win second place, the model (Turn to page 94)



Sport Plane

by Louis Garami
and Henry Struck



THE new Brown B-3 custom-built sport plane is a remarkable performer. Its top speed of 205 m.p.h. and its landing speed of 40 m.p.h. make it one of the outstanding two-seaters of the present day. Its qualities probably come from the valuable experience gained by the Lawrence Brown Aircraft Company in the construction of the famous Brown light racing planes, among which are the well-known *Miss Los Angeles* and the *Miles & Atwood Special*. The new Menasco C-6S-4 250 h.p. Super-Buccaneer 6-cylinder supercharged engine pulls the B-3 through the air at 190 m.p.h. cruising speed, due to the plane's light construction and aerodynamically clean lines.

The full-size B-3 has a welded steel tubing fuselage, covered with fabric, and fabric-covered wing of solid wood spars and wooden ribs. Its span is 32 feet and length over-all 26 feet. Weight empty is 1,850 pounds and gross weight 2,650. Cruising range is 600 miles.

Our model is a remarkable flier and a good replica of the original.

FUSELAGE

Construction is simplified by employing four main stringers. Trace these from the top- and side-view plans and cut them from 1/16" hard balsa. Cut the formers

*A fast-flying model of
a speedy new two-seater.*

BROWN B-3

from 1/8" soft sheet. Lay the stringers on the plans and mark the position of the formers on them. Cement bulkheads D, F, H in place.

As soon as these are dry, the other bulkheads are placed in position. Bend the rear hook of .034 piano wire and cement it securely into former H.

The auxiliary stringers of hard 1/16" square balsa are glued in place to complete the contour of the fuselage. Bend the cabin formers from 1/32" square bamboo by holding it over the gas range for a few seconds. Glue them to the cabin stringers at the proper points.

Glue two soft blocks of balsa 7/8x5/8x35/8" lightly together and carve them to the outside shape of the nose block, shown in cross section and side outline on the front and side views, after which they may be split apart and hollowed out to the approximate thickness shown by the dotted lines on the plans. Cut a hole 3/8" square in the joined nose block and make a plug to fit. Washers with bushings inserted are used at front and rear of the nose plug to serve as bearings.

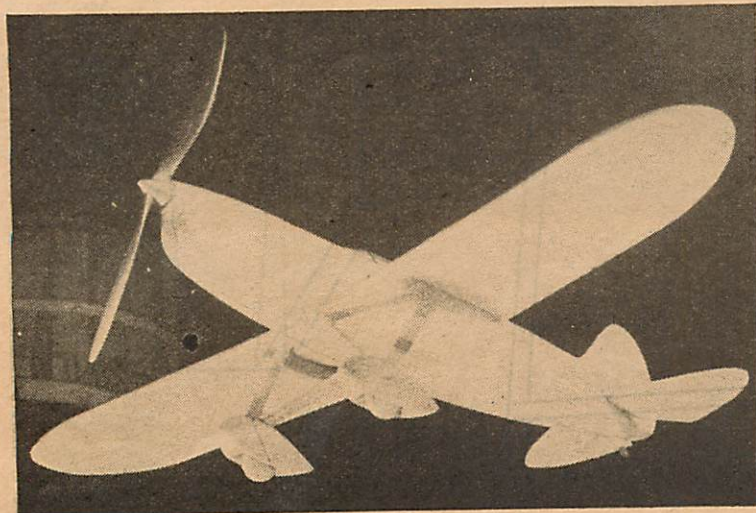
Cover the body with narrow strips of Japanese tissue, spray with water, and dope when dry. Cover the cabin with light celluloid. Because of the complex curve of the forward section of the cabin, four pieces should be used there to make a neat job.

The tail-wheel fork is attached at the proper point to the main bottom stringer and a 3/8" balsa wheel mounted in it.

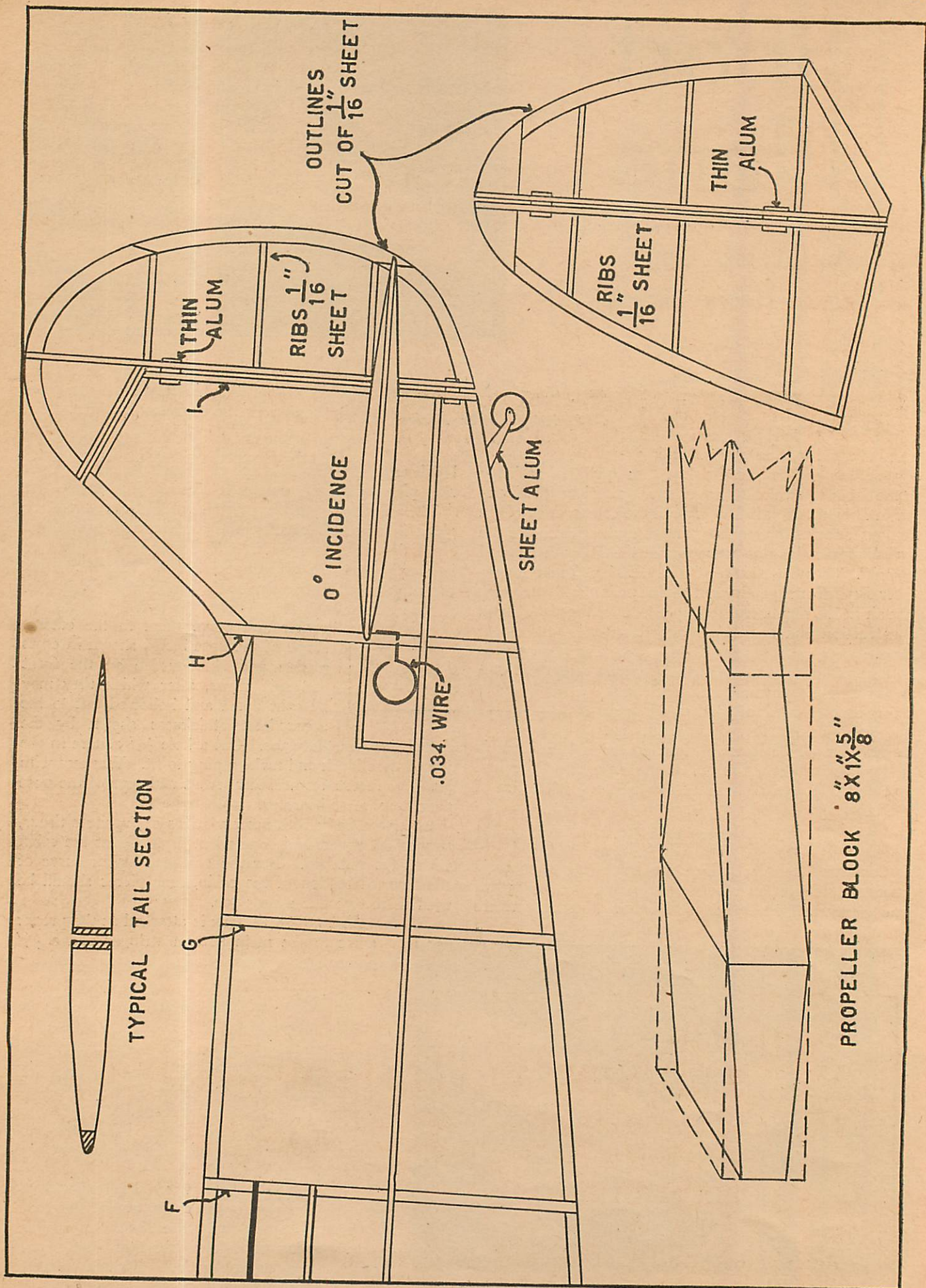
TAIL GROUP

Make the tail surfaces as light as possible by using soft balsa throughout. Main spars are 1/16x1/4". Ribs are of the same material and are streamlined to the shape of the typical tail section. The outlines are cut of 1/16" sheet balsa and cemented in place. Hinge the surfaces together with soft sheet aluminum and cover with tissue.

Attach the stabilizer at zero degrees incidence to the stringer immediately above the main stringer. Spray and dope *lightly* to prevent the warping of the surfaces that might occur with a heavier application. Pin the parts to a flat surface while they are drying.



Looking down at a bottom view to get an upward slant!



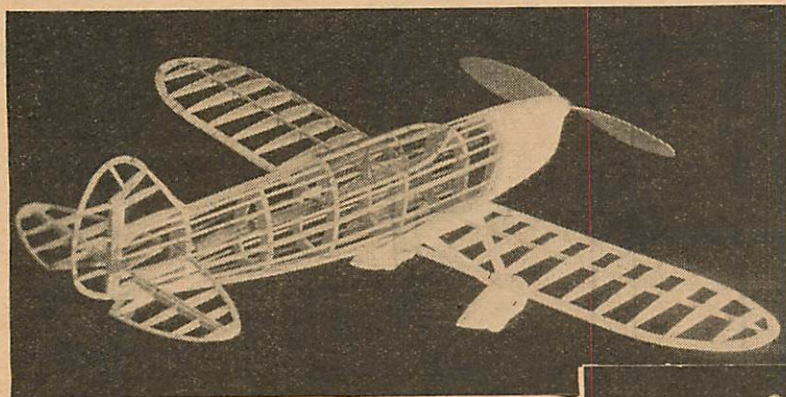
WING AND LANDING GEAR

The wing construction is light and strong. This is accomplished by using a deep spar. Cut all the ribs of 1/16" sheet, using the templates given. The spar is made of 1/8x5/16" medium balsa, tapering from the last No. 1 rib to 1/16" at the tip.

Shape the leading and trailing edges of medium balsa. Place the spar and edges upon the plan and mark the position of the ribs. Slide the ribs on the spar and attach the edges. Add the tip outline, cut from 1/16" sheet to complete the wing.

Ailerons and flaps are not necessary for a flying model. However, their location is shown on the plan for those who wish to add them for exhibition purposes. To cover the wing tip perfectly, use separate sections of tissue. The rest of the wing is covered in one piece.

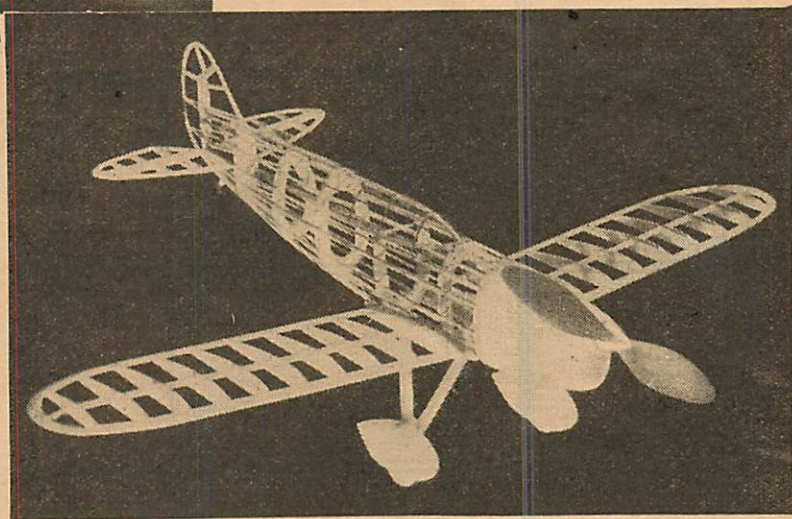
Shape the wing fillet from a soft balsa block 4 3/4 x 3/4 x 5/8". Cement the completed fillet to the wing.



These skeleton views are a guide to good workmanship.

Variations in the fuselage lines or fillet may necessitate individual fitting. Each wing tip is raised 3/4" to give proper dihedral.

The streamlined landing struts are made of 1/8x7/16" hard balsa. To make the pants, first cut out the center piece to accommodate the wheel. The wire shock absorber is glued in place before the sides are added. Carve and sandpaper to proper shape. Join the struts to form a V shape. The completed struts are attached to the fillet at the points indicated on the plans. Fasten the pants to the apex of the struts with plenty of cement.



PROPELLER AND MOTOR

Medium balsa 5/8x1x8" is used for the propeller block. Carve carefully and try to reproduce the shape of a standard metal prop. The photographs will serve as a guide. The spinner is 3/4" in diameter and made of hard balsa, with the rear cut out to fit the propeller.

The prop shaft is bent of .034 wire, passed through the nose plug, then the prop, and the end bent over and embedded in the spinner. Don't forget, however, to include two washers between the prop and plug. Six strands of 1/8" brown rubber provide ample power for this model.

FLYING

The model is a fast flier. For this reason a field of tall grass should be chosen when the first test is made. Because of the heavy nose and light tail surfaces, the center of gravity is in an excellent position and only minor adjustments may have to be made to get the model flying nicely. Use the movable tail surfaces for this purpose.

Glide the ship gently into the wind, making adjustments with the elevators until a flat glide is secured. Now put 50 turns in the motor and try a short test hop. Gradually increase the number of turns till the maximum of 250 is approached. With lubricated rubber and a winder, 500 turns may be safely stored and the flight duration consequently greatly increased.

Next Month—

The NEW Wakefield Winner!

Direct from the national meet at Detroit come complete plans and instructions for building the *leading model of the year*, presented by

GORDON S. LIGHT

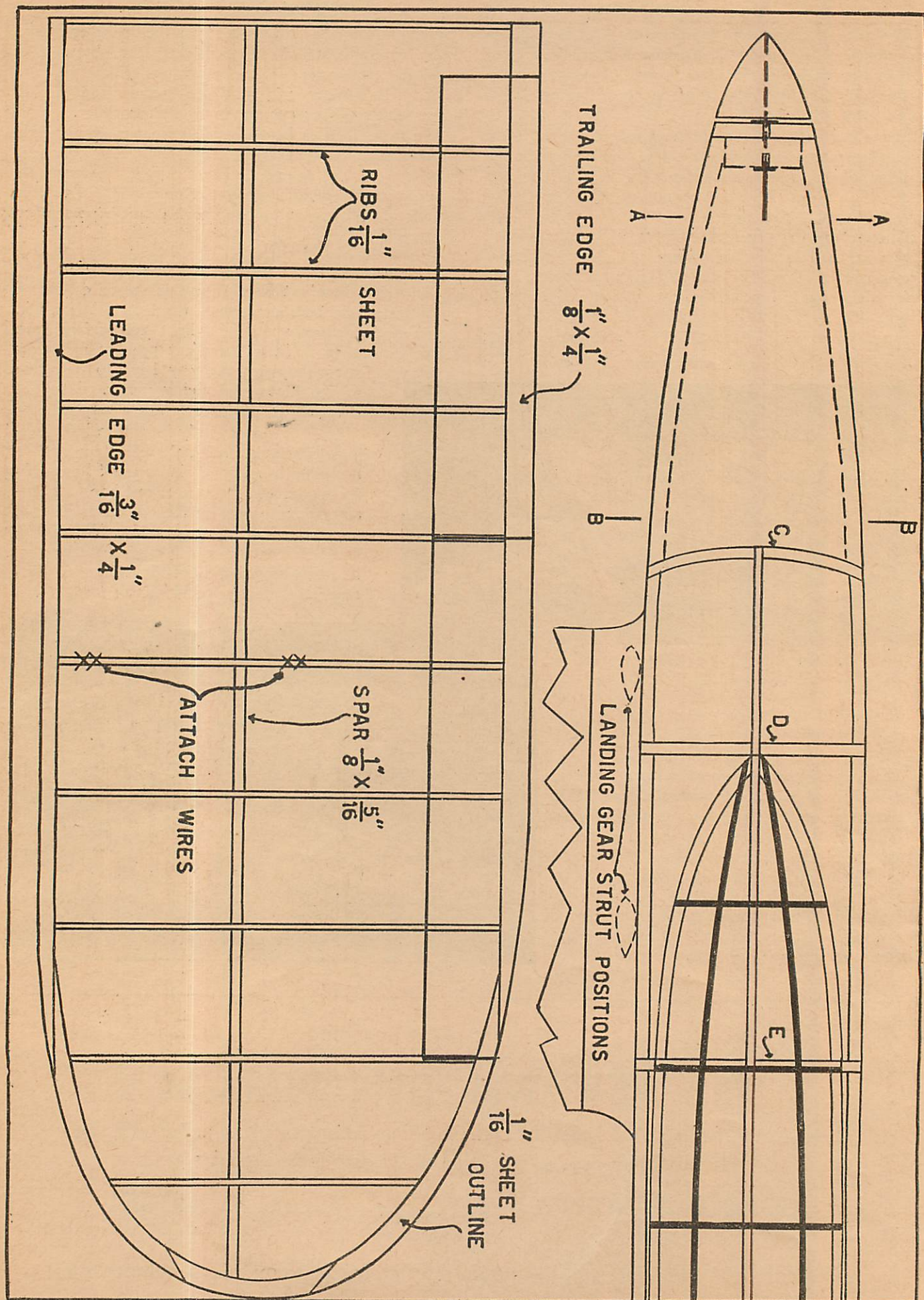
1935 winner

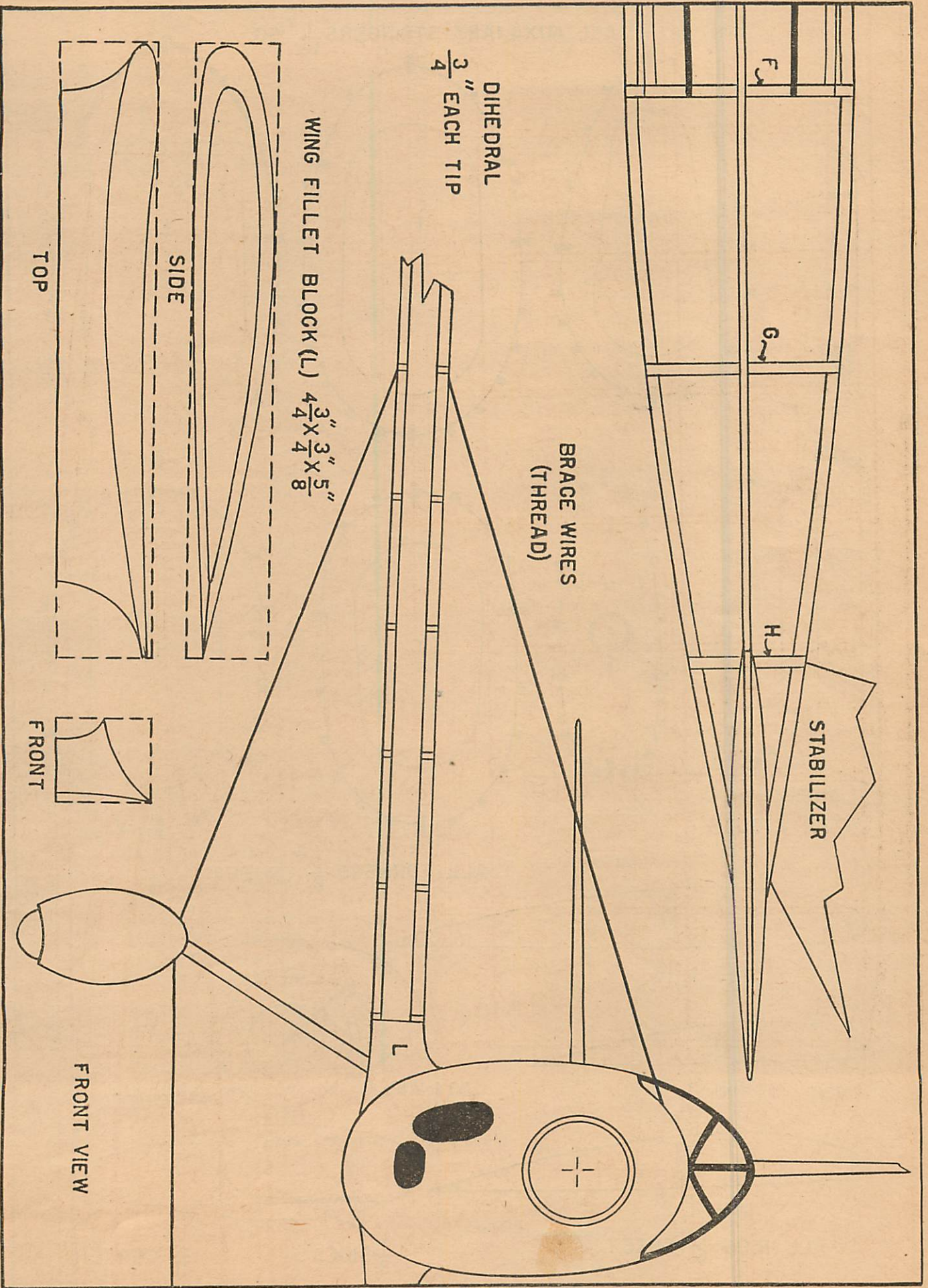
in
collaboration
with

A. A. JUDGE

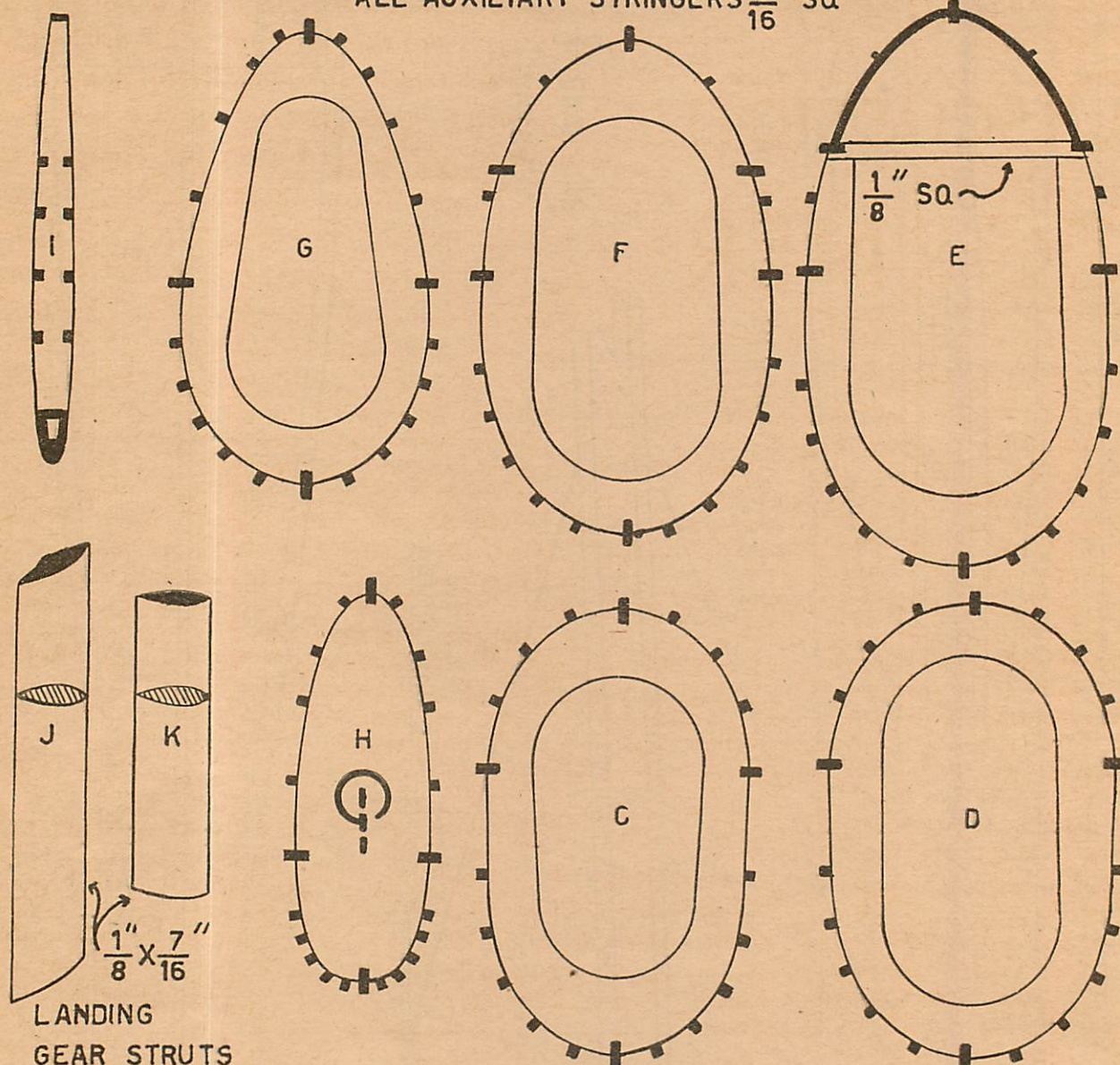
1936 winner

An exclusive Model Workshop feature in the October issue, on sale September 9th.



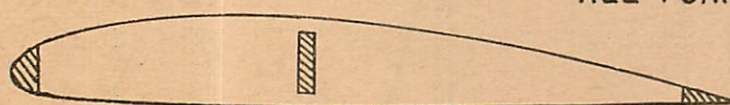


ALL AUXILIARY STRINGERS $\frac{1}{16}$ " SQ

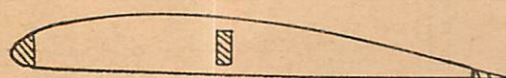


LANDING
GEAR STRUTS

ALL FORMERS $\frac{1}{8}$ " SHEET



RIB 1, 16

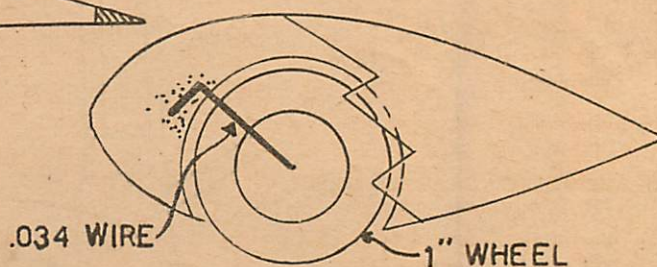


RIB 3, 2



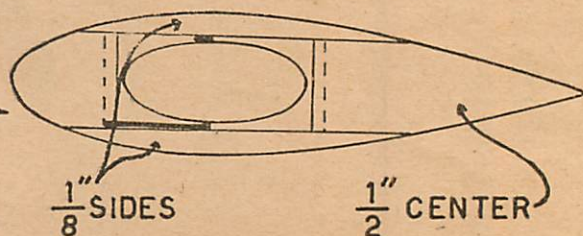
RIB 2, 2

ALL RIBS $\frac{1}{16}$ " SHEET



.034 WIRE

1" WHEEL



$\frac{1}{8}$ " SIDES

$\frac{1}{2}$ " CENTER

The Discussion CORNER

The model art progresses through exchange of ideas. The Discussion Corner is a monthly sounding board for your opinions. This month readers discuss airfoil sections. For October we're publishing answers on demountable vs. fixed motors. Topics that will follow are listed below. Think about them, then write your opinion in 150 words or less and send it to The Discussion Corner. One dollar is paid for each answer printed.

I FIND that I have a hard time making a choice between three different airfoil sections. These three sections are the ever popular Clark Y, the C-72, and the U. S. A. 27. For an exact choice I think the C-72 airfoil would be my choice. The C-72 has three advantages; it can accommodate a large spar, it is a high lift airfoil, and it improves the glide.

Do bottom-cambered airfoils add to the model's flight? I'll say they do. Both the C-72 and the U. S. A. 27 airfoil have under-camber and are noted for high lift and gliding qualities. I have noted the difference in my models' flights when using the Clark Y and the C-72 airfoils. The Clark Y is a high-lift section itself, but for duration models I take the under-cambered airfoil every time.—HARRY FOSBURY, Portland, Ore.

For all-around flying I think the Clark Y airfoil is the best for models. I never cared for bottom-cambered airfoils because I never noticed any increase in lift or flying qualities. Also a bottom-cambered wing is more difficult to cover than a flat one.

I never had much success with airfoil sections whose maximum camber fell below 10 per cent of the chord. In other words, the thin sections with considerable under-camber and upturned trailing edges never produced the results of the airfoils with 11 to 14 per cent camber.—JOHN F. BYRNES, Chicago, Ill.

For low-speed rubber-powered models it doesn't seem to make much difference in my models what shape airfoil is used as long as it has no sharp bends and curves. The variation between the usual airfoils seems so slight that I do not believe it would change the flying characteristics of a rubber-powered model, the top speed of which probably does not exceed 10 miles an hour. For gas models with faster speeds the airfoil is more important. I find the C-72 section is a good one for a gas model.—WILLIAM FEINMAN, New York City.

On commercial models, I find that an airfoil such as a U. S. A. 27 and a flat or Clark Y stabilizer bring good results. Wings on commercial models should be of high aspect ratio; therefore on some models those air-

foils of under-camber design are recommended. For pushers, under-camber designs are good for elevators, such as R. A. F. 32 and Eiffel 400, and for the main wing a Clark Y is the best combination with an M section tailplane.

A bottom-cambered airfoil does add to duration by giving much lift at the start, taking the plane high so as to get more out of the glide. But it has its faults. It has a very steep glide. The only way this glide can be made flat is to use, on commercial models, a thin modified Clark Y on the stabilizer, and on pushers to use a Clark Y on the main wing and an M section on the tailplane.—JACOB KOSOFKY, Philadelphia, P. M. A. A. junior pusher record-holder.

This Month's Topic

What airfoil section do you find most successful for models? Do bottom-cambered airfoils add to the model's flight?

I don't like airfoils with negative bottom camber such as the M-6 airfoil. I have tried this airfoil repeatedly thinking its stable characteristics would be good for the model. In every case I found that while stability was improved a little, the lift of the wing fell off so

as to make the model practically unflyable. I tested it at all flying angles. When replaced with a wing of the same area having an airfoil similar to the Clark Y, the model proved quite an efficient flier with the same power. I have found also that a high-lift airfoil flown at low angles of incidence is better than a low-lift airfoil flown at higher angles.—MILTON CROSS, Glendale, Calif.

COMING UP are these topics:

For November—*What step in building a flying model gives you the most trouble? What is your chief difficulty in getting a good flight? Have you any suggestions for overcoming these obstacles?* Answers must reach us by September 1st.

For December—*What weight rules would you like to see adopted for contests? Should the best flight or average of three flights be taken? Would you like to see an organized discussion on modeling as one of the contest activities instead of confining the program to competitive flying?* Answers must reach us by October 1st.

Keep your answers within 150 words. Every modeler's opinion is welcome. One dollar will be paid for each answer printed.