

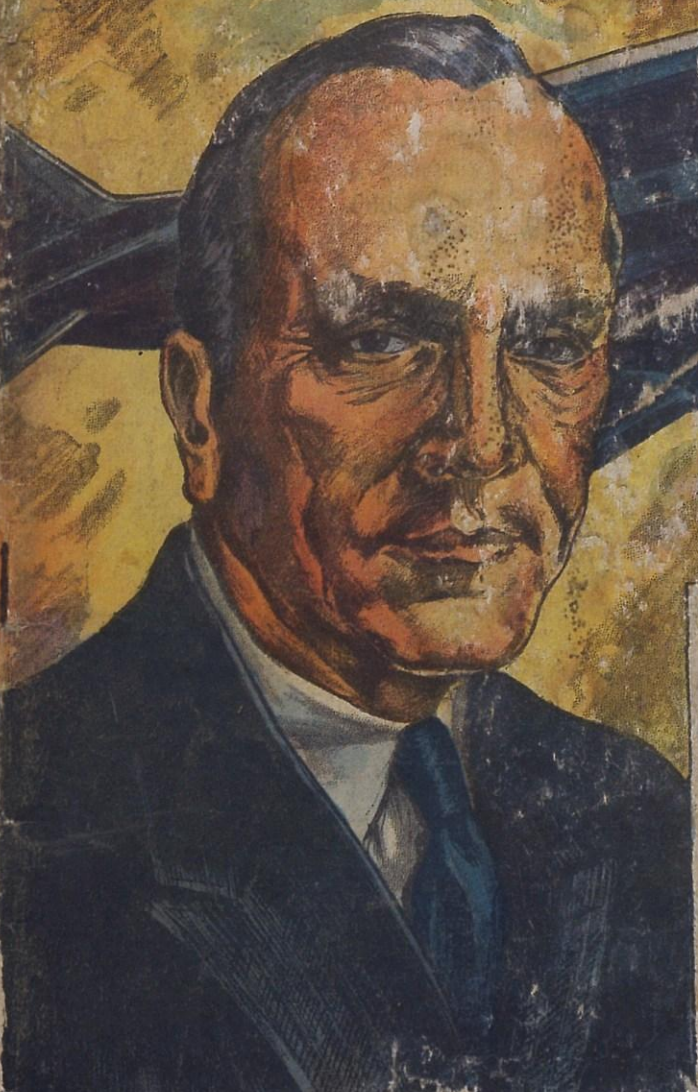
JIM RAY'S
Aviation



15¢

SKETCHBOOK

PICTURE STORIES OF PLANES AND PILOTS



"ACES UP"
THE STRANGER THAN FICTION
STORIES OF AMERICAN AIRMEN
NO. 1 THE AUTHENTIC LIFE STORY
OF
CAPTAIN
EDDIE RICKENBACKER
- ALSO -
UP and ATOM
SUPER SKYLINER
H. D. J. R.
THE INVINCIBLE EYE

AVIATION COMES TO THE LITTLE RED SCHOOLHOUSE AND "LET'S FLY" AND MANY OTHER GREAT AIR STORIES



VOL. 1, NO. 1

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"ACES UP"

THE THRILLING TRUE EXPLOITS OF AMERICA'S HEROIC AIRMEN

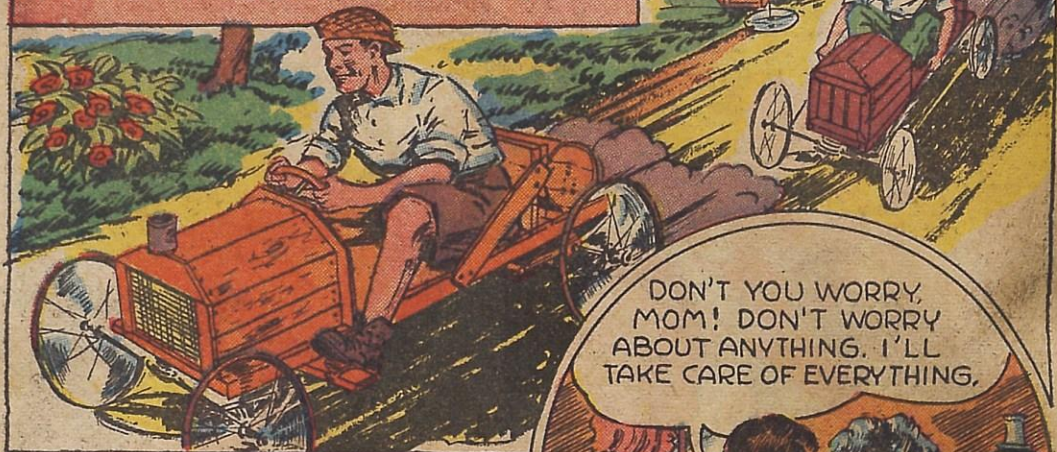


CAPTAIN "EDDIE" RICKENBACKER

AMERICA HAS PRODUCED MANY HEROES, BUT NONE OF THEM HAVE RETAINED THEIR POPULARITY AS LONG AS CAPTAIN "EDDIE." EDDIE, A POOR BOY, WHO GOT HIS FIRST JOB WHEN HE WAS TWELVE YEARS OLD AND FOUGHT HIS WAY TO THE TOP; ON THE AUTO RACING TRACKS, IN THE SKIES OF WAR, AND IN THE WORLD OF BUSINESS, IS AMERICA'S MOST DURABLE HERO OF THE AIR.

3 for 25c. Gifts-Piggy Banks-Shell Novelties
 Novelties-Souvenirs
 CHUCK'S NOVELTY & GIFT SHOP
 ABERDEEN, WASHINGTON

EDDIE RICKENBACKER'S CHILDHOOD WAS MUCH THE SAME AS THAT OF THE AVERAGE AMERICAN BOY IN THE EARLY 1900'S. BUT EDDIE WAS THE KIND OF A KID THAT WAS ALWAYS THE LEADER OF THE GANG.



DON'T YOU WORRY, MOM! DON'T WORRY ABOUT ANYTHING. I'LL TAKE CARE OF EVERYTHING.

WHEN EDDIE WAS TWELVE, TRAGEDY CAME TO THE RICKENBACKER FAMILY - THEY LOST THEIR DAD.



WHERE ARE YOU GOING EDDIE, PLAYING HOOKEY?

NO! I AM GOING TO GET A JOB AND HELP MOM.

ALL RIGHT! YOU CAN GO TO WORK, BUT YOU DON'T LOOK MORE THAN ELEVEN YEARS OLD TO ME.

A FEW DAYS LATER, WHEN THE OTHER KIDS CONTINUED ON THEIR WAY TO SCHOOL, EDDIE TURNED OFF AND HEADED FOR THE FACTORY DISTRICT.

EDDIE GOT A JOB IN A GLASS FACTORY BY INSISTING THAT HE WAS FOURTEEN YEARS OLD, INSTEAD OF TWELVE. HIS PAY WAS \$3.50 A WEEK ! AND HE WORKED TWELVE HOURS EVERY NIGHT.



EDDIE WORKED SIX NIGHTS A WEEK, FOR A YEAR, IN THE GLASS FACTORY. THEN, WHEN HE WAS THIRTEEN YEARS OLD, EDDIE FOUND A DAYTIME JOB IN A FOUNDRY. HE TOOK IT BECAUSE THE PAY WAS HIGHER HE RECEIVED ONE DOLLAR A DAY.

WHILE WORKING AT THE FOUNDRY EDDIE DECIDED THAT HE WOULD LIKE TO BE AN ARTIST. USING HIS MOTHER'S BREAD BOARD, HE PRACTICED DRAWING AT NIGHT. BUT THE ONLY ART JOB THAT EDDIE COULD FIND WAS CHISELING LETTERS ON TOMBSTONES. HE WORKED AT THIS UNTIL HE WAS SEVENTEEN. A NEW SPORT, AUTO RACING, CAUGHT EDDIE'S INTEREST.

HE BEGAN TO SPEND HIS DAY OFF WATCHING THE AUTO RACERS WHO PRACTICED AT THE COLUMBUS RACE TRACK.

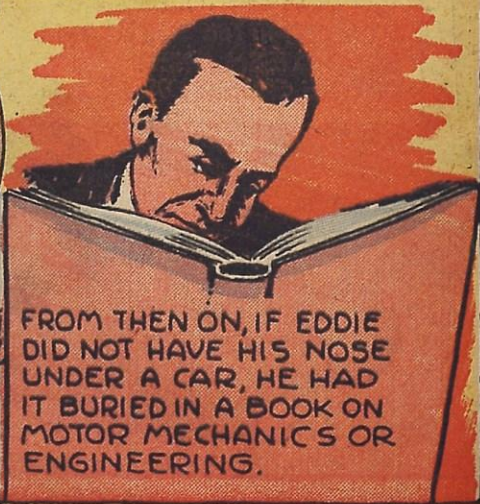
EDDIE'S FAVORITE RACING DRIVER WAS LEE FRAYER, A COLUMBUS MECHANIC. FRAYER HAD DESIGNED HIS OWN ENGINE FOR HIS RACER AND EDDIE LIKED TO VISIT HIS SHOP. IF FRAYER WAS NOT RACING ON EDDIE'S DAY OFF, HE HUNG AROUND AND MADE HIMSELF USEFUL.

MISTER FRAYER, I WANT TO GET INTO THE AUTO BUSINESS. CAN I WORK FOR YOU?

STICK TO TOMBSTONES EDDIE! THERE ARE TOO MANY HEADACHES IN THIS AUTOMOBILE GAME.



BUT EDDIE RICKENBACKER WAS A DETERMINED YOUNG MAN, AND ONE MORNING FRAYER OPENED THE DOOR AND FOUND EDDIE SWEEPING OUT THE SHOP. THE FACT THAT LEE FRAYER DID NOT HAVE ANY MONEY TO PAY AN AMATEUR MECHANIC MADE NO DIFFERENCE TO EDDIE. HE HAD SAVED A LITTLE MONEY, SO HE WENT TO WORK. AT NIGHT HE STUDIED A CORRESPONDENCE COURSE IN ENGINEERING.



FROM THEN ON, IF EDDIE DID NOT HAVE HIS NOSE UNDER A CAR, HE HAD IT BURIED IN A BOOK ON MOTOR MECHANICS OR ENGINEERING.

EDDIE WORKED HARD AND STUDIED HARD AND SOON BECAME A FIRST CLASS MECHANIC WITH A KNOWLEDGE OF ENGINEERING. HE ALSO BECAME AN EXPERT AT TUNING UP FRAYER'S NEW RACER.

THAT'S EDDIE RICKENBACKER, FRAYER'S MECHANIC, DRIVING NO. 20. HE'S NOT MUCH MORE THAN A KID.

WOW! LOOK AT THAT KID DRIVE. THAT RICKENBACKER MAY BE ONLY A BOY, BUT HE'S BEATING AMERICA'S BEST RACING DRIVERS. GO TO IT, EDDIE!

WHEN EDDIE WAS STILL IN HIS TEENS LEE FRAYER MADE HIM HIS RACING MECHANIC. IT WAS NOT LONG BEFORE FRAYER MOVED OVER AND GAVE EDDIE THE DRIVER'S SEAT. EDDIE RICKENBACKER MADE GOOD. HE WAS AN INSTANT SUCCESS AS A RACING DRIVER. FROM THE START EDDIE DROVE TO WIN AND THE FANS SOON KNEW THAT HERE WAS A NEW RACING CHAMPION IN THE MAKING.

LIKE ALL DARING DRIVERS, EDDIE HAD HIS SPILLS, BUT NONE OF THEM KEPT HIM FROM WINNING RACES



EDDIE RICKENBACKER WAS STILL A KID - NOT YET VOTING - WHEN HE BECAME THE IDOL OF AMERICA'S AUTO RACING FANS. EDDIE, ALTHOUGH ONLY A YOUNGSTER, WAS AS COURAGEOUS, SKILLFUL, AND DARING AS ANY MAN WHO EVER SAT BEHIND THE WHEEL OF A RACING CAR. EDDIE RICKENBACKER'S MOTTO WAS "GET OUT IN FRONT AND DRIVE LIKE THE DICKENS."



IN 1912, JUST SIX YEARS AFTER HE BEGAN RACING, EDDIE WON THE GREAT 500-MILE INDIANAPOLIS SPEEDWAY RACE AND BECAME AMERICA'S AUTO RACING CHAMPION.

OF COURSE, WE KNOW YOUR MOTOR RACING ABILITY MISTER RICKENBACKER. BUT YOU CAN'T PASS THE EDUCATIONAL REQUIREMENTS OF THE RFC. SORRY.

ALL RIGHT, I'LL GO BACK TO THE GOOD OLD U.S.A. WHERE ABILITY COUNTS.

IN 1915, EDDIE EARNED \$40,000 ON AMERICA'S AUTO TRACKS, AND HAD GROWN UP TO BE A WORLD FAMOUS RACING DRIVER. HE WAS IN ENGLAND PREPARING A RACING TEAM FOR THE SUNBEAM MOTOR COMPANY WHEN THIS COUNTRY WENT INTO WORLD WAR I. EDDIE TRIED TO JOIN THE ROYAL FLYING CORPS BUT WAS TURNED DOWN.

EDDIE RICKENBACKER TOOK THE NEXT BOAT FOR AMERICA.



THE UNITED STATES ARMY WELCOMED EDDIE RICKENBACKER WITH OPEN ARMS AND HE WAS NOT LONG IN GETTING AN ASSIGNMENT.



FALL OUT! PRIVATE RICKENBACKER, REPORT TO THE COMMANDING OFFICER. YOU'RE PROMOTED TO SERGEANT. YOU HAVE BEEN ASSIGNED TO DRIVE GENERAL PERSHING'S CAR. YOU WILL SAIL FOR FRANCE WITH HIS STAFF NEXT WEEK.



SOON A BIG KAHKI-COLORED LIMOUSINE, BEARING A FOUR-STAR INSIGNIA, BEGAN ROARING OVER THE ROADS AND THROUGH THE WAR-TORN VILLAGES OF FRANCE. ITS PASSENGER WAS THE GREAT AMERICAN GENERAL, JOHN J. PERSHING, AND ITS DRIVER WAS THE KID FROM COLUMBUS, OHIO, THE SPEED-KING OF AMERICA'S AUTO SPEEDWAYS, SERGEANT EDDIE RICKENBACKER.

EDDIE WANTED TO FLY, BUT IN A CAR HE WAS STILL A SPEED KING. SO IT WAS NOT LONG BEFORE PERSHING'S STAFF DECIDED THAT THE GENERAL OUGHT TO LET EDDIE FLY.

THIS WAS JUST WHAT EDDIE HAD PLANNED. HE WENT TO THE AIR TRAINING SCHOOL AT TOURS, FRANCE. DUE TO HIS MECHANICAL KNOWLEDGE AND RACING ABILITY HE LEARNED TO FLY IN 17 DAYS.

IN SPITE OF HIS FLYING ABILITY, HIS SUPERIORS THOUGHT THIS HIS GREAT MECHANICAL SKILL WOULD BE WASTED IN THE AIR. SO THEY MADE HIM AN ENGINEERING OFFICER.



THERE'S NOTHING WRONG WITH YOU EDDIE, YOU'RE THE HEALTHIEST SOLDIER IN THIS CAMP.

I KNOW DOC, BUT IF YOU COULD FIGURE A WAY TO PUT ME ON THE SICK LIST THEY WOULD FIND OUT THAT THEY COULD GET ALONG WITHOUT ME HERE.

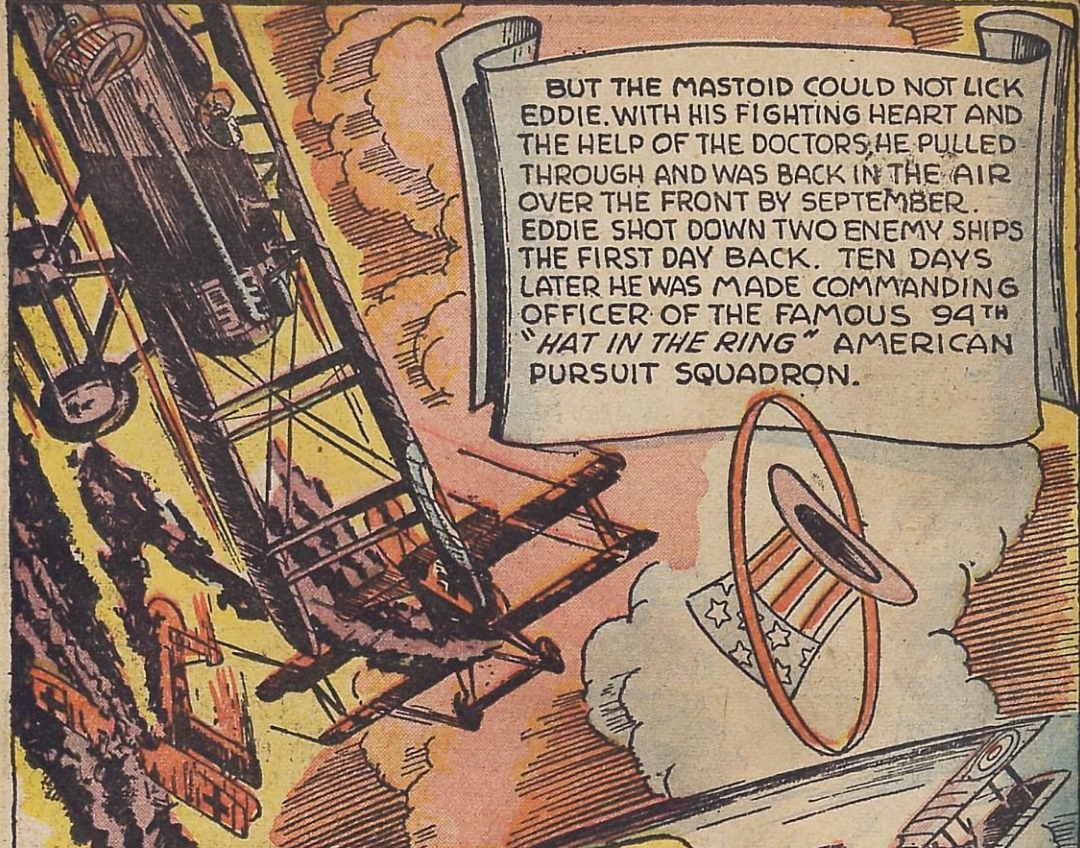
EDDIE'S SCHEME WORKED. HE TALKED THE MEDICAL OFFICER INTO SENDING HIM TO THE INFIRMARY TO HAVE A COLD TREATED. HIS SUPERIORS FOUND THAT EDDIE COULD BE SPARED FROM HIS DUTIES AS ENGINEERING OFFICER AT THE TRAINING FIELD. SO EDDIE GOT HIS WAY, AND ON MARCH 5, 1918, HE FLEW TO THE FRONT AND WAS ASSIGNED TO THE 94TH AERO SQUADRON.

ON MARCH 18, 1918, EDDIE AND DOUGLAS CAMPBELL FLEW WITH THE FAMOUS ACE, MAJOR RAOUL LUFBERY ON THE FIRST ALL-AMERICAN PATROL OVER THE GERMAN LINES.

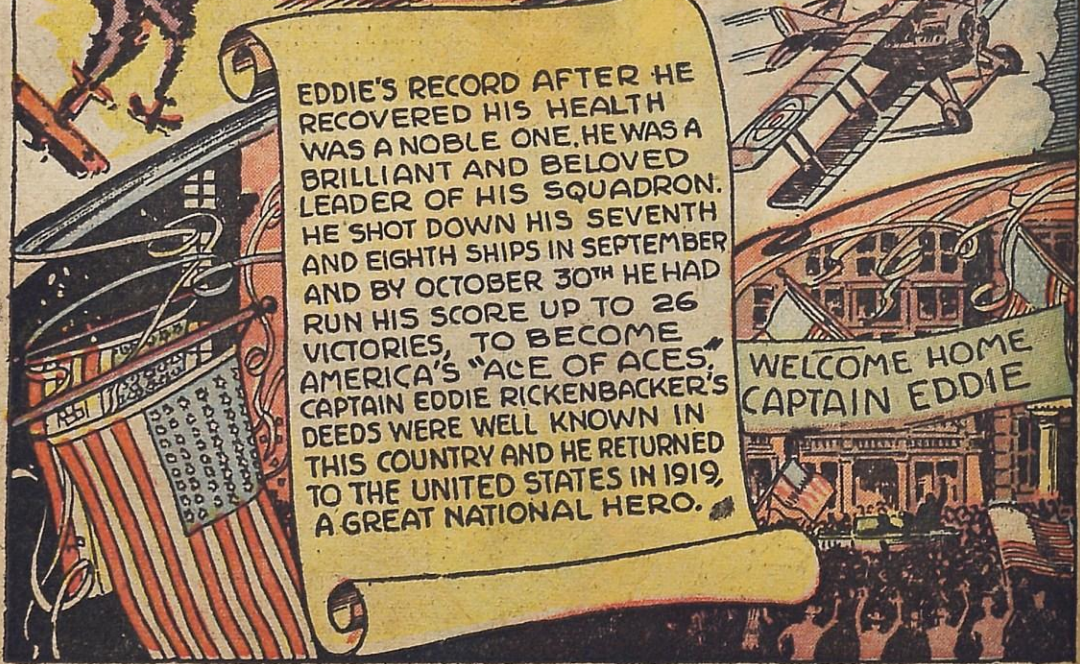
EDDIE HAD HIS FIRST COMBAT CONTACT WITH AN ENEMY PLANE ON APRIL 29, 1918. EDDIE AND JAMES NORMAN HALL ATTACKED A GERMAN ALBATROSS FIGHTER. EACH OF THEM FIRED SEVERAL HUNDRED BULLETS INTO IT AND BROUGHT IT DOWN IN FLAMES.

BEFORE THE NEXT MONTH HAD PASSED EDDIE HAD SCORED FIVE VICTORIES. AND BY THE FIRST OF JUNE, 1918, EDDIE RICKENBACKER AND DOUGLAS CAMPBELL HAD EACH DESTROYED FIVE ENEMY PLANES, TO BECOME AMERICA'S FIRST FLYING ACES. THEN IN JULY, EDDIE SUFFERED A GREAT MISFORTUNE. HE WAS CARRIED OFF TO THE HOSPITAL WITH A MASTOID INFECTION AND HIS FLYING CAREER SEEMED TO BE ENDED FOREVER.





BUT THE MASTOID COULD NOT LICK EDDIE. WITH HIS FIGHTING HEART AND THE HELP OF THE DOCTORS, HE PULLED THROUGH AND WAS BACK IN THE AIR OVER THE FRONT BY SEPTEMBER. EDDIE SHOT DOWN TWO ENEMY SHIPS THE FIRST DAY BACK. TEN DAYS LATER HE WAS MADE COMMANDING OFFICER OF THE FAMOUS 94TH "HAT IN THE RING" AMERICAN PURSUIT SQUADRON.



EDDIE'S RECORD AFTER HE RECOVERED HIS HEALTH WAS A NOBLE ONE. HE WAS A BRILLIANT AND BELOVED LEADER OF HIS SQUADRON. HE SHOT DOWN HIS SEVENTH AND EIGHTH SHIPS IN SEPTEMBER AND BY OCTOBER 30TH HE HAD RUN HIS SCORE UP TO 26 VICTORIES, TO BECOME AMERICA'S "ACE OF ACES." CAPTAIN EDDIE RICKENBACKER'S DEEDS WERE WELL KNOWN IN THIS COUNTRY AND HE RETURNED TO THE UNITED STATES IN 1919, A GREAT NATIONAL HERO.

WELCOME HOME CAPTAIN EDDIE



EDDIE'S EASTERN AIR LINES COVER THE EAST AND SOUTH, FROM CHICAGO TO MIAMI AND FROM BOSTON TO NEW ORLEANS.

CAPTAIN EDDIE RICKENBACKER CARRIED HIS HONORS AS A GREAT NATIONAL CELEBRITY WITH MODESTY AND DIGNITY. HE REFUSED RICH OFFERS FROM THE MOVIE MAGNATES TO CAPITALIZE ON HIS FAME. HE WENT INTO THE BUSINESS OF AERIAL MAPPING WITH MAJOR REED CHAMBERS OF HIS 94TH SQUADRON. BUT EDDIE STILL HAD A VENUE TOWARD HIS FIRST LOVE-THE AUTOMOBILE. HE SECURED SOME CAPITAL AND BUILT THE "RICKENBACKER." IT WAS A GOOD CAR WITH MANY ADVANCED FEATURES, BUT THE COMPANY DID NOT HAVE ENOUGH CAPITAL TO SET UP NATIONAL DISTRIBUTION. EDDIE THEN WENT INTO AIR TRANSPORT AND MADE A GREAT SUCCESS. HE WAS PUT IN CHARGE OF AN AIRLINE THAT WAS A LOSING VENTURE AND BUILT IT INTO A PROFITABLE ONE. EDDIE THEN ARRANGED TO PURCHASE THIS COMPANY, EASTERN AIR LINES, AND MADE IT ONE OF THE COUNTRY'S MAJOR AIR TRANSPORT ORGANIZATIONS.

IN WORLD WAR II, EDDIE DEVOTED HIS TIME TO WORLD-WIDE SECRET MISSIONS FOR THE ARMY AIR FORCES.

YOU ALL KNOW HOW EDDIE SURVIVED THE CRASH OF HIS PLANE AND 21 DAYS ON A RAFT IN THE PACIFIC, AFTER HE HAD ALMOST LOST HIS LIFE IN THE SERVICE OF HIS COUNTRY.



EDDIE RICKENBACKER HAS COME A LONG WAY FROM THE GLASS FACTORY TO THE PRESIDENT'S OFFICE OF THE GREAT EASTERN AIR LINES. EDDIE MADE IT THE HARD WAY, AS HE DID NOT HAVE THE ADVANTAGES THAT MOST BOYS HAD. BUT HE HAD THE HEART AND COURAGE THAT HAS MADE HIM AMERICA'S "ACE" IN WAR AND PEACE.

A MESSAGE TO THE YOUTH OF AMERICA from CAPTAIN EDDIE RICKENBACKER



EASTERN AIR LINES

INCORPORATED
MEMBER OF THE NATIONAL SAFETY COUNCIL

EASTERN AIR LINES BLDG.
40 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

To the Youth of America

It is not difficult to visualize you on the brink of a new horizon, a new age. Youth of the past, far less equipped, have seized the bare threads of opening vistas, and though, often ridiculed for their folly, they gave us revolutionized methods of accomplishment.

You stand on the brink of the air age. With your imaginations fired by our exhibitions of air power during World War II, you have seen the possibilities of your coming era.

Doubtless you have stood and gazed in unbroken awe at the handiwork of our men in the skies. You have read glowing accounts of their group and single-handed combats with the enemy.

You have heard recounts of the valiant who flew the longest transport lines of all time. The massive throb of industry from the skies was something that only a youthful imagination could visualize.

You will be taking up where these will leave off. Your air age has already begun. Commercial lines are flying more flights than ever before, and almost daily the endless lines that span our globe are being expanded.

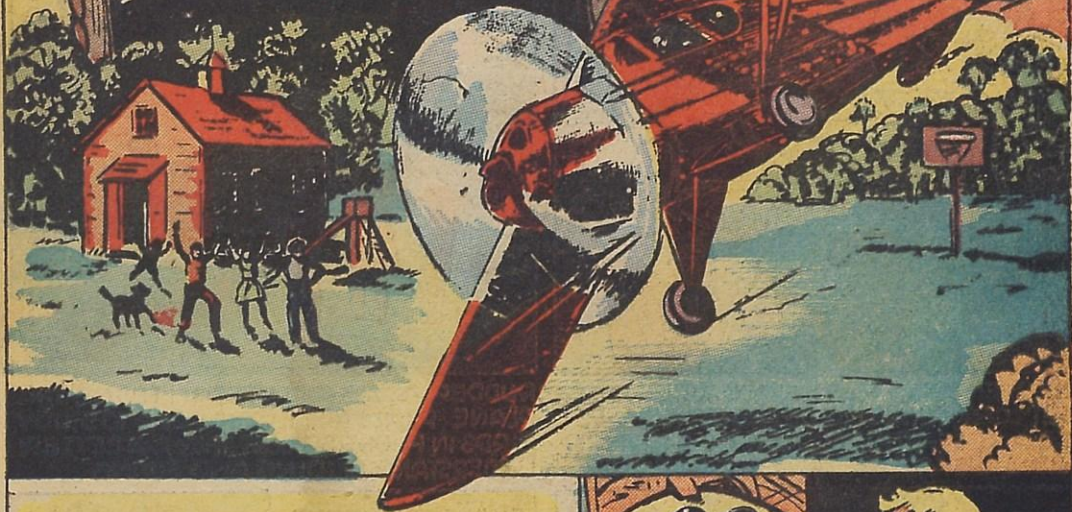
And I can see you, the Youth of America, in a veritable driver's seat. With your background, your everyday training and the unlimited capabilities that your forefathers have shown, no man or group of men can equal or surpass you.

Because of the traits you have shown so far in the new era, I know you will be ready and willing to uphold this reputation.

Those of us who stood on a similar threshold in years gone by salute you, Youth of America, and we also envy you. You are the Leaders of Tomorrow,

E. V. Rickenbacker
President and General Manager

AVIATION COMES TO THE LITTLE RED SCHOOLHOUSE

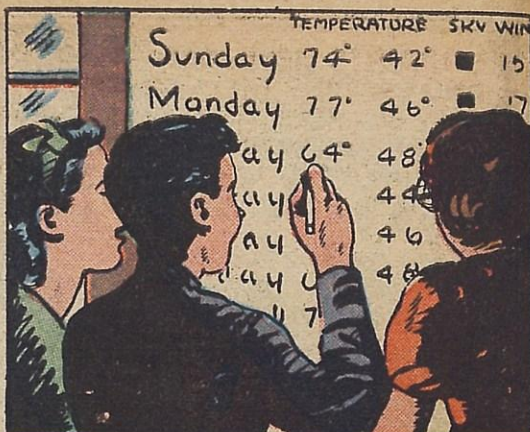


AIR-MINDED YOUNGSTERS HAVE CAUSED A NEW SUBJECT TO BE ADDED TO "READING, 'RITING, AND 'RITHMATIC" IN THE SCHOOLS OF THIS NATION. AN "A" FOR AVIATION HAS BEEN ADDED TO THE THREE "R's." FROM THE FIRST-GRADERS, WHO USE TOY COCKPITS TO PLAY AT FLYING AND LEARN AVIATION TERMS, TO HIGH SCHOOL STUDENTS WHO FLY REAL PLANES, THE SCHOOL CHILDREN OF THE UNITED STATES ARE GETTING THE OPPORTUNITY TO STUDY AVIATION.





PUPILS ARE TAUGHT THAT WEATHER IS VITALLY IMPORTANT TO FLIGHT. THEY SEE HOW THE WEATHER BALLOON IS USED TO TAKE **RADIOSONDES** ALOFT. THIS IS ALMOST HUMAN



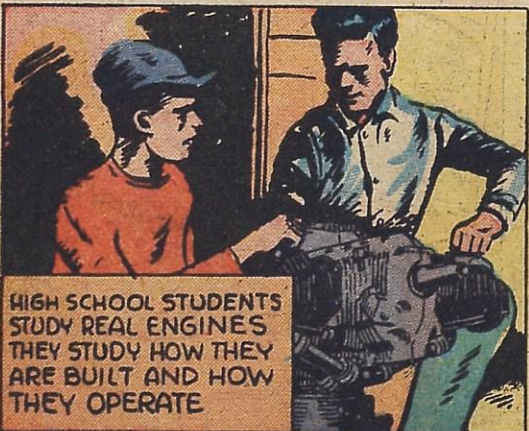
LITTLE MACHINE OBSERVES THE WEATHER AND REPORTS IT TO GROUND STATIONS BY RADIO. CHILDREN STUDY LOCAL WEATHER CONDITIONS AND KEEP A DAILY RECORD OF THEM



CHILDREN FROM FIRST GRADE TO HIGH SCHOOL VISIT LOCAL FLYING FIELDS AND GET A CHANCE FOR A CLOSE-UP INSPECTION OF A REAL AIRPLANE. THEY ARE SHOWN HOW THE STICK AND



RUDDER PEDALS ARE USED IN FLYING THE PLANE. PUPILS ARE ENCOURAGED TO STUDY BIRDS IN FLIGHT SO THAT THEY CAN BETTER UNDERSTAND GLIDING AND FLYING



HIGH SCHOOL STUDENTS STUDY REAL ENGINES. THEY STUDY HOW THEY ARE BUILT AND HOW THEY OPERATE



FLYING EQUIPMENT IS LOANED TO SCHOOLS SO THAT YOUNGSTERS CAN INSPECT IT AND LEARN ITS USES.

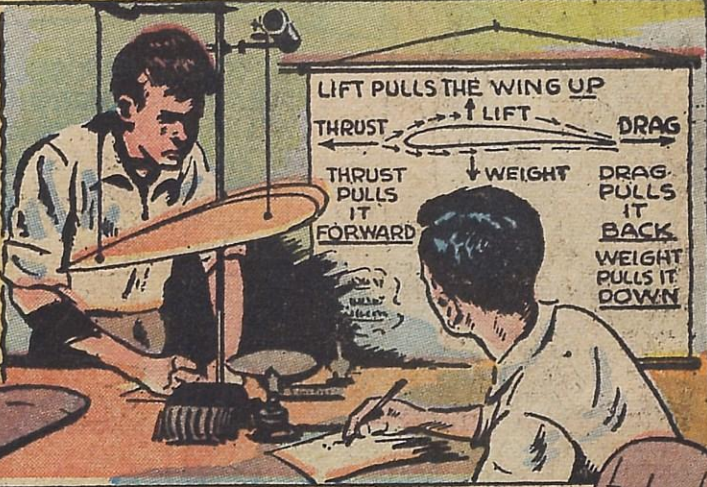
WINTER FLYING CAP

SUN GLASSES

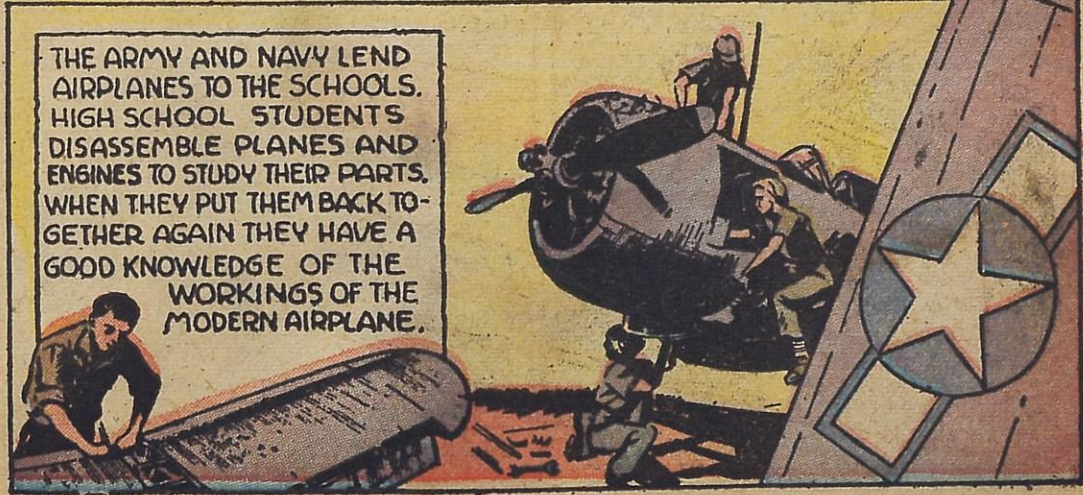
STUDENTS VISIT LOCAL AIRPORTS AND EXAMINE THEM CAREFULLY. THEN THEY GET TOGETHER AND DESIGN A MODEL AIRPORT OF THEIR OWN, COMPLETE WITH CARDBOARD PLANES, HANGARS, TERMINAL, AND RUNWAYS.



THEY BUILD AND USE WIND-TUNNELS TO TEST WING DESIGNS. AN OLD ELECTRIC FAN CREATES WIND. BY HANGING A WING SECTION IN THE AIRSTREAM FROM THE FAN, THEY CAN TEST THE LIFTING POWER OF A WING. THIS GIVES THEM AN UNDERSTANDING OF THE FOUR FORCES THAT CONTROL FLIGHT.

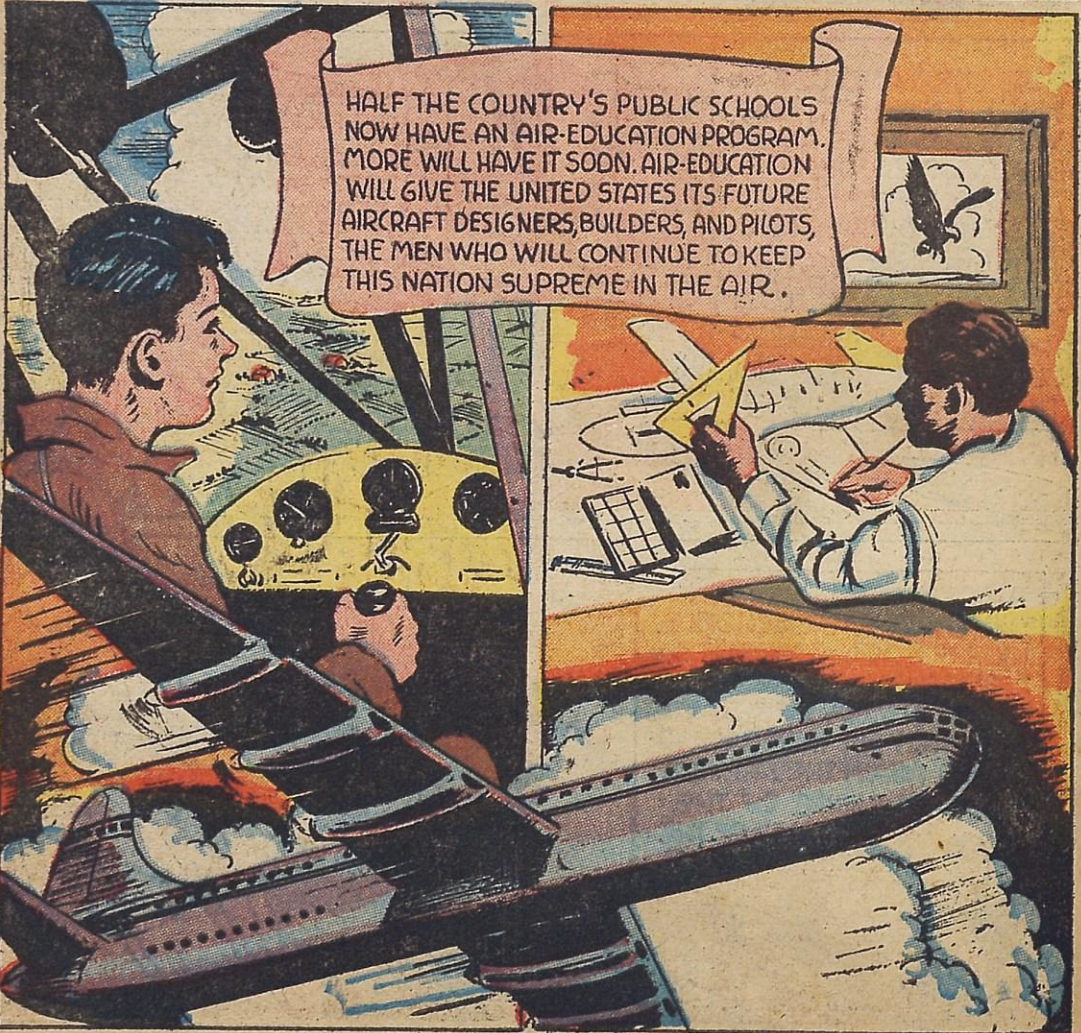


THE ARMY AND NAVY LEND AIRPLANES TO THE SCHOOLS. HIGH SCHOOL STUDENTS DISASSEMBLE PLANES AND ENGINES TO STUDY THEIR PARTS. WHEN THEY PUT THEM BACK TOGETHER AGAIN THEY HAVE A GOOD KNOWLEDGE OF THE WORKINGS OF THE MODERN AIRPLANE.





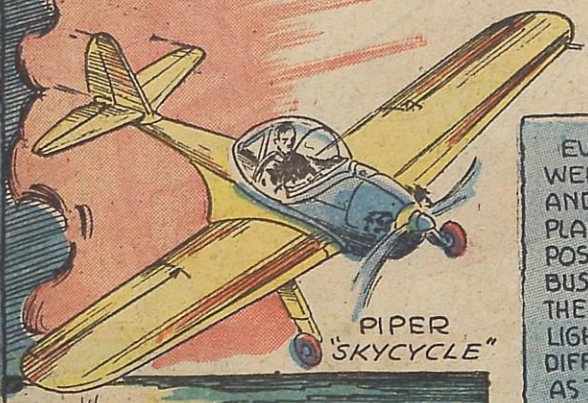
BOYS AND GIRLS OF ALL AGES ARE ENCOURAGED TO BUILD MODEL PLANES AND TO COMPETE IN MODEL CONTESTS. SOME OF THEIR GAS JOBS DO 60 MILES AN HOUR.



HALF THE COUNTRY'S PUBLIC SCHOOLS NOW HAVE AN AIR-EDUCATION PROGRAM. MORE WILL HAVE IT SOON. AIR-EDUCATION WILL GIVE THE UNITED STATES ITS FUTURE AIRCRAFT DESIGNERS, BUILDERS, AND PILOTS, THE MEN WHO WILL CONTINUE TO KEEP THIS NATION SUPREME IN THE AIR.

LET'S FLY

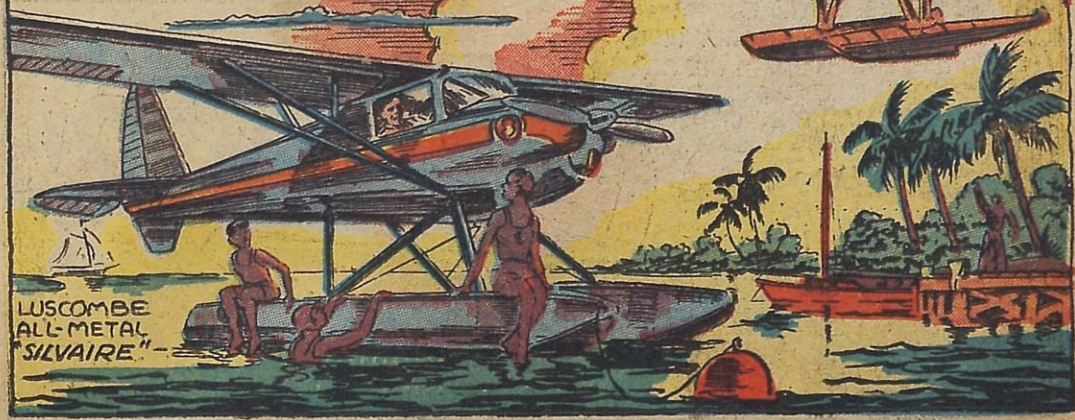
REPUBLIC
"SEABEE"
AMPHIBIAN



PIPER
"SKYCYCLE"



AERONCA BUSINESS COUPE



LUSCOMBE
ALL-METAL
"SILVAIRE"

EVEN AS THEIR AIRCRAFT PLANTS WERE TURNING OUT OBSERVATION AND LIAISON PLANES, AMERICA'S LIGHT PLANE DESIGNERS WERE PLANNING POST-WAR PERSONAL PLANES FOR BOTH BUSINESS AND PLEASURE. AS A RESULT THE PERSON WHO WANTS TO BUY A LIGHT PLANE WILL FIND ALMOST AS MANY DIFFERENT MODELS MODELS OF PLANES AS THERE ARE OF CARS. MANUFACTURERS IN ADDITION TO MAKING THEIR PLANES MUCH STRONGER AND SAFER, HAVE ADDED COMFORT AND STYLE TO THEIR POST-WAR PERSONAL PLANES.



the
AERONCA

THE FIRST AERONCA WAS A 398-POUND AIRPLANE, BUILT FIFTEEN YEARS AGO, IT WAS AMERICA'S FIRST REAL LIGHT PLANE. TODAY THE AERONCA "CHIEF," A TWO-PLACE, SIDE-BY-SIDE, PERSONAL PLANE, CRUISES AT 100 MILES AN HOUR. THE "CHIEF" IS A STURDY, DEPENDABLE AIRPLANE THAT IS VERY POPULAR WITH BUSINESS MEN, FLYING INSTRUCTORS, AND THOSE WHO FLY FOR JUST THE FUN OF FLYING.



THE FIRST AERONCA

THE LIGHT PLANE HAS COME INTO POPULAR USE ON THE FARM. "FLYING FARMERS" INSPECT THEIR LAND AND STOCK FROM THE AIR ON A SHORT FLIGHT, QUICKLY AND FAR BETTER THAN THEY COULD ON THE GROUND.





the
PIPER "CUB"

"CUB" HAS ALMOST COME TO BE A NAME THAT IS APPLIED TO ALL LIGHT PLANES. THIS IS PROBABLY DUE TO THE FACT THAT THE PIPER AIRCRAFT COMPANY BUILT SO MANY PIPER "CUBS," THE "CUB" WAS THE FASTEST SELLING LIGHT PLANE IN AMERICA WHEN THE WAR BEGAN IN 1941. PROBABLY MORE PEOPLE HAVE LEARNED TO FLY IN PIPER "CUBS" THAN ANY OTHER PLANE. LOTS OF OUR BOYS WHO LEARNED TO FLY IN "CUBS" A FEW YEARS AGO, ARE THE ARMY'S AND NAVY'S "ACES" TODAY.



ARMY PILOTS GOT THEIR PRIMARY TRAINING IN "CUB" TRAINERS. "CUB" OBSERVATION AND LIAISON PLANES HOPPED IN AND OUT WHERE BIG SHIPS COULDN'T, AND SERVED GALLANTLY ON EVERY BATTLEFRONT IN WORLD WAR II. NEITHER SNOWDRIFTS OR MUDDY ROADS CAN STOP THE COUNTRY DOCTOR WHO FLIES A PLANE. YOU WOULD BE SURPRISED AT HOW MANY DOCTORS FLY.





The Taylorcraft "Foursome" is a four-passenger plane with a high-wing configuration and a tailwheel landing gear. It is shown in flight, banking slightly to the right. The interior of the cabin is visible through the large windows, showing several passengers. The background consists of a stylized landscape with fields and a horizon line under a yellowish sky.

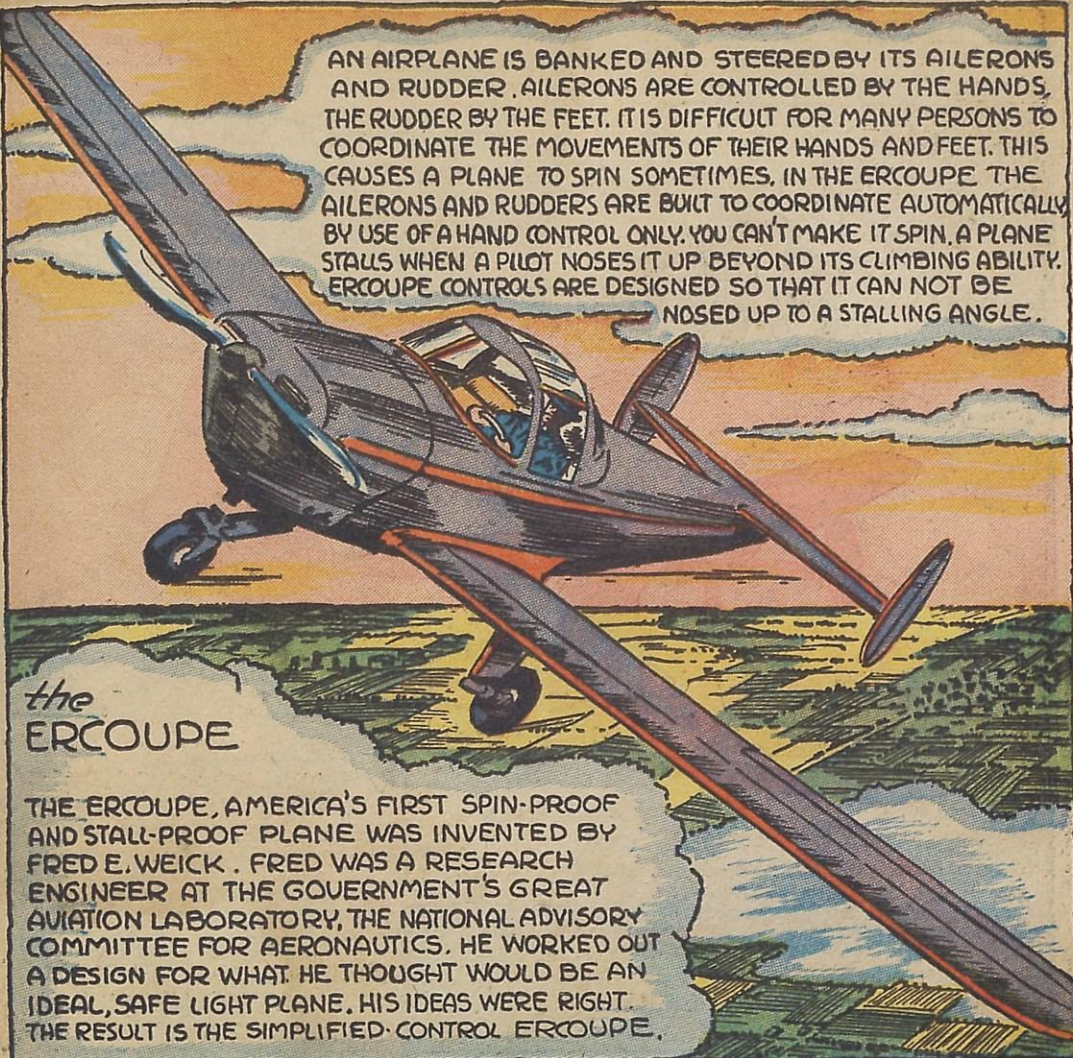
the TAYLORCRAFT

THE TAYLORCRAFT "FOUR SOME," BUILT BY ONE OF AMERICA'S OLDEST LIGHT PLANE MANUFACTURERS, IS A COMFORTABLE, ROOMY "FAMILY SEDAN" OF THE AIR.

THE "FOUR SOME" IS A FOUR-PASSENGER PLANE. ITS WIDE WINDOWS PROVIDE GOOD VISION. A 125-HORSEPOWER ENGINE GIVES IT A CRUISING SPEED OF OVER 100 MILES AN HOUR. IT HAS AN ELECTRIC STARTER AND OTHER LUXURY FEATURES. BUT ITS COST IS WITHIN REACH OF THE FAMILY'S POCKET BOOK.

IT IS JUST THE PLANE FOR A FAMILY VACATION TRIP OR A WEEK-END VISIT TO GRANDMA'S. OR DAD AND HIS PALS CAN USE IT TO FLY QUICKLY TO WHERE THE HUNTING IS GOOD.






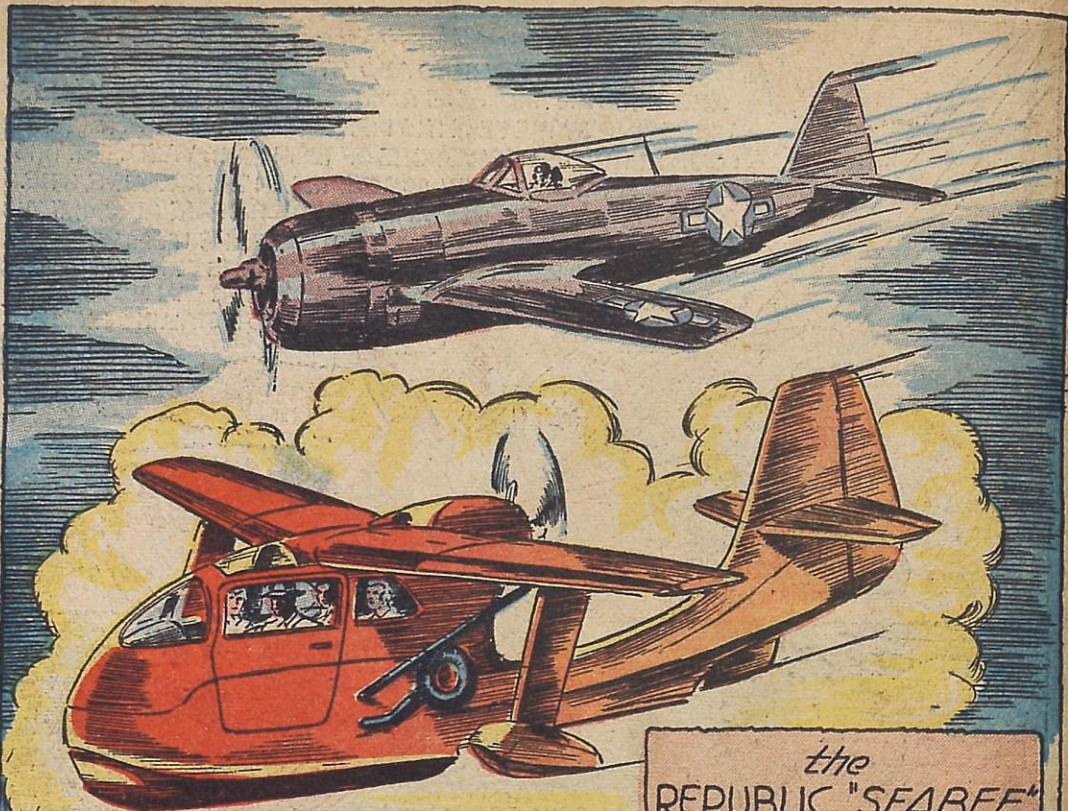
AN AIRPLANE IS BANKED AND STEERED BY ITS AILERONS AND RUDDER. AILERONS ARE CONTROLLED BY THE HANDS, THE RUDDER BY THE FEET. IT IS DIFFICULT FOR MANY PERSONS TO COORDINATE THE MOVEMENTS OF THEIR HANDS AND FEET. THIS CAUSES A PLANE TO SPIN SOMETIMES. IN THE ERCOUPE THE AILERONS AND RUDDERS ARE BUILT TO COORDINATE AUTOMATICALLY BY USE OF A HAND CONTROL ONLY. YOU CAN'T MAKE IT SPIN. A PLANE STALLS WHEN A PILOT NOSES IT UP BEYOND ITS CLIMBING ABILITY. ERCOUPE CONTROLS ARE DESIGNED SO THAT IT CAN NOT BE NOSED UP TO A STALLING ANGLE.

the ERCOUPE

THE ERCOUPE, AMERICA'S FIRST SPIN-PROOF AND STALL-PROOF PLANE WAS INVENTED BY FRED E. WEICK. FRED WAS A RESEARCH ENGINEER AT THE GOVERNMENT'S GREAT AVIATION LABORATORY, THE NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS. HE WORKED OUT A DESIGN FOR WHAT HE THOUGHT WOULD BE AN IDEAL, SAFE LIGHT PLANE. HIS IDEAS WERE RIGHT. THE RESULT IS THE SIMPLIFIED CONTROL ERCOUPE.



SALES AND SERVICE MEN FIND LIGHT PLANES VALUABLE FOR COVERING WIDE-SPREAD TERRITORIES. SERVICE MEN CAN FLY QUICKLY TO REMOTE SPOTS FOR REPAIRS AND TO RENDER SERVICE.



the
REPUBLIC "SEABEE"

THE "SEABEE," CREATED AND BUILT BY THE MAKERS OF THE MIGHTY "THUNDERBOLT" P-47 FIGHTER, IS DESIGNED TO GO ANYWHERE. THE "SEABEE" IS AN AMPHIBIAN, AND IS AT HOME ON LAND OR WATER. ALTHOUGH IT IS A PERSONAL PLANE IT IS A LITTLE MORE COSTLY THAN MOST LIGHT PLANES. ITS PRICE IS ABOUT \$4,000. IT IS A LUXURIOUS, ROOMY, 4-PLACE JOB FOR THOSE WHO LIKE TO FISH IN THE TROPICS IN WINTER AND THE NORTH WOODS IN THE SUMMER—AN AIR YACHT.

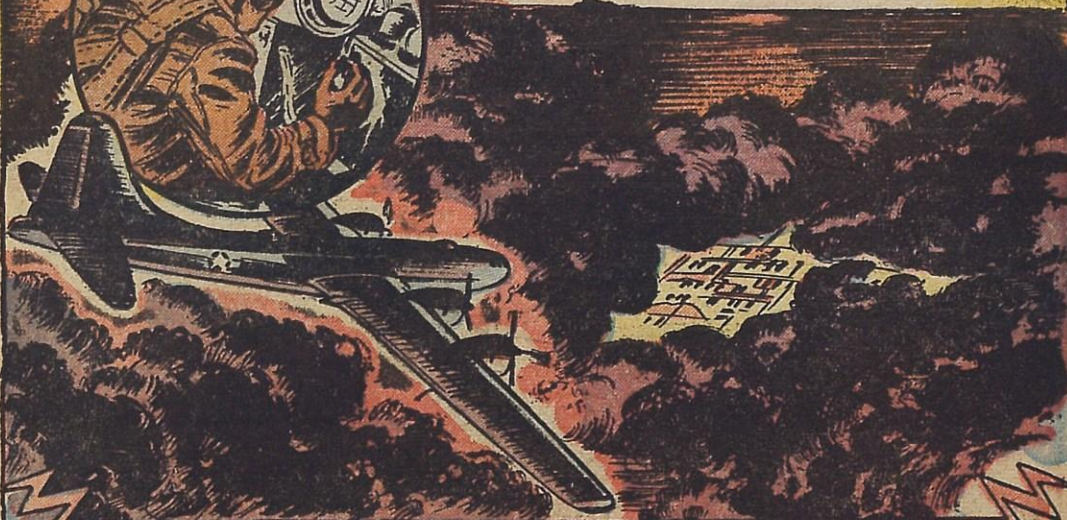





New Eyes for Airplanes

RADAR, THE ALL-SEEING EYE THAT HELPED TO WIN THE WAR, WILL BRING NEW SAFETY IN THE AIR.

RADAR, THE WONDER WEAPON OF WORLD WAR II, IS A PRODUCT, NOT OF THE MILITARY MIND, BUT OF THE MINDS OF PEACEFUL SCIENTISTS IN THE RESEARCH LABORATORIES OF UNITED STATES AND GREAT BRITAIN.

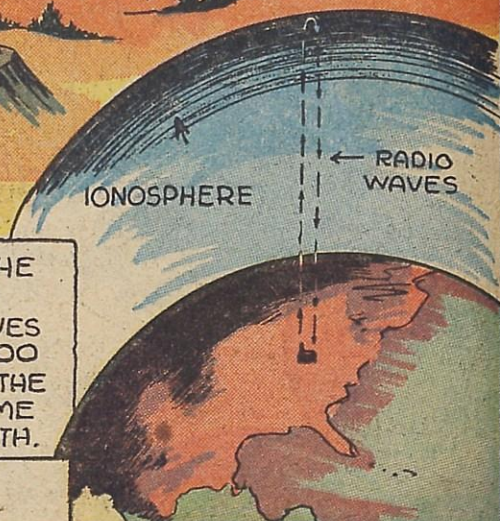


THE BATTLE OF BRITAIN WAS WON, THE DEFEAT OF THE NAZIS AND JAPS HASTENED, BECAUSE OF THE HELP OF LITTLE PULSING RADIO WAVES HARNESSSED BY SCIENTISTS.

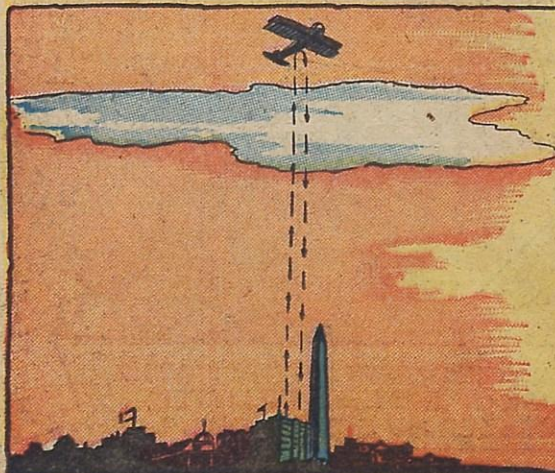


IN 1886, IN GERMANY, HEINRICH HERTZ FOUND THAT RADIO WAVES COULD BE FORMED INTO BEAMS LIKE LIGHT, AND REFLECTED LIKE LIGHT OR SOUND. THAT WAS REALLY THE FIRST STEP ON THE ROAD TO RADAR.

RADIO WAVES WERE THEN BEAMED AT THE IONOSPHERE, THE EARTH'S CEILING, TO MEASURE ITS HEIGHT. SINCE RADIO WAVES MOVED AT THE SPEED OF LIGHT-186,000 MILES A SECOND-SCIENTIST CALCULATED THE DISTANCE TO THE IONOSPHERE BY THE TIME IT TOOK THE WAVES TO BOUNCE BACK TO EARTH.



IN 1922, DOCTOR ALFRED TAYLOR, AT THE U.S. NAVAL RESEARCH LABORATORY IN WASHINGTON, D.C., NOTICED THAT RADIO ECHOES BOUNCED BACK FROM OBJECTS, IN THIS CASE IT WAS A SMALL STEAMER ON THE POTOMAC RIVER.



THE DOOR WAS OPENING TO RADAR, ALMOST UNNOTICED. RESEARCH MEN DIDN'T THINK OF USING RADIO WAVES TO DETECT FAST-MOVING OBJECTS. IN 1930, AN AIRPLANE FLYING OVER WASHINGTON, D.C., WAS DETECTED BY RADIO WAVE ECHOES. THAT YEAR THE U.S. NAVY BEGAN TO THINK OF A DEVICE THAT WOULD GIVE KNOWLEDGE OF THE MOVEMENTS OF ENEMY PLANES AND SHIPS. THE ARMY ALSO UNDERTOOK TO EXPERIMENT WITH RADIO WAVES AND DETECTION DEVICES FOR USE IN COASTAL DEFENSES.

IN 1935, ENGLAND AND THE UNITED STATES DISCOVERED, ALMOST AT THE SAME TIME, THE POSSIBILITIES OF RADAR.

DR. WATSON-WATT
DETECTED
PLANES WITH
RADAR IN 1935

THE CATHODE
TUBE TRANSFERS
RADIO IMPULSES
INTO PICTURES

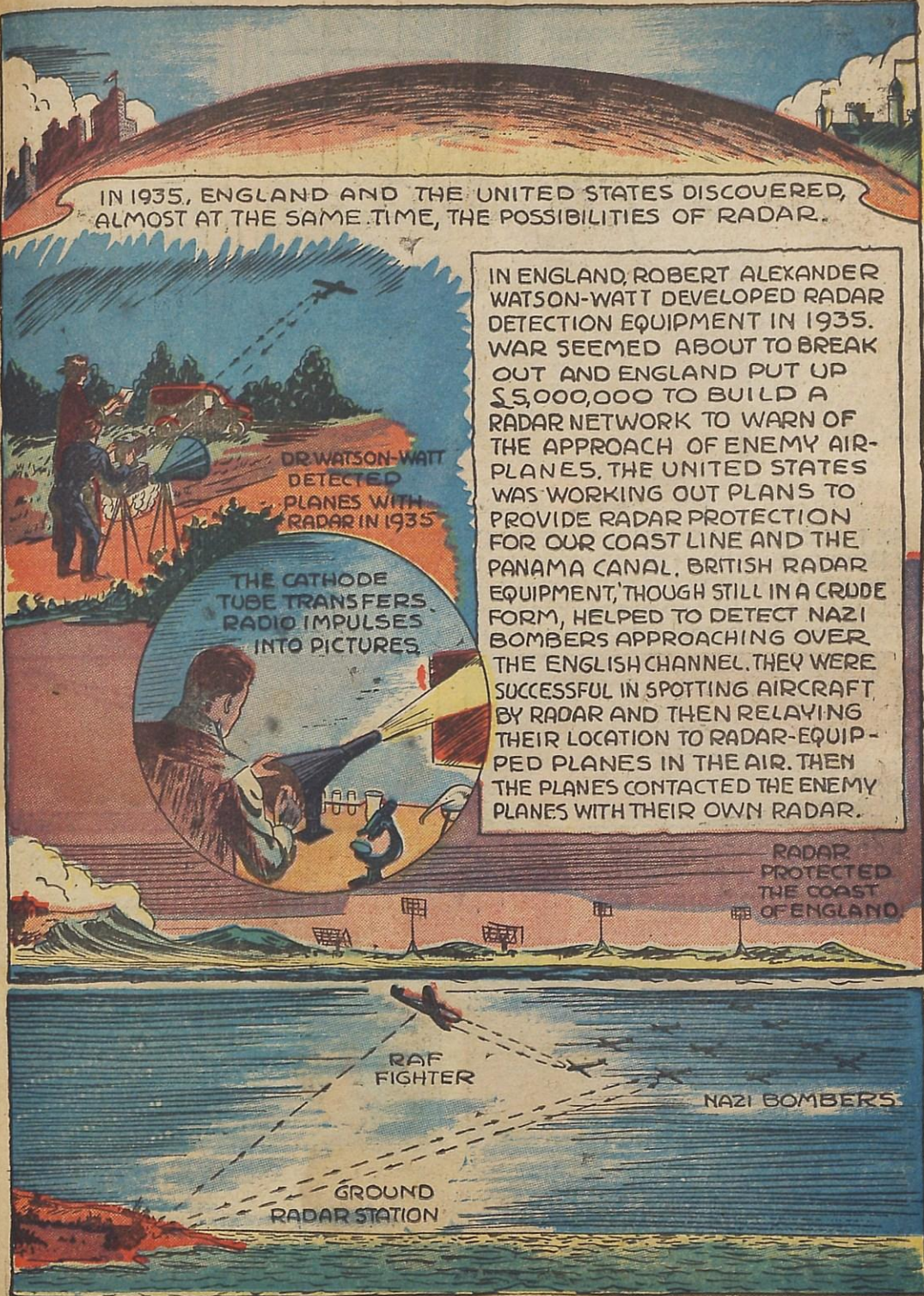
IN ENGLAND, ROBERT ALEXANDER WATSON-WATT DEVELOPED RADAR DETECTION EQUIPMENT IN 1935. WAR SEEMED ABOUT TO BREAK OUT AND ENGLAND PUT UP \$5,000,000 TO BUILD A RADAR NETWORK TO WARN OF THE APPROACH OF ENEMY AIRPLANES. THE UNITED STATES WAS WORKING OUT PLANS TO PROVIDE RADAR PROTECTION FOR OUR COAST LINE AND THE PANAMA CANAL. BRITISH RADAR EQUIPMENT, THOUGH STILL IN A CRUDE FORM, HELPED TO DETECT NAZI BOMBERS APPROACHING OVER THE ENGLISH CHANNEL. THEY WERE SUCCESSFUL IN SPOTTING AIRCRAFT BY RADAR AND THEN RELAYING THEIR LOCATION TO RADAR-EQUIPPED PLANES IN THE AIR. THEN THE PLANES CONTACTED THE ENEMY PLANES WITH THEIR OWN RADAR.

RADAR
PROTECTED
THE COAST
OF ENGLAND

RAF
FIGHTER

NAZI BOMBERS

GROUND
RADAR STATION



IN 1940, PROFESSOR OLIPHANT, OF ENGLAND, DEVELOPED THE CAVITY MAGNETRON. THIS DEVICE ENABLED RADAR TO USE SHORT WAVES WHICH PRODUCED A A KEEN-SIGHTED RADAR.



IN THIS COUNTRY, SCIENTISTS AT THE GREAT RADIATION LABORATORY AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY, HELPED PERFECT RADAR FOR MANY PRACTICAL WAR USES. WHEN

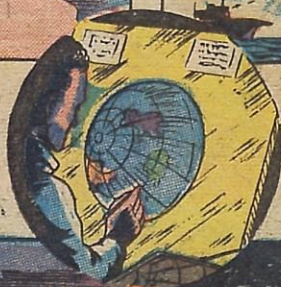
RADIO WAVES CONTACT A SOLID OBJECT THEY BOUNCE BACK AND THEIR IMPULSES ARE RECORDED LIKE A TELEVISION PICTURE ON A GLASS SCREEN, BY THE USE OF THE CATHODE TUBE.



RADAR WARNED OF THE APPROACH OF FRIENDLY AIRPLANES AND SHIPS OR RAIDING ENEMY BOMBERS.



AIRCRAFT CARRIERS AT SEA LOCATED DISTANT ENEMY PLANES, AND THEIR PLANES CONTACTED THEM BY RADAR.

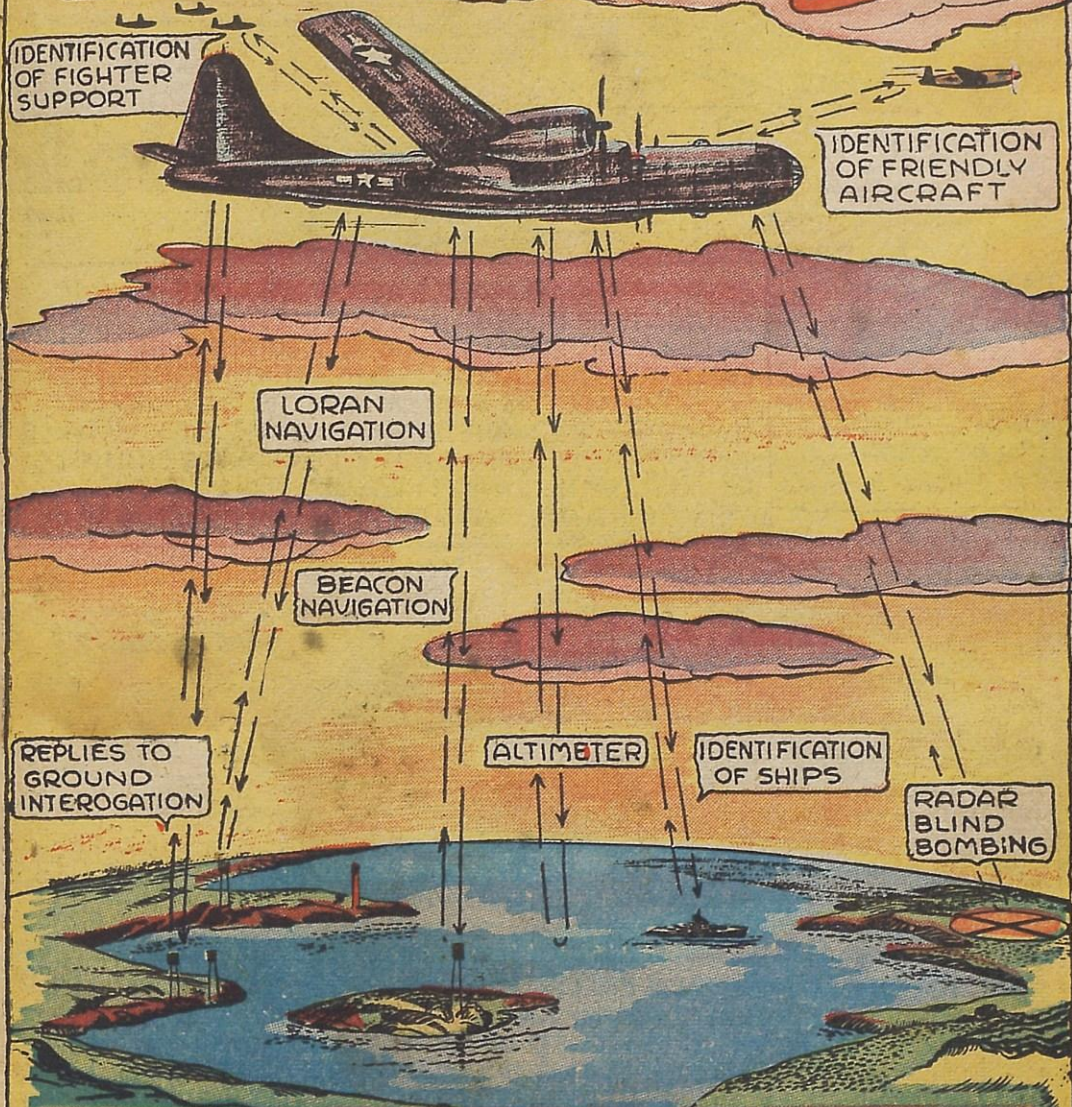


RADAR ENABLED PATROL BOMBERS TO LOCATE A SUBMARINE'S PERISCOPE AT SEA, REGARDLESS OF CLOUDS, FOG OR STORMS.

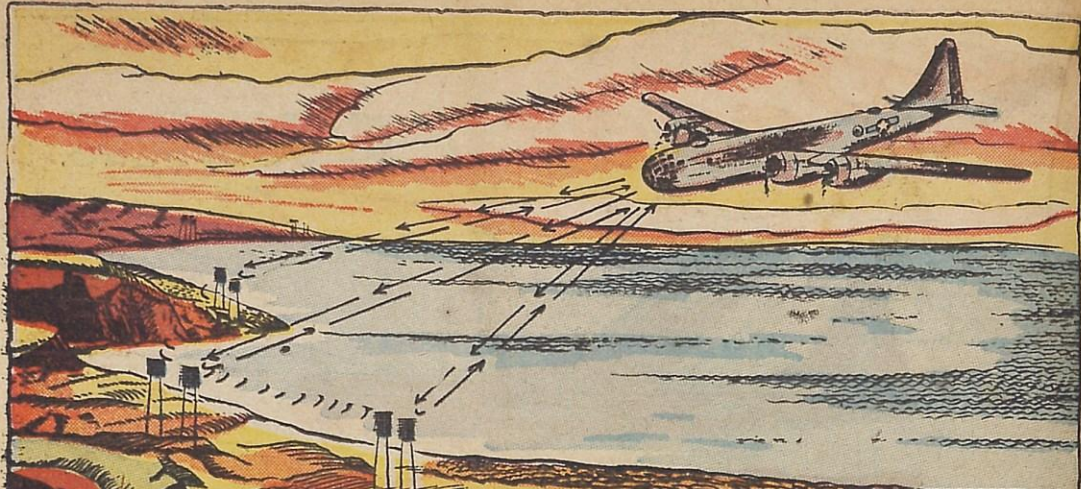


RADAR GAVE EYES TO OUR NIGHT-FIGHTERS AND ENABLED THEM TO CLEAR THE SKIES OF ENEMY PLANES THAT ATTACKED IN THE DARK.

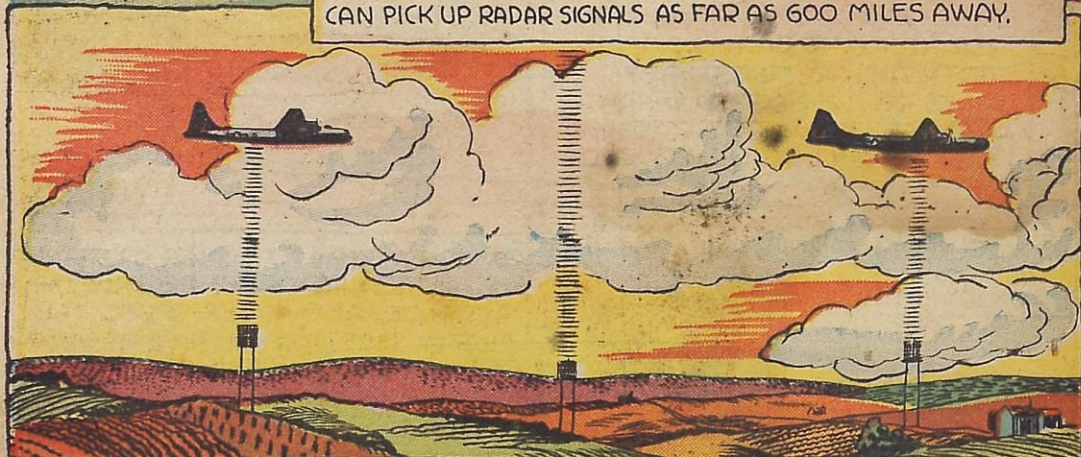
Radar AT WORK



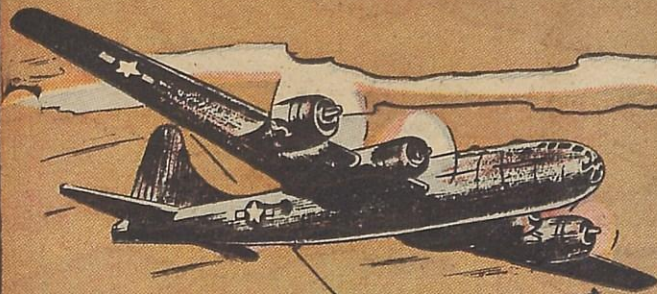
RADAR IS A TERM COVERING MANY DEVICES, ALL OF WHICH WORK BY HARNESSING THE ECHOES OF RADIO WAVES. A GROUP OF THESE DEVICES FORMED A SYSTEM OF DEFENSE AND ATTACK WEAPONS THAT BECAME ONE OF THE MOST IMPORTANT FACTORS IN WINNING THE WAR. IN PEACE, RADAR WILL BRING ADDED SAFETY TO AIR TRANSPORT.



LORAN RADAR MAKES ACCURATE LONG-RANGE NAVIGATION POSSIBLE— EVEN IF LAND OR STARS CANNOT BE SEEN. AN AIRPLANE FLYING OVER LAND CAN SEE A LAKE, A CITY OR A MOUNTAIN THROUGH ITS SCOPE AND GET ITS POSITION FROM THEIR LOCATION ON A CHART, OR THE NAVIGATOR CAN GET HIS BEARINGS FROM THREE RADAR BEACONS AND RECKON HIS POSITION BY REGULAR TRIANGULATION METHODS. WITH **LORAN** A PLANE CAN PICK UP RADAR SIGNALS AS FAR AS 600 MILES AWAY.



THE RADAR BEACON IS CALLED **REBECCA**. **REBECCA** SENDS IT IMPULSES STRAIGHT UP INTO THE AIR. IT CAN SEND A SPECIAL CODE SIGNAL WHICH IS PICKED UP BY AIRPLANES FLYING OVER IT. RADAR-EQUIPPED PLANES PICK UP THE SIGNAL AND AUTOMATICALLY ANSWER IT AS THEY PASS OVER THE BEACON. THIS PROVIDES AN AUTOMATIC CHECK ON THE POSITION OF ALL RADAR-EQUIPPED PLANES ON THE AIR LANES. LACK OF A RETURN SIGNAL WOULD WARN OF TRESPASSERS. WITHIN A FEW YEARS A CHAIN OF RADAR **REBECCAS** WILL MARK ALL OF OUR AIR ROUTES.



ONE OF THE MOST USEFUL OF ALL RADAR DEVELOPMENTS IS THE *PRA* ABSOLUTE ALTIMETER. THIS INSTRUMENT GIVES A PILOT AN ACCURATE CHECK ON HIS ACTUAL ALTITUDE ABOVE THE TERRAIN. RADAR IMPULSES ARE DIRECTED EARTHWARD. THESE IMPULSES INSTANTLY ECHO BACK FROM THE EARTH AND ARE PICKED UP BY THE PLANE'S RECEIVER ANTENNA AND AUTOMATICALLY RECORD THE EXACT DISTANCE TO THE GROUND.



ABOVE THE GROUND



PRA ALTIMETER

ABOVE SEA LEVEL



BAROMETRIC ALTIMETER

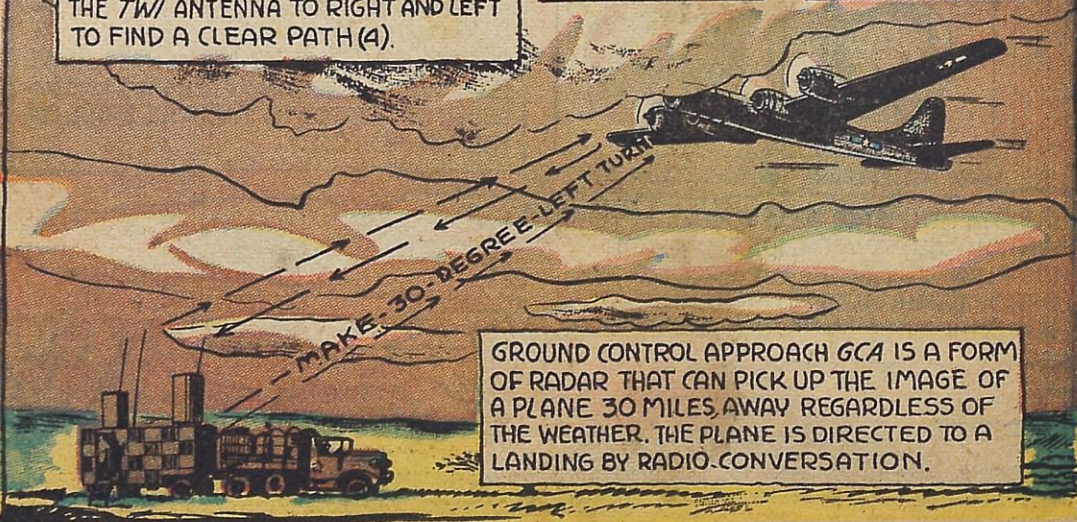
THE BAROMETRIC ALTIMETER, OPERATED BY THE PRESSURE OF AIR, RECORDS THE ALTITUDE ABOVE SEA-LEVEL. THE PILOT MUST RECKON HOW HIGH HIS PLANE IS ABOVE THE GROUND FROM HIS KNOWLEDGE OF HIS ROUTE AND THE SKILL OF HIS NAVIGATOR.

THE *PRA* ALTIMETER TELLS A PILOT, WITHOUT GUESSWORK, JUST HOW HIGH HIS PLANE IS ABOVE THE GROUND. THE BAROMETRIC ALTIMETER CANNOT TELL HIM THAT MOUNTAINS ARE JUST BELOW.

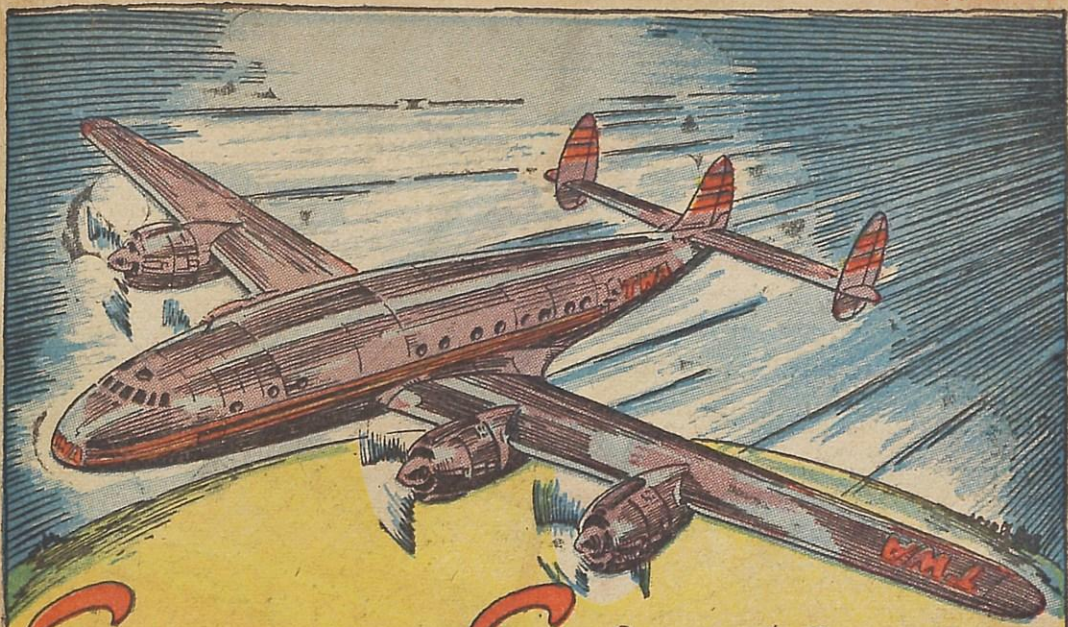




AN AIRPLANE MOVES SWIFTLY, AND ITS PILOT MUST SEE ABOVE AND BELOW AND AROUND HIS WINGTIPS. *TW*, TAIL WARNING INDICATOR, IS RADAR'S ANSWER TO THIS PROBLEM. RADAR IMPULSES SENT OUT IN ANY DIRECTION BY *TW* WILL DETECT ANY SOLID OBJECT IN THEIR RANGE AND ECHO BACK A WARNING TO THE PILOT. *TW* EQUIPMENT PREVENTS PLANES FROM HITTING TALL BUILDINGS OR MOUNTAIN PEAKS. A PLANE'S *TW* SENDS OUT IMPULSES (1). A SOLID OBJECT OR A BUILDING (2) CAUSES IMPULSES TO BOUNCE BACK (3) AND SOUND A WARNING SIGNAL TO THE PILOT WHO SWINGS THE *TW* ANTENNA TO RIGHT AND LEFT TO FIND A CLEAR PATH (4).



GROUND CONTROL APPROACH *GCA* IS A FORM OF RADAR THAT CAN PICK UP THE IMAGE OF A PLANE 30 MILES AWAY REGARDLESS OF THE WEATHER. THE PLANE IS DIRECTED TO A LANDING BY RADIO CONVERSATION.

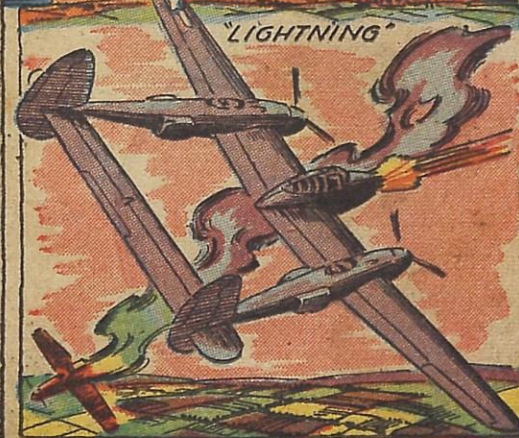


Super Skyliner

the
LOCKHEED
"CONSTELLATION"

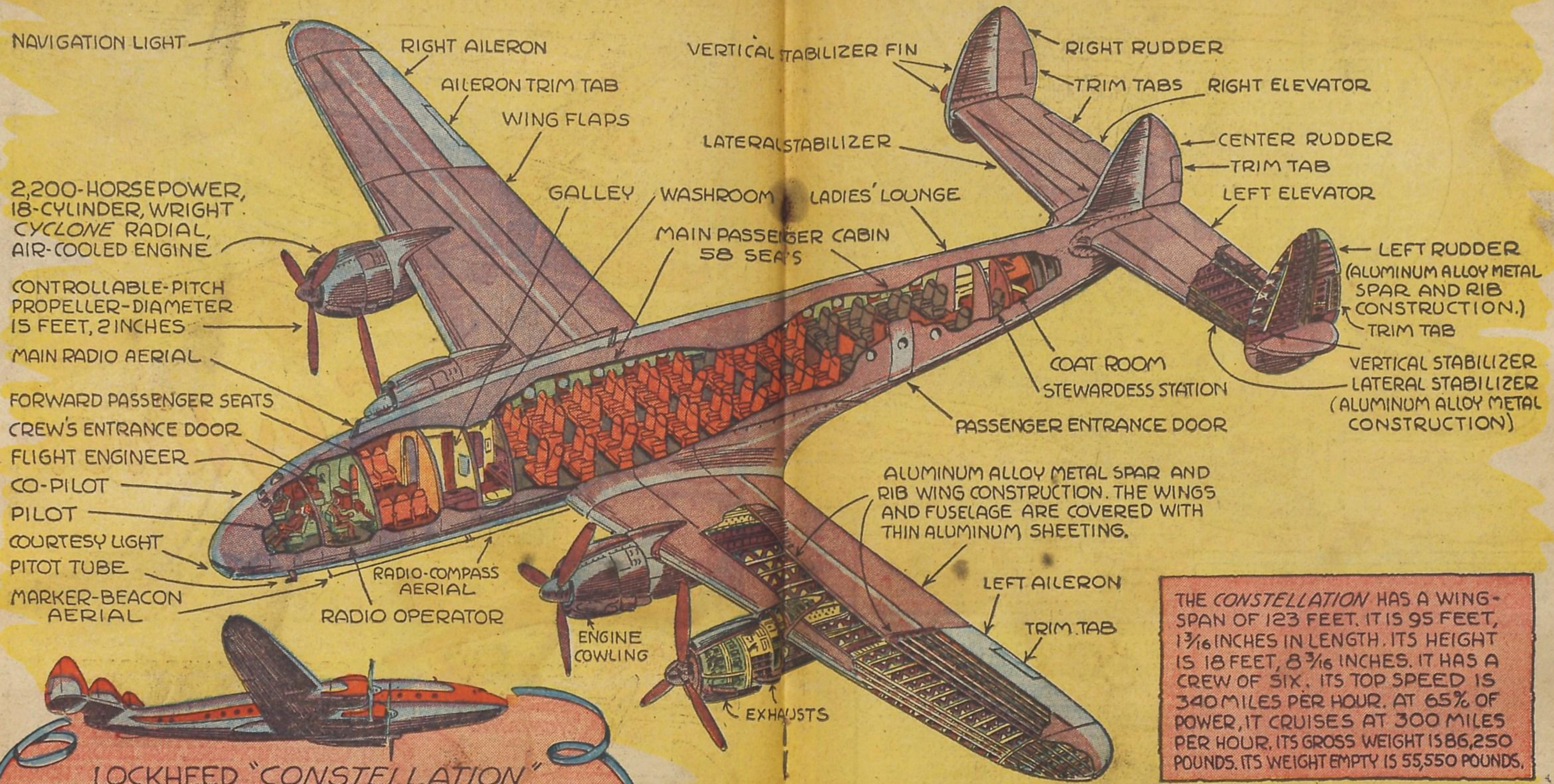


"LODESTAR"



"LIGHTNING"

20,000 PLANES FOR THE U.S. ARMY AND NAVY AND GREAT BRITAIN, INCLUDING 9,850 *LIGHTNING* FIGHTERS, HUNDREDS OF *LODESTARS*, *HUDSON*, AND *VENTURA* BOMBERS, THAT RECORD, ALONG WITH THE VISION AND IDEAS OF HOWARD HUGHES AND JACK FRYE, PRESIDENT OF TWA, PLUS THE "KNOW HOW" OF LOCKHEED, HAS GIVEN US A NEW SLEEK, SPEEDY SUPER-AIRLINER. DESIGNED FOR FAST TRANSATLANTIC AND TRANSCONTINENTAL SERVICE, THE "*CONSTELLATIONS*" ARE AIR-CONDITIONED FOR HIGH-ALTITUDE FLYING. THEY WILL FLY OVER BAD WEATHER IN THE SMOOTH UPPER AIR FOR GREATER COMFORT AND SAFETY. "*CONSTELLATIONS*" WILL FLY THE ATLANTIC IN TWELVE TO FOURTEEN HOURS.



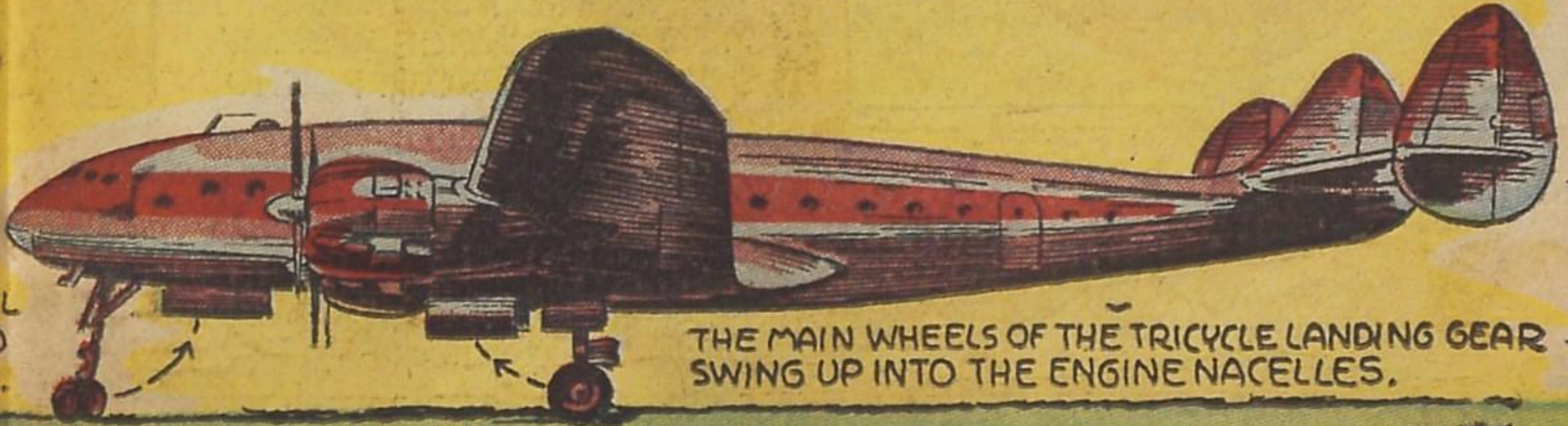
THE CONSTELLATION HAS A WING-SPAN OF 123 FEET. IT IS 95 FEET, 1³/₁₆ INCHES IN LENGTH. ITS HEIGHT IS 18 FEET, 8³/₁₆ INCHES. IT HAS A CREW OF SIX. ITS TOP SPEED IS 340 MILES PER HOUR. AT 65% OF POWER, IT CRUISES AT 300 MILES PER HOUR. ITS GROSS WEIGHT IS 86,250 POUNDS. ITS WEIGHT EMPTY IS 55,550 POUNDS.

LOCKHEED "CONSTELLATION"
64-PASSENGER DAYLIGHT EXPRESS

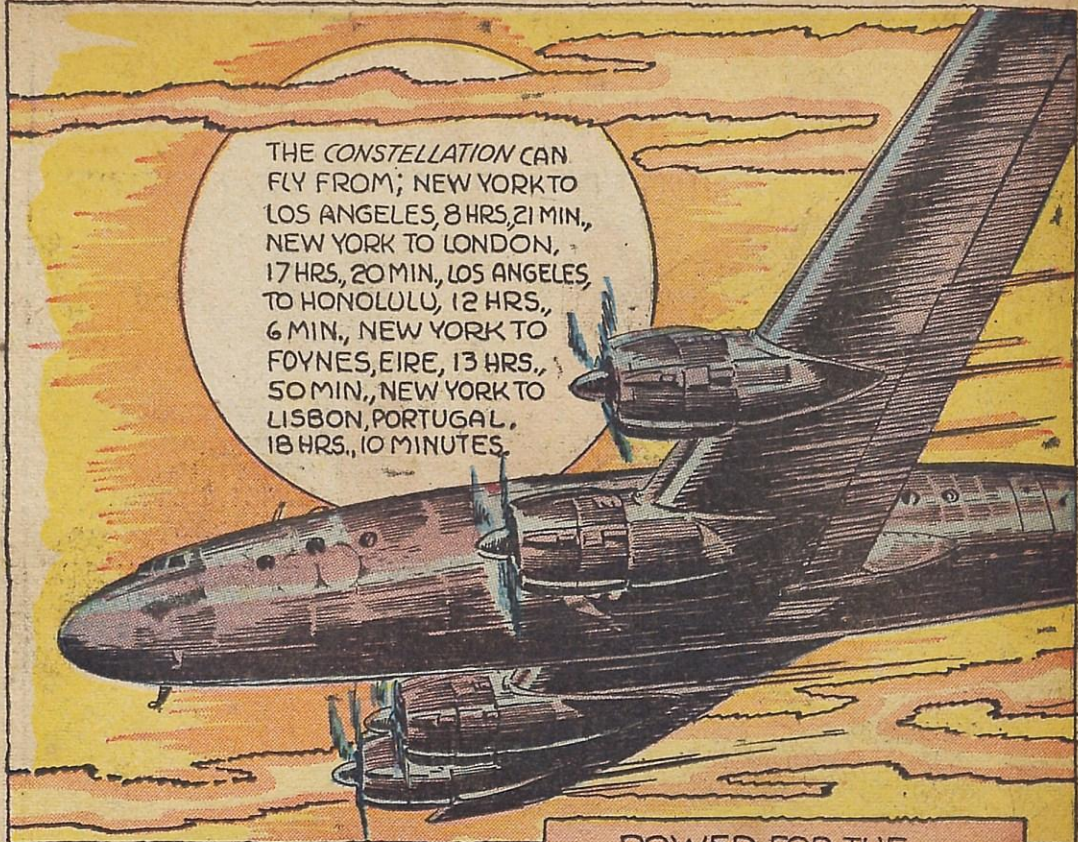
WITH ITS 8,800 HORSEPOWER WHIRLING ITS FOUR FIFTEEN-FOOT PROPELLERS, THE "CONSTELLATION" CAN CROSS THE AMERICAN CONTINENT IN LESS THAN NINE HOURS, NON-STOP. IT CAN CARRY 64 DAY PASSENGERS FROM NEW YORK TO CHICAGO IN LESS THAN THREE HOURS. AS A SLEEPER IT WILL CARRY 34 PASSENGERS. AS A LUXURY CLUB CRUISER, IT WILL CARRY 48 DAY PASSENGERS.

THE NOSE WHEEL SWINGS UP INTO THE FUSELAGE.

THE MAIN WHEELS OF THE TRICYCLE LANDING GEAR SWING UP INTO THE ENGINE NACELLES.

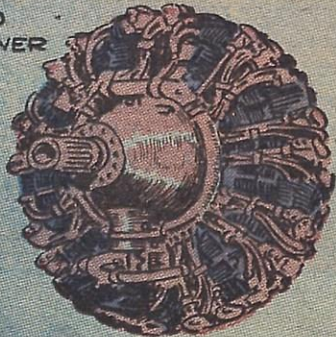


THE *CONSTELLATION* CAN FLY FROM; NEW YORK TO LOS ANGELES, 8 HRS., 21 MIN., NEW YORK TO LONDON, 17 HRS., 20 MIN., LOS ANGELES TO HONOLULU, 12 HRS., 6 MIN., NEW YORK TO FOYNES, EIRE, 13 HRS., 50 MIN., NEW YORK TO LISBON, PORTUGAL, 18 HRS., 10 MINUTES.



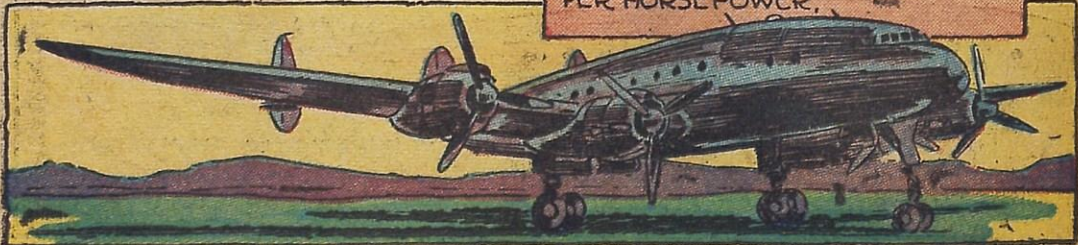
WRIGHT CYCLONE 18 ENGINE

2,200
HORSEPOWER



POWER FOR THE *CONSTELLATION*

THE "*CONSTELLATION*" IS POWERED WITH FOUR 2,200-HORSEPOWER, RADIAL ENGINES. THE ENGINE HAS EIGHTEEN CYLINDERS, TWO ROWS OF NINE CYLINDERS EACH. EACH CYLINDER PRODUCES OVER 122 HP, OR MORE POWER PER CYLINDER THAN THE TOTAL HORSEPOWER OF THE AVERAGE AUTOMOBILE ENGINE. THE ENGINE IS ONLY 55 INCHES IN DIAMETER AND WEIGHS ABOUT 2,000 POUNDS, OR ONE POUND PER HORSEPOWER.



WINGS in the WILDS

BRUSH PILOTS of the FAR NORTH



THE HARDY BRUSH FLYERS CARRY EVERYTHING FROM BULLDOZERS TO BABIES THROUGH THE SNOW-SWEPT SKIES OF THE FAR NORTH. IN ALASKA AND NORTHERN CANADA, THE ONE-MAN AIRLINES ARE THE ONLY LINK WITH CIVILIZATION FOR THE MINERS, TRAPPERS, AND FAMILIES WHO LIVE IN THE WILDS. MANY LIVES HAVE BEEN SAVED BY THESE DARING AIRMEN WHO SPREAD THEIR WINGS IN THE WILDERNESS AND BLAZED SKY TRAILS ABOVE THE SNOW.

I AIN'T BEEN UP THERE FOR THIRTY YEARS. THINK YOU KIN LAND THAT AEROPLANE IN THERE ?

THERE IS ONLY ONE WAY TO FIND OUT. WE'LL FLY UP AND TRY IT.



AN OLD PROSPECTOR, WHO HAD NOT BEEN IN ALASKA FOR THIRTY YEARS, DECIDED TO OPEN UP AN OLD CLAIM. HE GOT JIM DODSON, A FAMOUS BRUSH PILOT, TO HELP HIM LOCATE IT IN 1940.

IS THAT YOUR OLD CLAIM, CHARLEY?

IT SHORE IS. BY GOSH! WE'VE ONLY BEEN FLYIN' ABOUT HALF AN HOUR.



THIRTY YEARS AGO, IT HAD TAKEN THE PROSPECTOR TEN EXHAUSTING DAYS OVER THE SNOWY TRAIL WITH A DOGTEAM TO REACH HIS CAMP. BY PLANE IT TOOK 28 MINUTES.

THE BRUSH PILOTS FLY THE MINING MACHINERY OR DOGTEAMS MANY A VALUABLE ORE DEPOSIT HAS BEEN OPENED UP BECAUSE EQUIPMENT COULD BE FLOWN IN. MACHINERY IS CARRIED SECTIONS AND ASSEMBLED AT THE MINES. WHEN THE MINES ARE WORKING, BRUSH PILOTS LOAD THE GOLD INTO THEIR PLANES AND FLY IT QUICKLY AND SAFELY TO TOWN.



HI, JIM, DID YOU BRING MY RADIO TUBES?

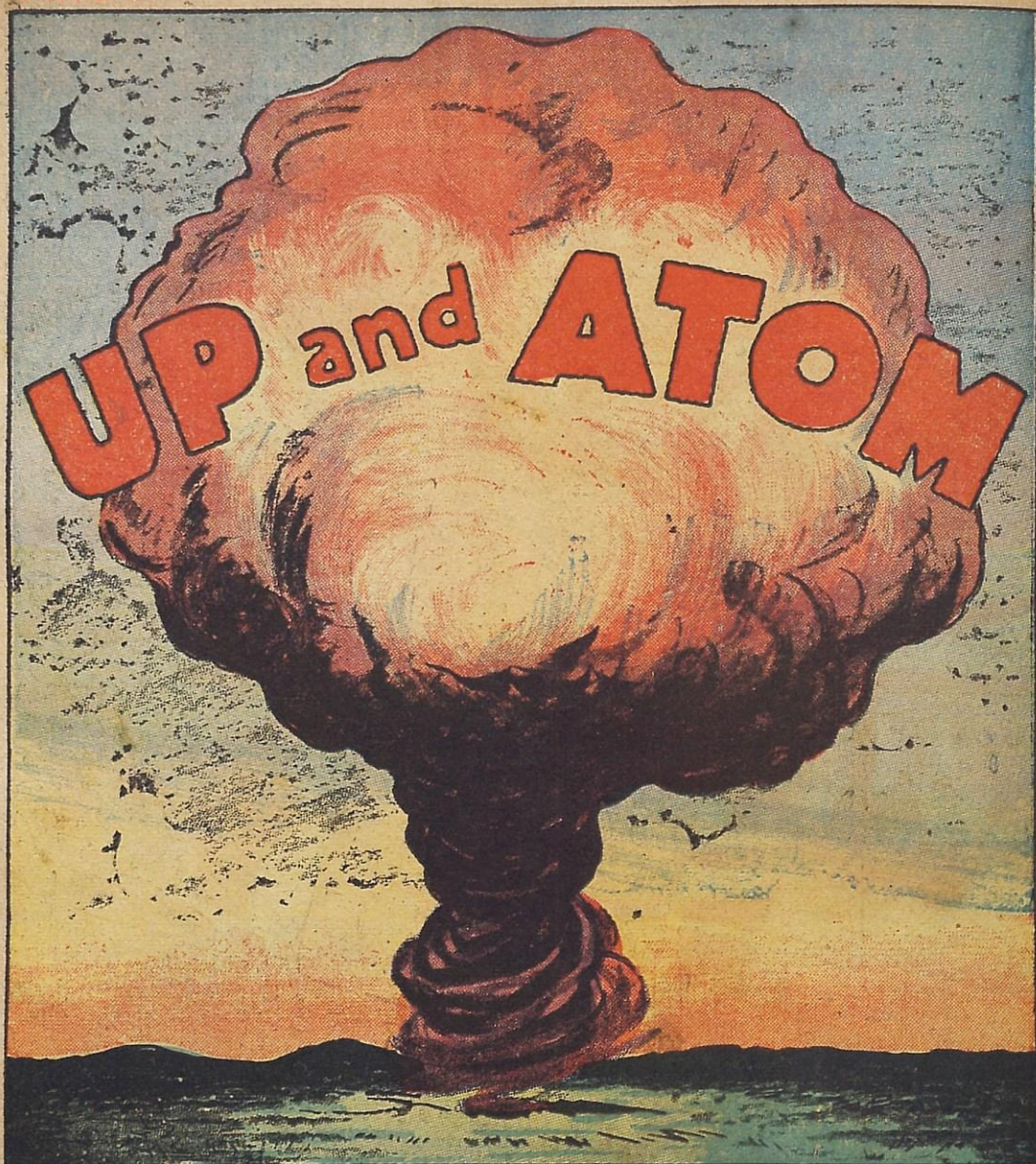
HELLO, JIM, HOW IS EVERYTHING IN FAIRBANKS? YOU GOT ANY PAPERS?

DID YOU BRING MY COUGH MEDICINE?

LOOK, BOYS! HERE'S MAIL AND PACKAGES.

TO THE FOLKS IN THE SNOW-BOUND LOG HOUSES IN THE ALASKAN BRUSH, THE ARRIVAL OF THE PLANE IS A GREAT EVENT. PILOTS FLY MAIL, FOOD, MEDICINE, AND VITAL SUPPLIES TO ISOLATED SETTLEMENTS. A CAL BRINGS A PLANE TO RUSH A SICK BABY OR AN INJURED MAN TO THE HOSPITAL. BABIES HAVE EVEN BEEN BORN IN AIRPLANES IN ALASKA. BRUSH PILOTS OFTEN RISK THEIR LIVES TO FLY SERUM AND MEDICINE TO SAVE THE LIVES OF SNOW BOUND SETTLERS OF THE FAR NORTH.

BRUSH FLYING IS NOT A STUNT. IT IS STRICKLY BUSINESS—THE BUSINESS OF SAVING LIVES AND SERVING HUMANITY.



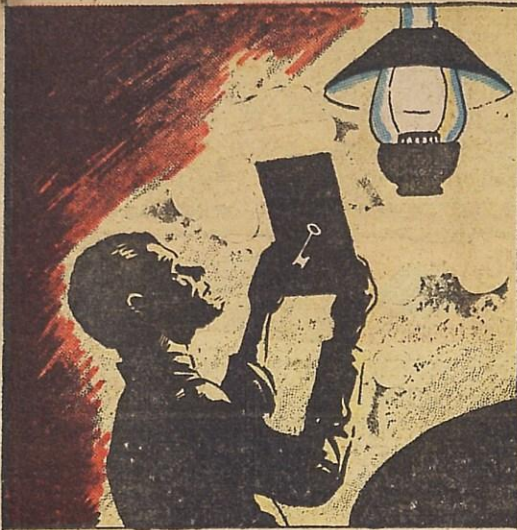
ON JULY 16, 1945, A LIGHT, A HUNDRED TIMES BRIGHTER THAN THE MIDDAY SUN, SEARED THE BLACK, STORMY SKIES OF NEW MEXICO. THIS BLINDING FLASH OF SUPERNATURAL BRILLIANCE AND UNEARTHLY HEAT, WAS FOLLOWED BY A VIOLENT PRESSURE WAVE, AND A SUSTAINED AWESOME ROAR. ONLY A SMALL, SELECT GROUP OF MEN KNEW THAT THIS FIREY TORCH SIGNALLED, NOT THE END OF THE WORLD, BUT THE BIRTH OF A SUPERWEAPON TO END THE WAR AND THE BEGINNING OF THE ATOMIC AGE.



ON THAT STORMY JULY NIGHT IN 1945, MEN CROUCHED BEFORE MYSTERIOUS DIALS AND INSTRUMENTS. IN A HUT ON THE NEW MEXICAN DESERT. IN THAT HUT PROTECTED BY MASSIVE EARTHWORK BUNKERS, SOME OF THE WORLD'S MOST BRILLIANT SCIENTISTS TENSELY WAITED THE ZERO HOUR. THIS WAS A TEST OF THEIR ANSWER TO A PROBLEM THAT HAD PUZZLED MEN FOR ALMOST 5,000 YEARS. ABOUT THE YEAR 375 B.C. IN GREECE, DEMOCRITUS, THE PHILOSOPHER WITH THE GREY BEARD, CREATED THE WORD "ATOM". HE TOLD HIS STUDENTS THAT A STONE WAS BUILT UP OF TINY PARTICLES, JUST AS A TEMPLE WAS CONSTRUCTED OF STONES. HE CALLED THE TINY PARTICLES "ATOMS."

DEMOCRITUS SAID THAT ATOMS WERE OF ULTIMATE SMALLNESS, AND THAT THEY COULD NOT BE DIVIDED FURTHER. THERE THE MATTER RESTED. THROUGH THE DARK AGES ALCHEMISTS ALL DREAMED OF MAKING GOLD. SO THEY MIXED STRANGE CONCOCTIONS AND GAVE NO THOUGHT TO THE ATOM. IN THE 19TH CENTURY GREAT PROGRESS WAS MADE IN THE SCIENCE OF ELECTRICITY. THE INCANDESCENT LAMP WAS INVENTED AND SCIENTISTS BEGAN TO STUDY THE THEORY OF THE ATOMIC STRUCTURE.

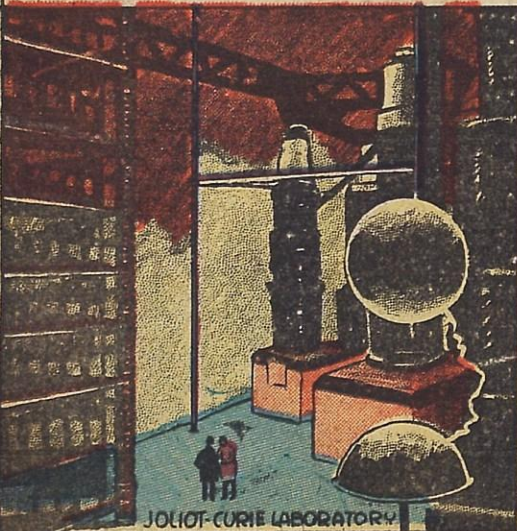




SCIENTISTS FOUND THAT CERTAIN BODIES EMITTED INVISIBLE RAYS OF LIGHT. THIS ACTION WAS CALLED RADIOACTIVITY. THESE RAYS COULD PENETRATE OBJECTS



THAT WERE OPAQUE. THIS LED THE WAY TO THE X-RAY THAT COULD "SEE THROUGH" SOLID OBJECTS. MADAME MARIE CURIE, A FRENCH SCIENTIST, DISCOVERED RADIUM,



RADIUM WAS A RADIOACTIVE ELEMENT FOUND IN PITCHBLENDE. IT POSSESSED THE PROPERTY OF GIVING OFF LUMINOUS RAYS, SIMILAR TO THOSE OF THE SUN. THE RAYS WERE ACCOMPANIED HEAT ENERGY. RADIUM EMITTED A CONTINUAL STREAM OF RAYS WITHOUT LOSING ITS ENERGY. RADIUM GLOWED, GAVE OFF HEAT AND BROKE APART OTHER MATTER AS IT



SHED ITS EXTRA PARTICLES. THIS ACTION SEEMED TO GO ON INDEFINITELY WITHOUT BREAKING UP A MASS OF RADIUM. IN 1934, IRENE CURIE JOLIO, DAUGHTER OF MARIE CURIE, AND HER HUSBAND, F. JOLIO, PRODUCED THE FIRST ARTIFICIALLY RADIOACTIVE ELEMENTS EVER MADE. IN THEIR HUGE PARIS LABORATORY, THE JOLIOTS PROVED THAT MAN COULD PRODUCE RADIOACTIVE ELEMENTS.

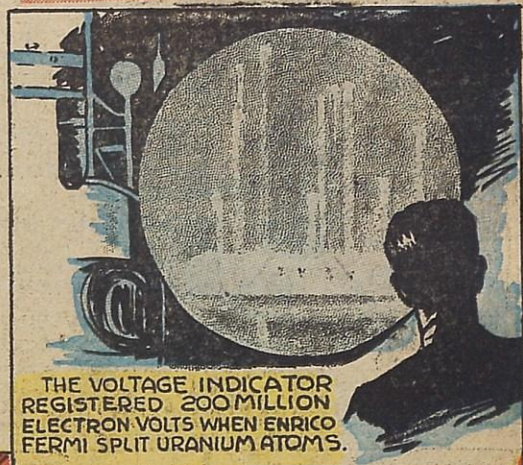


MAX PLANCK, A GERMAN SCIENTIST, ORIGINATED THE THEORY THAT ENERGY RADIATION IN THE ATOM EXISTED IN SMALL EXACT UNITS. A NOTED DANISH SCIENTIST, NIELS BOHR, USING PLANCK'S IDEA ON THE STRUCTURE OF THE ATOM, FORMULATED THE THEORY THAT THE ATOM CONSISTED OF A NUCLEUS, OR CENTER, WHICH HAD ELECTRONS REVOLVING AROUND IT. EACH ATOM IS LIKE OUR SOLAR SYSTEM.

THE NUCLEUS IS LIKE OUR SUN. THE ELECTRONS REVOLVE ABOUT IT LIKE PLANETS DO AROUND THE SUN.

AN ENGLISHMAN, H.G.J. MOSELEY, USED X-RAYS ON THE ATOM AND FOUND THAT EACH ELEMENT HAD A DEFINITE ATOMIC NUMBER. SOME ATOMS, SUCH AS THE HYDROGEN ATOM, HAD JUST ONE PARTICLE IN ITS NUCLEUS, AND ONE ELECTRON OUTSIDE. THE URANIUM ATOM IS

THE HEAVIEST OF ALL ATOMS, WITH 235 PARTICLES IN ITS NUCLEUS AND 92 ELECTRONS CIRCLING IT, EACH TINY ATOM IS A WORLD IN ITSELF, GLOWING AND CREATING HEAT CONSTANTLY. NORMALLY ATOMS DO NOT JOIN EACH OTHER. THEY WORK INDIVIDUALLY, RETAINING THEIR ENERGY. ONCE THE THEORY OF ATOMIC ENERGY WAS ESTABLISHED, SCIENTISTS BEGAN TO LOOK FOR A WAY TO RELEASE AND PUT TO USE THE ENERGY FROM THE BILLIONS OF ATOMS IN NATURE'S ELEMENTS. IT WAS DISCOVERED THAT ATOMS ALSO CONTAINED AN ELECTRICALLY NEUTRAL PARTICLE THAT WAS NOT EFFECTED BY THE FORCE OF THE NUCLEUS. THIS PARTICLE WAS CALLED A NEUTRON. SCIENTISTS REALIZED THAT THE NEUTRON MIGHT BE USED AS A FORCE THAT WOULD SPLIT THE ATOM. THIS WOULD RELEASE THE ATOM'S TERRIFIC ENERGY.

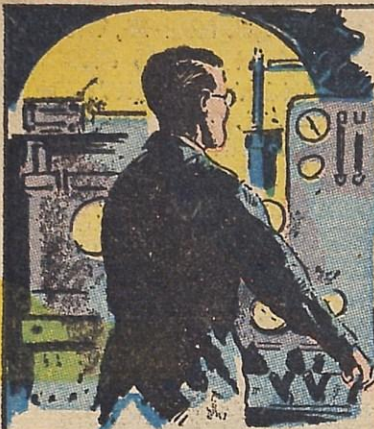


THE VOLTAGE INDICATOR REGISTERED 200 MILLION ELECTRON VOLTS WHEN ENRICO FERMI SPLIT URANIUM ATOMS.



GIANT MACHINES WERE DESIGNED TO HELP TO SPLIT THE ATOM. IN 1939, DOCTOR ENRICO FERMI, OF ITALY, WHO WAS COOPERATING WITH SCIENTISTS AT COLUMBIA UNIVERSITY IN NEW YORK CITY, MADE

ATOM-SPLITTING HISTORY. DR. FERMI BOMBARDED URANIUM ATOMS WITH NEUTRONS AND SPLIT THEM, RELEASING MILLIONS OF ELECTRON VOLTS. WORLD WAR II, HASTENED ATOMIC RESEARCH, AS SCIENTISTS SAW THE POSSIBILITIES OF A DEADLY NEW WEAPON. HITLER'S NAZI SCIENTISTS TRIED DESPERATELY TO FIND THE SECRET. BUT IRONICALLY A JEWISH WOMAN SCIENTIST, DOCTOR LISE MEITNER, EXILED BY HITLER, HELD THE CLUE THAT COULD HAVE BROUGHT A NAZI VICTORY.



DOCTOR LISE MEITNER'S DISCOVERY THAT URANIUM ATOMS COULD BE SPLIT BY NEUTRONS GAVE SCIENTISTS A CLUE TO THE PROBLEM OF

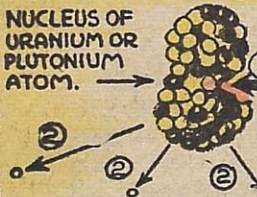
RELEASING ATOMIC ENERGY. DR. ALFRED O. NIER, OF THE UNIVERSITY OF MINNESOTA, ISOLATED THE FIRST TANGIBLE QUANTITY OF URANIUM. BY LABORATORY EXPERIMENTS SCIENTISTS DISCOVERED THAT TERRIFIC POWER WAS RELEASED WHEN URANIUM ATOMS WERE SPLIT BY NEUTRONS. THIS SHOWED THEM THE WAY TO OBTAIN PRACTICAL USE OF ATOMIC ENERGY. BUT THEY ALSO LEARNED THAT TO OBTAIN A GREAT AMOUNT OF USEFUL ATOMIC POWER IT WAS NECESSARY TO ACCUMULATE

LARGE QUANTITIES OF PURE URANIUM. THIS SEEMED AN IMPOSSIBLE TASK. IN THE NORMAL COURSE OF EVENTS IT MIGHT HAVE BEEN YEARS BEFORE SCIENTISTS WOULD HAVE SOLVED THE PROBLEM OF ATOMIC POWER, BUT A WORLD WAR WAS RAGING.



THE NUCLEUS OF THE ATOM CONSISTS OF POSITIVELY CHARGED PARTICLES AND ELECTRICALLY NEUTRAL NEUTRONS. THE FORCES HOLDING THESE PARTICLES TOGETHER IN THE NUCLEUS ARE VERY POWERFUL.

NUCLEUS OF URANIUM OR PLUTONIUM ATOM.



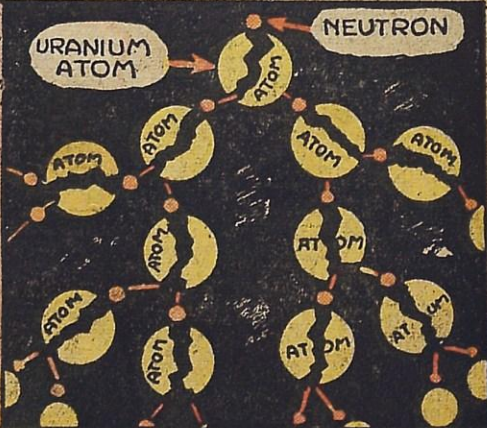
NEUTRON (1) FORCED INTO THE NUCLEUS SPLITS THE ATOM.

WHEN AN ATOM SPLITS IT RELEASES MANY NEUTRONS (2) THAT RUSH OUT AND SPLIT OTHER ATOMS

WHEN AN ATOM IS SPLIT, ITS NEUTRONS RUSH OUT AND SPLIT OTHER ATOMS. THIS STARTS A CHAIN OF ATOM SPLITTING THAT CREATES A SERIES OF TREMENDOUS ATOMIC ENERGY EXPLOSIONS THAT LASTS UNTIL A MASS OF URANIUM IS USED UP.

THE NAZIS WERE SEARCHING FOR THE SECRET OF ATOMIC POWER FOR THE CONQUEST OF THE WORLD. BRITISH SCIENTISTS WERE RUSHING THEIR ATOMIC RESEARCH TO TRY TO HALT THIS CONQUEST. AMERICAN SCIENTISTS KEPT PACE WITH BRITAIN'S PROGRESS. IN 1941, WE HEARD THAT THE NAZIS WERE PREPARING TO USE ATOMIC WEAPONS. THE UNITED STATES AND BRITAIN DECIDED TO POOL THEIR RESEARCH IN ATOMIC POWER AND CARRY OUT THE PROJECT IN AMERICA.

A BRILLIANT GROUP OF SCIENTISTS, UNDER THE LEADERSHIP OF DR. VANNEVAR BUSH, DIRECTOR OF THE U.S. OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT, WENT TO WORK IN AN ALL-OUT EFFORT TO PERFECT AN ATOMIC WEAPON. IN ROCK-HEWN VAULTS BENEATH COLUMBIA UNIVERSITY, THESE SCIENTISTS SOLVED THE PROBLEM OF THE WARTIME USE OF ATOMIC POWER. THEIR DISCOVERIES BECAME A MILITARY PROJECT. IN THE ARMY'S SECRET FILES IT BECAME "MANHATTAN PROJECT," AND A CURTAIN OF SILENCE WAS DRAWN OVER THE WAR'S GREATEST SECRET.





HEAVILY ARMED MEN GUARDED EVERY APPROACH TO THE IMMENSE, SECRET WAR PLANTS.


AS A MILITARY OPERATION, "MANHATTAN PROJECT" WAS UNDER THE COMMAND OF 48-YEAR-OLD MAJOR GENERAL LESLIE R. GROVES, U.S. ARMY. THE TIRELESS EFFORTS OF TOP AMERICAN AND BRITISH SCIENTISTS, BACKED BY TWO BILLION DOLLARS, WENT INTO THE DEVELOPMENT OF THIS SUPER-SECRET PROJECT. OVER 175,000 AMERICAN MEN AND WOMEN WORKED DAY AND NIGHT IN SUPER-WARPLANTS WITHOUT EVEN KNOWING WHAT THEY WERE HELPING TO PRODUCE. COMPLETE SECRECY SHROUDED AMERICA'S NUMBER ONE WAR PROJECT.



THEN ONE NIGHT IN AUGUST, 1945, MEN ON IWO JIMA, SAT TENSELY AT THE SCOPES OF THE GREATEST CONCENTRATION OF RADAR EVER SET UP IN THE PACIFIC. NO PRYING ENEMY PLANE OR WARSHIP WAS GOING TO GET AN OPPORTUNITY OF APPROACHING WITHIN MILES OF THAT TINY ISLE THAT WAS NOW PLAYING A PART IN AMERICA'S SUPER-SECRET DRAMA.



NEVER WAS A BOMBER SO CAREFULLY GUARDED AND LOADED AS A CERTAIN B-29 ON IWO JIMA.

A dramatic illustration of a B-29 Superfortress in flight. The aircraft is shown from a low angle, flying over a city. A parachute is being dropped from the plane. In the upper left, a pilot is shown in a circular inset, wearing goggles and a helmet. The sky is filled with dark, dramatic clouds. The overall style is reminiscent of mid-20th-century pulp magazines.

ON THE MORNING OF AUGUST 5, 1945, THE RADAR MAN IN A LONE B-29 SUPERFORTRESS PICKED UP THE JAPANESE COAST AND LINED UP THE TARGET ON HIS SCOPE. THE CREW OF THE B-29 KNEW THAT IT WAS A SPECIAL MISSION, BUT ONLY THREE MEN IN THE PLANE KNEW JUST HOW SPECIAL IT WAS.

AS THE GIANT B-29 BEGAN ITS RUN OVER THE TARGET, THE CREW WERE TOLD TO PUT ON THE HEAVY WELDER'S GOGGLES THAT HAD BEEN ISSUED TO THEM. DIRECTLY OVER THE TARGET A PARACHUTE FLOATED DOWN FROM THE B-29. INSTANTLY THE PILOT GUNNED THE ENGINES AND SWUNG THE PLANE AWAY.

AS THE B-29 ZOOMED OUT OF RANGE A GREAT FLASH OF LIGHT, MORE BRILLIANT THAN SUNLIGHT, BURST OVER THE TARGET, TWO CONCUSSIONS ROCKED THE PLANE, AND A HUGE PILLAR OF SMOKE AND CHURNING DUST SHOT 30,000 FEET INTO THE SKY. AN AMERICAN AIR CREW HAD DROPPED THE FIRST ATOMIC BOMB, AND THE BIG JAPANESE CITY OF HIROSHIMA HAD ALMOST INSTANTLY BEEN BLASTED OUT OF EXISTENCE.



EXTRA The World-News EXTRA

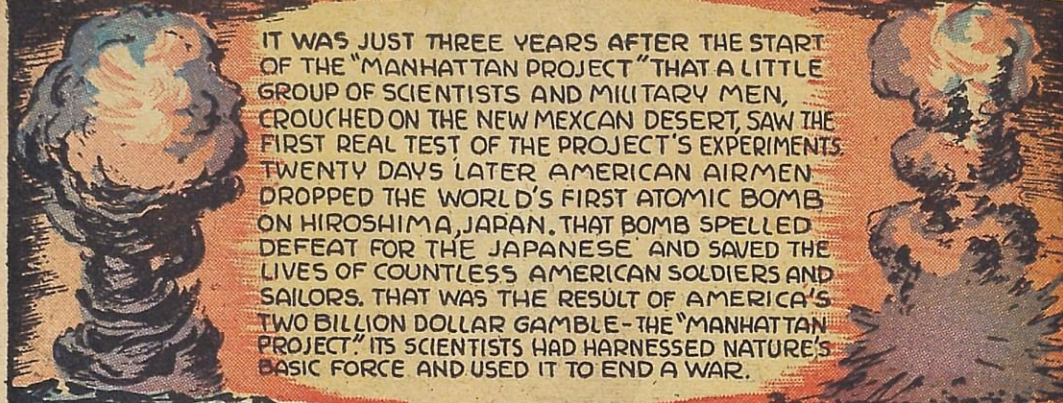
THE ATOMIC BOMB SMASHES JAP CITY

NEW WEAPON EQUALS 20,000 TONS OF TNT.

THE ATOM BOMB WILL END WAR

SECRET WAR PLANTS BUILD ATOM BOMB

SCIENTISTS CREATE NEW SUPER WEAPON

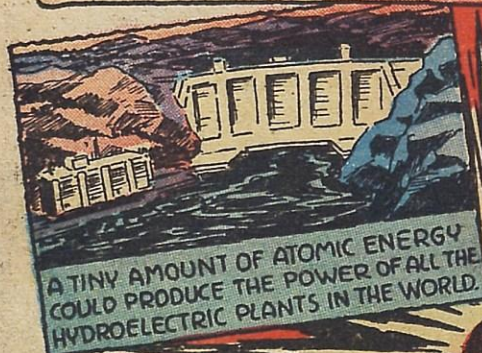


IT WAS JUST THREE YEARS AFTER THE START OF THE "MANHATTAN PROJECT" THAT A LITTLE GROUP OF SCIENTISTS AND MILITARY MEN, CROUCHED ON THE NEW MEXICAN DESERT, SAW THE FIRST REAL TEST OF THE PROJECT'S EXPERIMENTS. TWENTY DAYS LATER AMERICAN AIRMEN DROPPED THE WORLD'S FIRST ATOMIC BOMB ON HIROSHIMA, JAPAN. THAT BOMB SPELLED DEFEAT FOR THE JAPANESE AND SAVED THE LIVES OF COUNTLESS AMERICAN SOLDIERS AND SAILORS. THAT WAS THE RESULT OF AMERICA'S TWO BILLION DOLLAR GAMBLE- THE "MANHATTAN PROJECT." ITS SCIENTISTS HAD HARNESSSED NATURE'S BASIC FORCE AND USED IT TO END A WAR.

NEW MEXICO, U.S.A. JULY 16, 1945

AUGUST 5, 1945, HIROSHIMA, JAPAN

ALTHOUGH THE DEMOCRATIC PEOPLE OF THE WORLD REJOICED BECAUSE WAR HAD ENDED, THEY STOOD AGHAST AS SCIENTISTS REVEALED THE POWER OF THE ATOMIC BOMB. A FEW POUNDS OF THE BOMB'S EXPLOSIVE MASS WAS EQUAL TO 20,000 TONS OF TNT. THE ATOM BOMB THAT DESTROYED HIROSHIMA EQUALED THE POWER OF THE BOMB LOADS OF 2,000 SUPERFORTRESSES. PEOPLE REALIZED THAT HERE WAS A TREMENDOUS FORCE THAT COULD ACCOMPLISH WONDERS FOR MAN, BUT IT COULD ALSO BE A GREAT SOURCE OF EVIL.




ATOMIC ENERGY, NATURE'S BASIC FORCE, HAS BEEN HARNESSSED BY MAN. UNDER PROPER CONTROL IT CAN WORK FOR HIM-POWER HIS INDUSTRY-RAISE HIS FOOD AND CURE HIS ILLS. IN EVIL HANDS IT COULD DESTROY THE WORLD. *LET'S MAKE IT WORK FOR PEACE.*

KNOW THE *Weather*



CLOUDS CAN TELL YOU WHEN TO FLY. CLOUDS ARE NOT THE CAUSE OF WEATHER. CLOUDS ARE SIGNPOSTS OF WEATHER BECAUSE THEIR SHAPES ARE THE RESULT OF THE CHANGES IN THE AIR-MASSSES. A PILOT WHO KNOWS THE MEANING OF CLOUDS CAN TELL WHETHER TO FLY OR STAY ON THE GROUND.

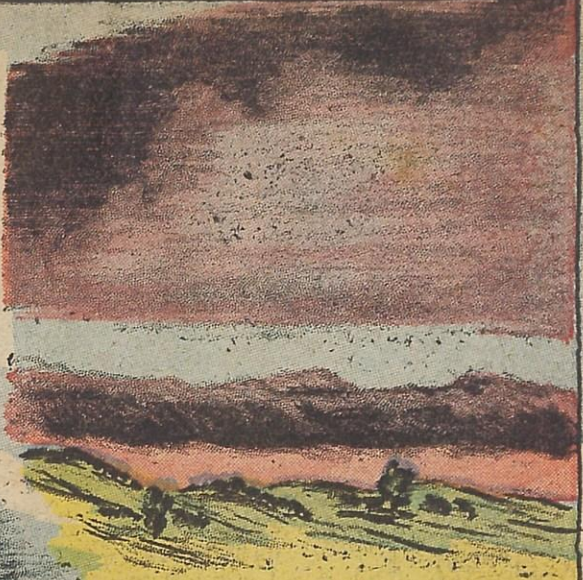


IN STUDYING CLOUDS YOU SHOULD BE FAMILIAR WITH THE TERMS USED FOR THEIR VARIOUS FORMS, LUMPY OR BILLOWING CLOUDS ARE DESIGNATED CUMULUS (LEFT). THEY INDICATE MOVEMENT WITHIN. IF THEY ARE NOT MOVING TOO RAPIDLY IT IS GOOD FLYING WEATHER IN THE AIR AROUND THEM.


ALL ICY AND FIBROUS CLOUDS ARE DESIGNATED CIRRUS. CIRRUS ARE THE HIGHEST AND THINNEST OF ALL CLOUD FORMATIONS AND ARE USUALLY SEEN VERY HIGH IN A CLEAR BLUE SKY. THEY NORMALLY INDICATE GOOD FLYING WEATHER.

FRACTOCUMULUS CLOUDS ARE RAGGED BAD WEATHER CLOUDS. THEY ARE LADEN WITH MOISTURE THAT HAS NOT YET TURNED TO RAIN. THIS MAKES THE SKIES MISTY AND THE VISIBILITY IS POOR, NOT VERY GOOD FOR FLYING.


NIMBOSTRATUS OR RAIN CLOUDS ARE DARK GRAY, IRREGULAR IN SHAPE, AND DISTINGUISHED BY A HEAVY PRECIPITATION. THIS PRECIPITATION IS WHAT WE CALL RAIN. THIS CLOUD INDICATES THAT A COLD FRONT IS APPROACHING. THIS MEANS LOW CEILING, POOR VISIBILITY, AND BAD FLYING WEATHER.



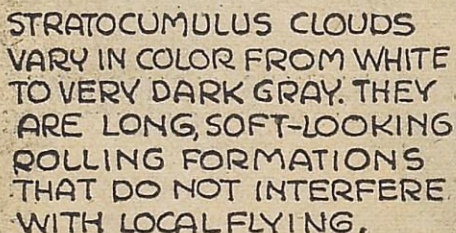
ALTOCUMULUS CLOUDS ARE GENERALLY SEEN JUST BEFORE OR AFTER CHANGING WEATHER. THE AIR AROUND THEM IS CALM AND SMOOTH. THIS GOOD FLYING WEATHER. THIS TYPE OF CLOUD FORMATION IS KNOWN AS A "MACKEREL SKY."




CUMULONIMBUS CLOUDS, THAT BUILD UP HIGH IN THE SKIES, FORETELL OF AN APPROACHING THUNDERSTORM. THEY INDICATE TURBULENT AIR AND VERY DANGEROUS FLYING WEATHER. STRONG CURRENTS OF AIR LURK ALONG THE BASE OF THE CLOUDS.



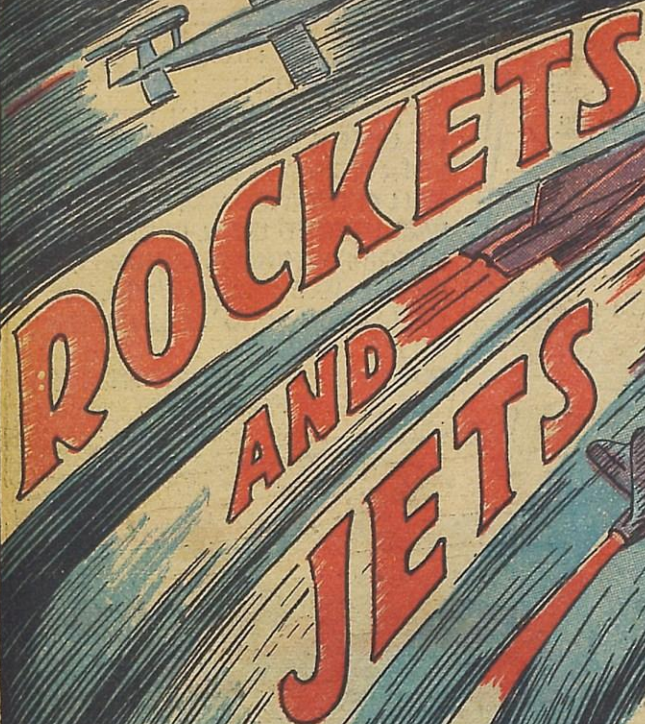
ALTOSTRATUS FORMATIONS ARE MADE UP OF SMALL DROPLETS OF WATER. THESE CLOUDS ACCOMPANY COLD FRONTS AND PRECIPITATION IS CONTINUOUS. SMALL, DARK PATCHES OF CLOUDS THAT ACCOMPANY THIS FORMATION ARE CALLED "SCUD" THIS IS NOT GOOD FLYING WEATHER.



STRATOCUMULUS CLOUDS VARY IN COLOR FROM WHITE TO VERY DARK GRAY. THEY ARE LONG, SOFT-LOOKING ROLLING FORMATIONS THAT DO NOT INTERFERE WITH LOCAL FLYING.



WHEN CUMULONIMBUS CLOUDS RISE BLACK AND HIGH IN A SUMMER STORM, THEY ARE CALLED "THUNDERHEADS." AIR CURRENTS IN THEM REACH A VELOCITY OF 300 MILES AN HOUR AND PILOTS MUST AVOID THEM AT ALL TIMES.



ROCKETS AND JETS

JET PROPULSION, ALTHOUGH IT PRODUCES THE SAME RESULT, IS TOO OFTEN CONFUSED WITH ROCKET PROPULSION. THE NAZI "BUZZ BOMBS" WERE NOT TRUE ROCKETS. THEY WERE REALLY JET-DRIVEN GLIDERS POWERED BY GASOLINE, WHICH WAS BURNED TO CREATE THE GAS EXPANSION THAT PUSHED THEM THROUGH THE AIR AT HIGH SPEED. THE MAIN DIFFERENCE BETWEEN ROCKETS AND JETS IS THAT A ROCKET CAN CARRY BOTH FUEL AND THE OXYGEN NEEDED TO BURN IT, WHILE THE JET MUST GET OXYGEN FROM THE AIR AS IT FLIES. BOTH ARE LIMITED IN RANGE TODAY BECAUSE THEIR LIMITED FUEL CAPACITY.





HERO, OF ANCIENT GREECE DISCOVERED THE SECRET OF JET PROPULSION IN 130 B.C. HE USED A ROUND METAL BALL WITH JETS ON EITHER SIDE. THE BALL CONTAINED WATER WHICH WAS HEATED UNTIL IT BECAME STEAM. THE STEAM RUSHING OUT OF THE JETS WOULD WHIRL THE BALL 'ROUND AND 'ROUND. TODAY GASES INSTEAD OF STEAM RUSH OUT FROM JET ENGINES AND PUSH JET PLANE FORWARD.

IT IS BELIEVED THAT THE CHINESE FIRST USED ROCKETS IN THEIR WARS AGAINST THE MONGOLS IN 1232 A.D. GUNPOWDER IN A CONTAINERS WAS ATTACHED TO THE SHAFT OF A SPEAR. WHEN THE GUNPOWDER EXPLODED THE HEAT RUSHED OUT OF THE REAR OF THE CONTAINER, AND THE OPPOSITE REACTION HURLED THE SPEAR THROUGH THE AIR

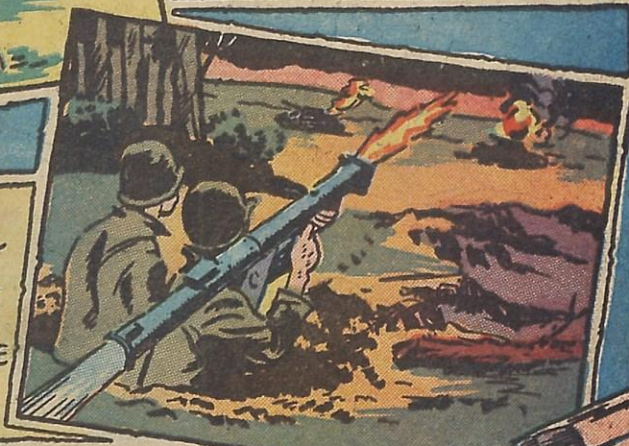


THE PHRASE IN OUR NATIONAL ANTHEM "THE ROCKET'S RED GLARE," INDICATE THAT ROCKETS WERE USED BY THE BRITISH IN THEIR UNSUCCESSFUL ATTACK ON FORT McHENRY DURING THE WAR OF 1812 THE ROCKETS WERE PROBABLY USED TO TRY TO START FIRES AND WERE NOT EXPLOSIVE MISSILES LIKE OUR MODERN ROCKETS.

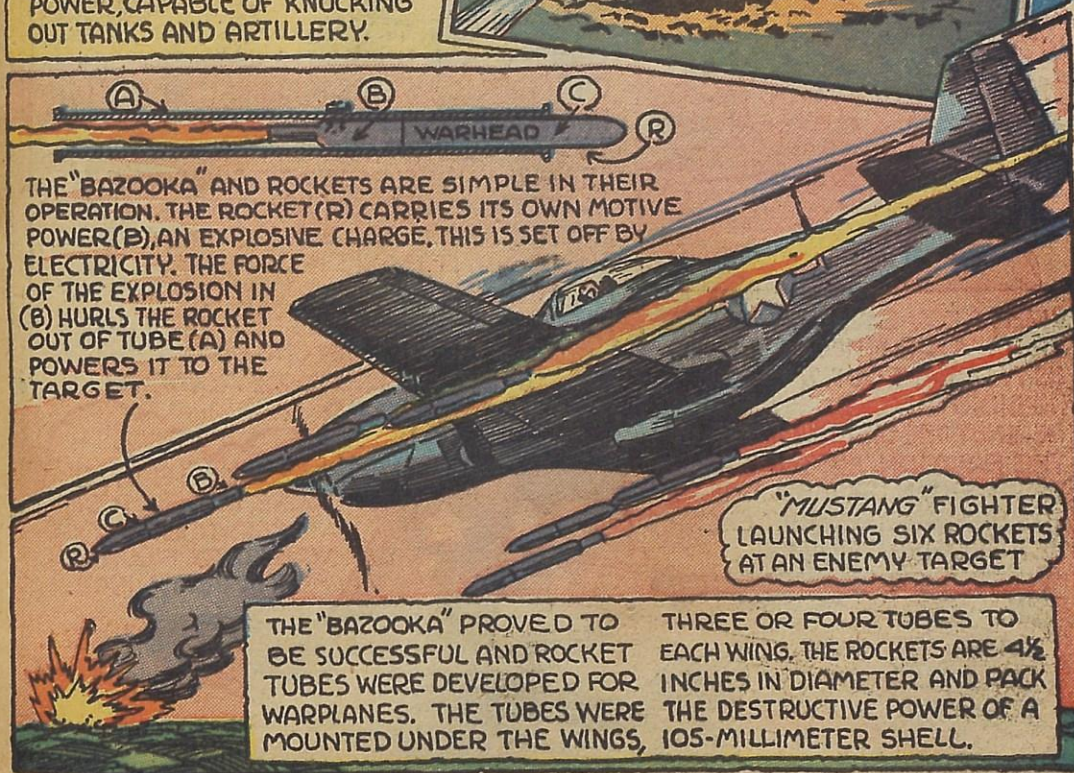


ROCKETS WERE ALMOST FORGOTTEN FOR MORE-THAN 100 YEARS. ABOUT THEIR ONLY USE WAS IN FIREWORKS DISPLAYS ON THE 4TH OF JULY. NO ONE GAVE THEM MUCH THOUGHT AS WAR WEAPONS. ROCKET WERE MAINLY USED AS SIGNALS BY SHIPS AT SEA.

IT WAS NOT UNTIL 1943, THAT ROCKETS CAME INTO PRACTICAL USE AS WAR WEAPONS. ROCKET GUNS, CALLED "BAZOOKAS," WERE DEVELOPED. THEY PROVED TO BE WEAPONS OF GREAT DESTRUCTIVE POWER, CAPABLE OF KNOCKING OUT TANKS AND ARTILLERY.



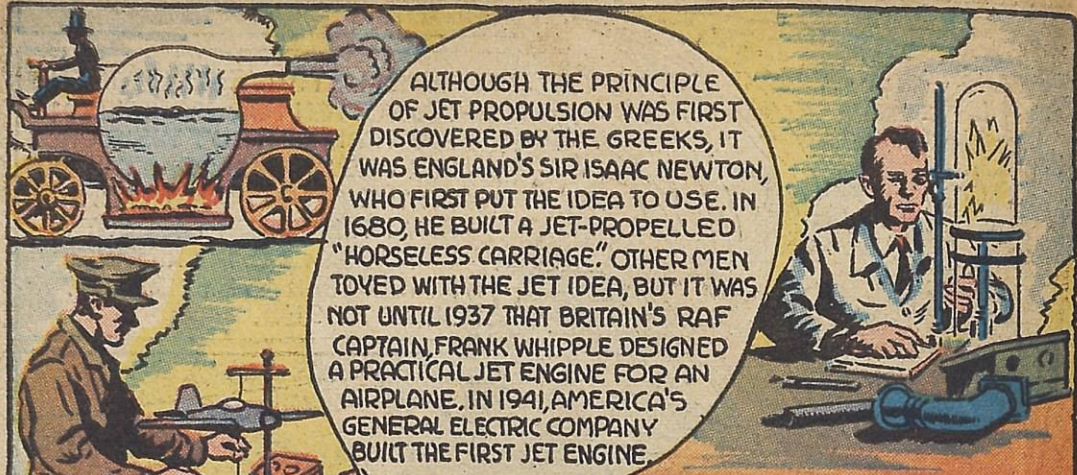
THE "BAZOOKA" AND ROCKETS ARE SIMPLE IN THEIR OPERATION. THE ROCKET (R) CARRIES ITS OWN MOTIVE POWER (B), AN EXPLOSIVE CHARGE. THIS IS SET OFF BY ELECTRICITY. THE FORCE OF THE EXPLOSION IN (B) HURLS THE ROCKET OUT OF TUBE (A) AND POWERS IT TO THE TARGET.



"MUSTANG" FIGHTER LAUNCHING SIX ROCKETS AT AN ENEMY TARGET

THE "BAZOOKA" PROVED TO BE SUCCESSFUL AND ROCKET TUBES WERE DEVELOPED FOR WARPLANES. THE TUBES WERE MOUNTED UNDER THE WINGS,

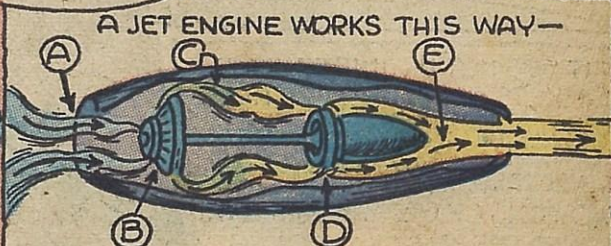
THREE OR FOUR TUBES TO EACH WING. THE ROCKETS ARE 4½ INCHES IN DIAMETER AND PACK THE DESTRUCTIVE POWER OF A 105-MILLIMETER SHELL.



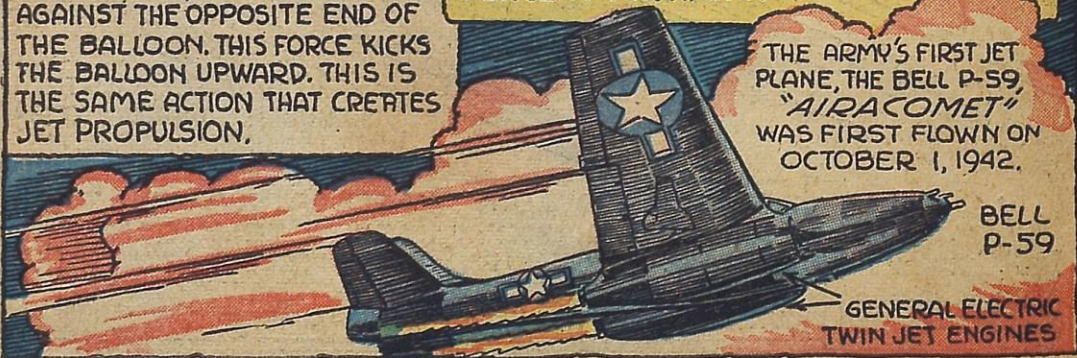
ALTHOUGH THE PRINCIPLE OF JET PROPULSION WAS FIRST DISCOVERED BY THE GREEKS, IT WAS ENGLAND'S SIR ISAAC NEWTON, WHO FIRST PUT THE IDEA TO USE. IN 1680, HE BUILT A JET-PROPELLED "HORSELESS CARRIAGE." OTHER MEN TOYED WITH THE JET IDEA, BUT IT WAS NOT UNTIL 1937 THAT BRITAIN'S RAF CAPTAIN, FRANK WHIPPLE DESIGNED A PRACTICAL JET ENGINE FOR AN AIRPLANE. IN 1941, AMERICA'S GENERAL ELECTRIC COMPANY BUILT THE FIRST JET ENGINE.



WHEN A TOY BALLOON SLIPS FROM YOUR FINGERS THE AIR IN IT RUSHES OUT. THIS AIR RUSHING OUT, CREATES A FORCE AGAINST THE OPPOSITE END OF THE BALLOON. THIS FORCE KICKS THE BALLOON UPWARD. THIS IS THE SAME ACTION THAT CREATES JET PROPULSION.



A JET ENGINE WORKS THIS WAY—
AIR FLOWS FROM (A) THROUGH THE COMPRESSOR (B) INTO COMBUSTION CHAMBER (C), WHERE IT IS HEATED AND EXPANDED BY BURNING FUEL (KEROSENE). THE HOT GAS EXPANDS GREATLY AND MUST GET OUT. IT IS RELEASED THROUGH NOZZLE (E). AS THE GAS RUSHES OUT BEHIND IT KICKS BACK LIKE THE RECOIL OF A GUN AGAINST YOUR SHOULDER. IT IS THIS KICK AGAINST THE FRONT OF THE CHAMBER THAT CREATES THE FORCE THAT DRIVES THE JET AIRPLANE THROUGH THE SKY. *THE GAS DOES NOT PUSH AGAINST THE AIR BEHIND THE PLANE TO FORCE IT FORWARD.*

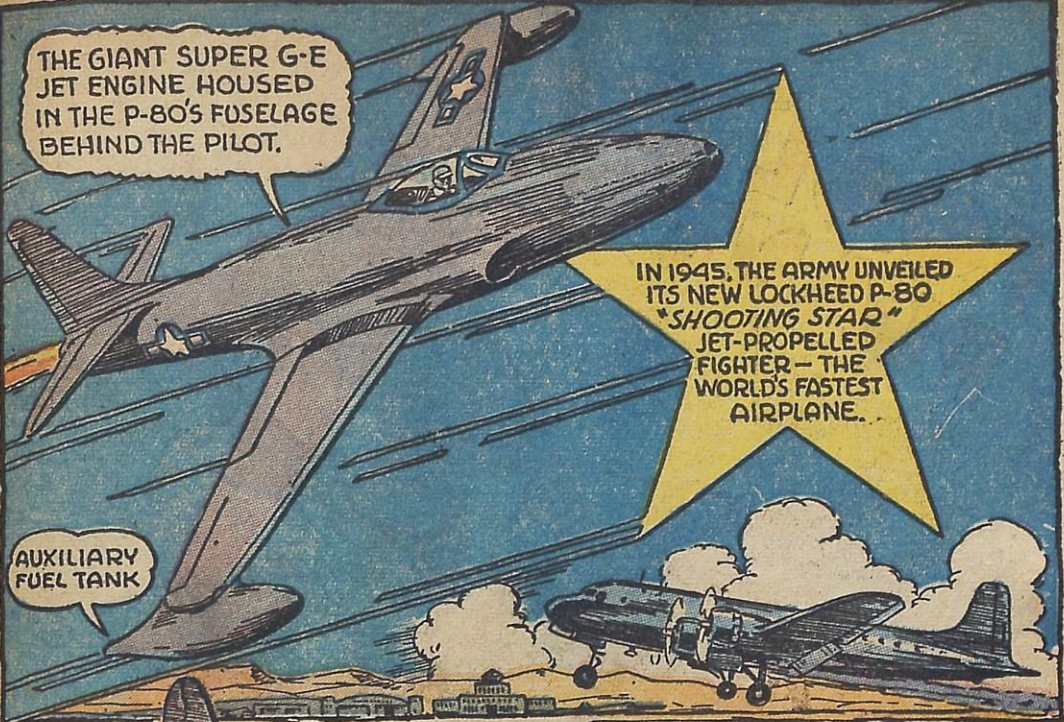


THE ARMY'S FIRST JET PLANE, THE BELL P-59, "AIRCOMET" WAS FIRST FLOWN ON OCTOBER 1, 1942.

BELL
P-59

GENERAL ELECTRIC
TWIN JET ENGINES

THE GIANT SUPER G-E JET ENGINE HOUSED IN THE P-80'S FUSELAGE BEHIND THE PILOT.



IN 1945, THE ARMY UNVEILED ITS NEW LOCKHEED P-80 "SHOOTING STAR" JET-PROPELLED FIGHTER - THE WORLD'S FASTEST AIRPLANE.

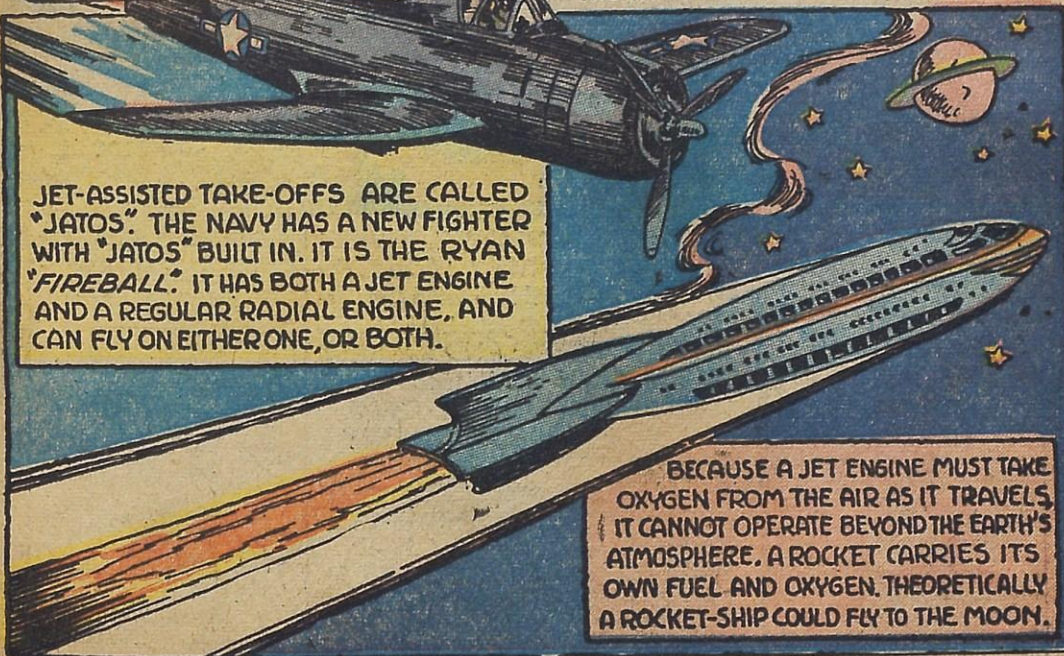
AUXILIARY FUEL TANK



JET NOZZLE

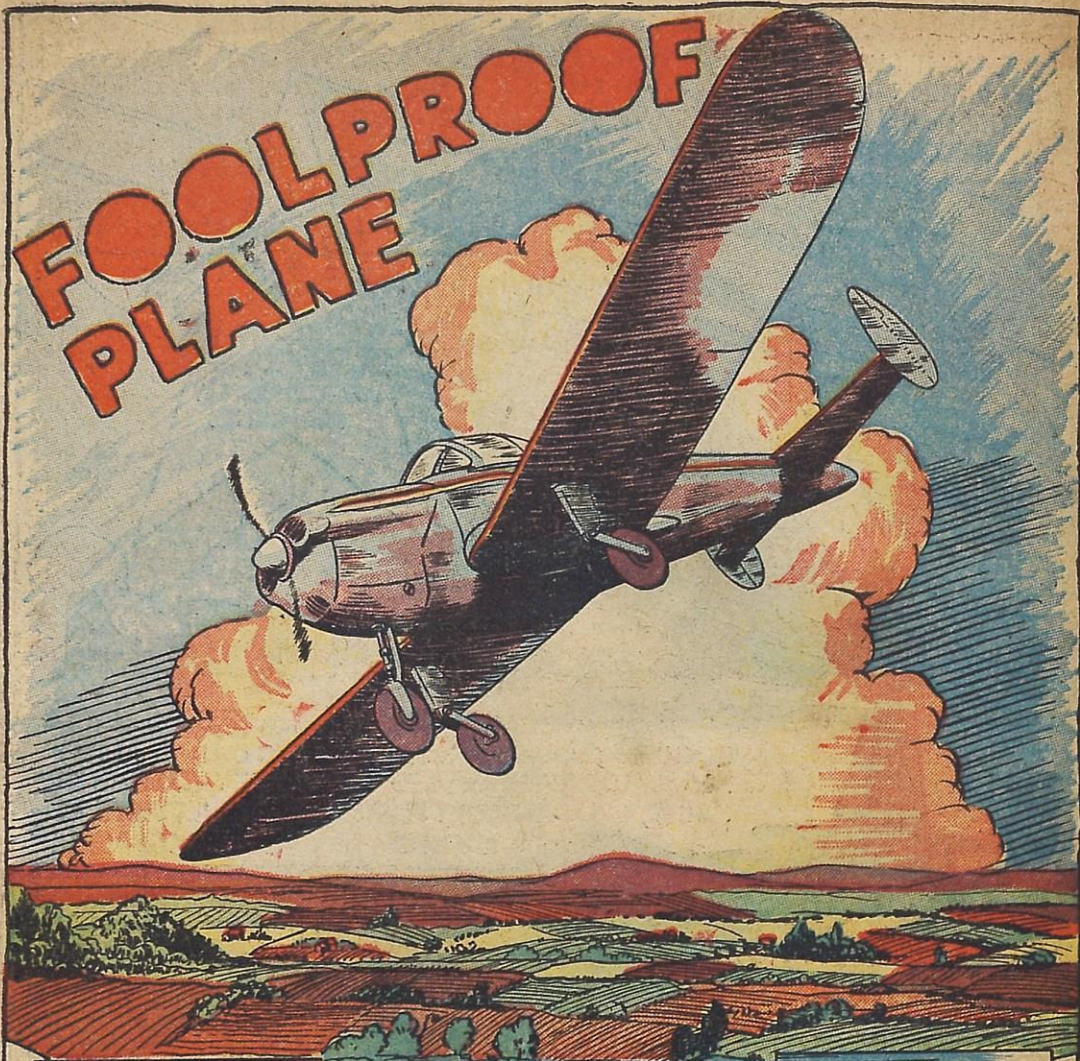
ROCKETS AND JETS HAVE BOTH BEEN USED TO ASSIST HEAVILY LOADED PLANES TO GET OFF THE GROUND. IN THE FUTURE, BIG TRANSPORT PLANES WILL USE JET UNITS TO AID IN GETTING INTO THE AIR QUICKLY

JET-ASSISTED TAKE-OFFS ARE CALLED "JATOS." THE NAVY HAS A NEW FIGHTER WITH "JATOS" BUILT IN. IT IS THE RYAN "FIREBALL." IT HAS BOTH A JET ENGINE AND A REGULAR RADIAL ENGINE, AND CAN FLY ON EITHER ONE, OR BOTH.



BECAUSE A JET ENGINE MUST TAKE OXYGEN FROM THE AIR AS IT TRAVELS, IT CANNOT OPERATE BEYOND THE EARTH'S ATMOSPHERE. A ROCKET CARRIES ITS OWN FUEL AND OXYGEN. THEORETICALLY A ROCKET-SHIP COULD FLY TO THE MOON.

FOOLPROOF PLANE

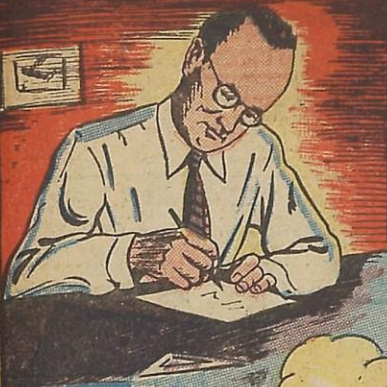


SPIN

THE DEVELOPMENT OF THE SIMPLIFIED CONTROL SYSTEM FOR LIGHT PLANES HAS MADE IT POSSIBLE TO BUILD PLANES THAT ARE SAFER AND EASIER TO FLY. MANY WOULD-BE FLIERS HAVE HAD DIFFICULTY IN COORDINATING THE MOVEMENT OF BOTH HANDS AND FEET ON THE CONTROLS. ONLY THE HANDS ARE USED IN THE SIMPLIFIED CONTROL PLANE. IT WILL NOT STALL OR SPIN; THIS ELIMINATES TWO OF FLYING'S GREATEST HAZARDS FOR BEGINNERS.



STALL

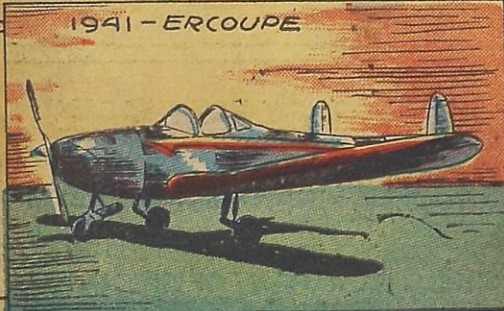


ABOUT FIFTEEN YEARS AGO A YOUNG ENGINEER OF THE NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS IN WASHINGTON, D.C., DREW UP PLANS FOR WHAT HE THOUGHT WOULD BE AN IDEAL LIGHT PLANE. TO TEST HIS IDEAS, HE BUILT AN EXPERIMENTAL PLANE. THE ENGINEER WAS FRED WEICK, AND THE PLANE THAT HE AND HIS FELLOW ENGINEERS BUILT IN THEIR SPARE TIME, IN WEICK'S GARAGE, WAS THE WEICK W-1. ALTHOUGH THE FIRST PLANE DID NOT FILL ALL OF WEICK'S DESIRES, IT DID PERFORM VERY WELL.



THE WEICK W-1


THE W-1, FLOWN IN 1934, WAS THE FIRST PLANE TO USE THE TWO-CONTROL SYSTEM.



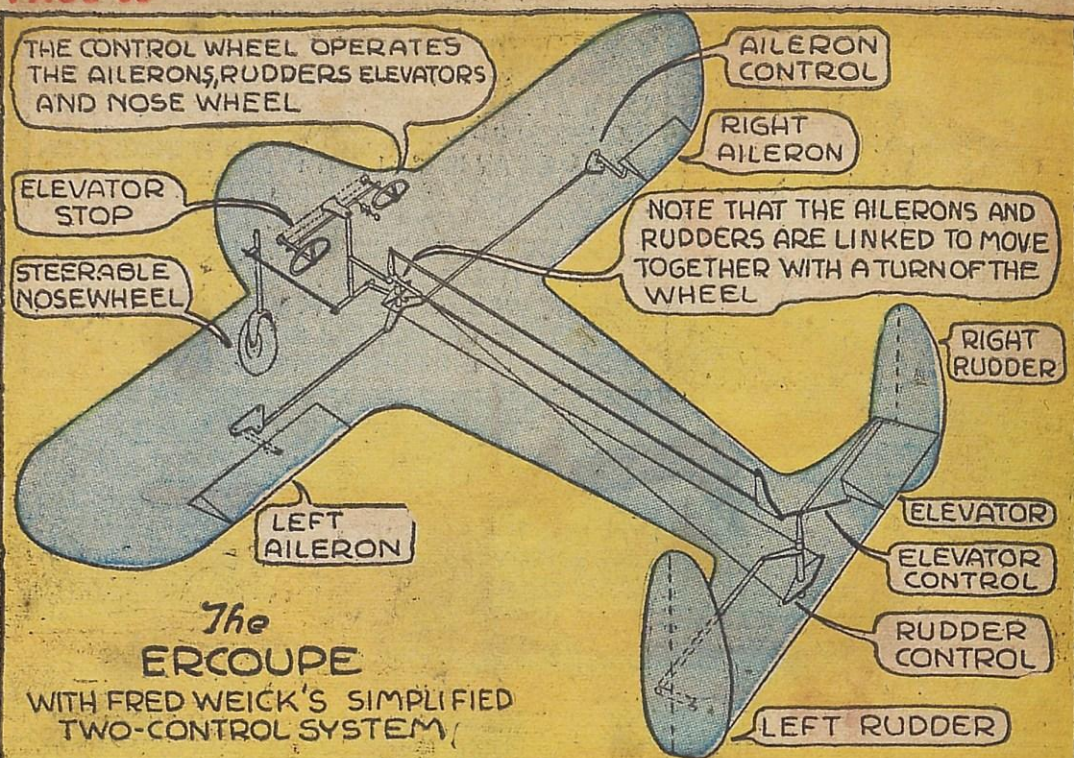
1941 - ERCOUPE

WEICK'S PLANE SHOWED SO MANY GOOD POINTS THAT HIS FRIEND HENRY BERLINER PERSUADED HIM TO LEAVE NACA AND BUILD THE TWO-CONTROL, SPIN-PROOF AND STALL-PROOF *ERCOUPE*. THIS SHIP CREATED A SENSATION IN THE LIGHT PLANE FIELD, AND ITS SUCCESS WAS ASSURED FROM THE START.

BECAUSE IT IS SO SAFE AND EASY TO FLY, THE *ERCOUPE* IS AN IDEAL PERSONAL PLANE.



A BEGINNER CAN LEARN TO FLY AN *ERCOUPE* IN ONE-THIRD LESS TIME THAN IT TAKES IN CONVENTIONAL PLANES.



The ERCOUCPE

WITH FRED WEICK'S SIMPLIFIED
TWO-CONTROL SYSTEM

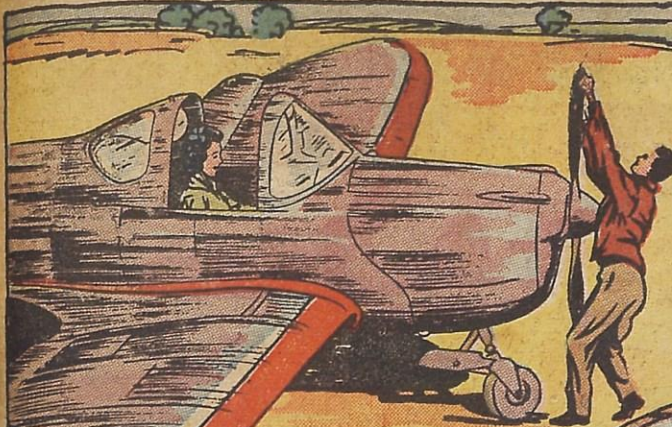


ROOMY ERCOUCPE CABIN

AS THE CONTROLS ARE ALL ON THE WHEEL, WHICH IS MOUNTED ON THE STICK UNDER THE INSTRUMENT PANEL, THERE ARE NO FOOT PEDALS. THIS MAKES A ROOMY INTERIOR.

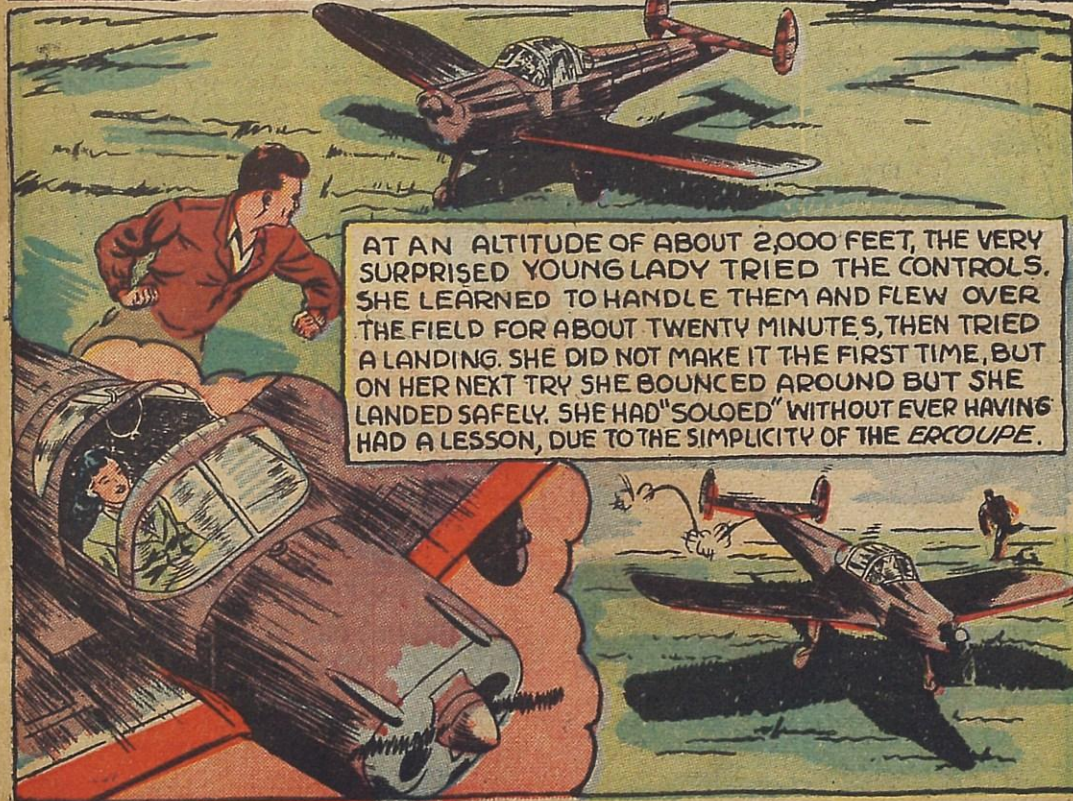
THE *ERCOUCPE* HAS THE SAME CONTROL SURFACES AS ORDINARY AIRCRAFT, BUT ITS TWIN RUDDERS AND AILERONS, WHICH TOGETHER CONTROL STEERING AND BANKING, ARE LINKED AND OPERATED BY A SINGLE MOVEMENT OF THE HAND WHEEL. THE TWO SURFACES ARE SO CONSTRUCTED THAT IT IS NOT POSSIBLE TO USE TOO MUCH OR TOO LITTLE AILERON OR RUDDER AND CAUSE THE PLANE TO SPIN OR SKID. BECAUSE THE CONTROLS ARE COORDINATED BY ONE MOVEMENT OF THE HAND THERE NO REASON FOR A PILOT TO BECOME CONFUSED AN OVER CONTROL WITH HANDS OR FEET AND CAUSE THE PLANE TO GET OUT OF CONTROL.

THE *ERCOUCPE* WILL NOT STALL BECAUSE THE ELEVATOR CONTROL IS EQUIPPED WITH A "STOP" THAT PREVENTS A PILOT FROM NOSING THE PLANE UP BEYOND ITS MAXIMUM CLIMBING ANGLE.



THE PROOF OF THE EASE WITH WHICH THE *ERCOUPE* CAN BE FLOWN IS GIVEN IN A TRUE EPISODE AT A MIDWEST FLYING FIELD. A YOUNG LADY WHO HAD RIDDEN WITH HER HUSBAND, BUT HAD NEVER HANDLED THE CONTROLS OF AN AIRPLANE, SUDDENLY FOUND HERSELF FLYING ALONE IN AN *ERCOUPE*

THE PLANE HAD TAKEN OFF BY ITSELF BY ACCIDENT. THE YOUNG LADY HAD OPENED THE THROTTLE BY MISTAKE WHEN HER HUSBAND ASKED HER TO CLOSE IT, BEFORE SHE KNEW IT THE PLANE STARTED DOWN THE FIELD ON ITS TRICYCLE LANDING GEAR AND TOOK TO THE AIR.



AT AN ALTITUDE OF ABOUT 2,000 FEET, THE VERY SURPRISED YOUNG LADY TRIED THE CONTROLS. SHE LEARNED TO HANDLE THEM AND FLEW OVER THE FIELD FOR ABOUT TWENTY MINUTES, THEN TRIED A LANDING. SHE DID NOT MAKE IT THE FIRST TIME, BUT ON HER NEXT TRY SHE BOUNCED AROUND BUT SHE LANDED SAFELY. SHE HAD "SOLOED" WITHOUT EVER HAVING HAD A LESSON, DUE TO THE SIMPLICITY OF THE *ERCOUPE*.

SKETCHBOOK
of
AMERICAN
AVIATION
1903
TO
1946
by
Jim Hay

Jim Hay's SKETCHBOOK



The Wright Brothers' first kite-like glider 1900



After they had tested many types of wings with kites, the Wrights built man-carrying gliders and flew them during 1901 and 1902.



YOUR EDITOR HAS BEEN AN AVIATION FAN FOR ALMOST FORTY YEARS. I LIVED NOT MANY MILES FROM THE HOME OF THE WRIGHT BROTHERS AND THE BIRTHPLACE OF THE AIRPLANE AT DAYTON, OHIO. THIS LITTLE SKETCHBOOK CONTAINS DRAWINGS AND NOTES ON AVIATION BASED ON MY CONTACTS WITH FLYING AND AERONAUTICS FROM THEIR EARLIEST DAYS TO THIS MODERN AGE OF FLIGHT

Jim Hay

The first flight lasted 3½ seconds and the airplane flew 105 feet.



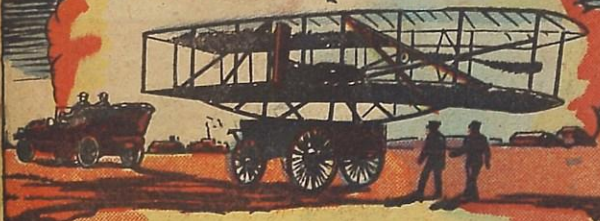
THE FIRST FLIGHT - 1903
THE AIR-AGE REALLY BEGAN ON THE SAND DUNES AT KITTY HAWK, NORTH CAROLINA, ON DECEMBER 17, 1903. ON THIS DAY THE WRIGHT BROTHERS MADE THE FIRST FLIGHTS IN A MAN-CARRYING, POWERED PLANE.

The U.S. Army bought its first airplane in 1909, after a Wright biplane passed the tests by staying in the air for over one hour and flying over forty miles.



In the Army speed tests the Wright plane flew ten miles at the rate of 43 miles per hour.

The Wright Army airplane was 28 feet long and had a wingspan of 36 feet, four inches.



Army specifications called for an airplane that could be carried on a standard Army wagon.

The first Wright airplanes were launched from a catapult-monorail. The airplane rode on a small car that ran on a rail. A weight, attached to the car by cable, was dropped from a tower. Its weight pulled the car forward rapidly on the rail and launched the airplane.



monorail



car

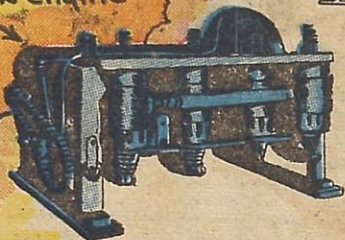
cable

MOST PEOPLE WERE SKEPTICAL ABOUT THE STORY OF THE FIRST FLIGHTS OF THE WRIGHT BROTHERS AIRPLANE IN 1903. AND EVEN WHEN THEY OFFERED TO BUILD A PLANE FOR THE ARMY IN 1905, THE WRIGHT BROTHERS WERE TURNED DOWN. HOWEVER, THEY CONTINUED TO FLY THEIR FIRST PLANE. AFTER MANY FLIGHTS IN IT, THEY BUILT A NEW AND IMPROVED AIRPLANE. IT WAS NOT UNTIL PRESIDENT THEODORE ROOSEVELT TOOK AN INTEREST IN THE WRIGHTS' PLANE THAT THE U.S. ARMY ARRANGED TO TEST AN AIRPLANE. THE TESTS WERE HELD IN 1908 AND 1909, AND THE ARMY FINALLY BOUGHT ITS FIRST AIRPLANE, A WRIGHT BIPLANE ON AUGUST 1, 1909.

The Wright Brothers built their own engine for their first plane. It was a four-cylinder, twelve-horsepower gasoline engine



The Wright Army plane was powered with a four-cylinder, vertical, in-line thirty-horsepower engine, designed and built by the Wright Brothers



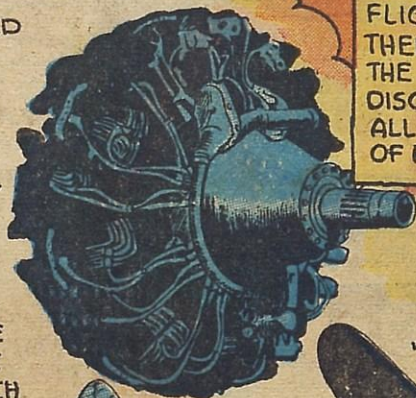
THE HOME-BUILT ENGINE USED IN THE FIRST WRIGHT BROTHERS' PLANE.

MANY PEOPLE THINK OF THE FIRST WRIGHT AIRPLANE AS A CLUMSY CRATE MADE OF STICKS, CLOTH, AND WIRE. ALTHOUGH IT WAS BUILT OF WOOD, CLOTH, AND WIRE, IT WAS SOUNDLY CONSTRUCTED AFTER YEARS OF STUDY OF THE PROBLEMS OF FLIGHT. IN BUILDING THEIR FIRST AIRPLANES THE WRIGHT BROTHERS DISCOVERED AND SOLVED ALL THE BASIC PROBLEMS OF POWERED FLIGHT.



8,800-HORSEPOWERED BOEING "STRATOCRUISER"

A MODERN 1945 RADIAL AIRPLANE ENGINE, THE 2,200-HORSEPOWER, 18-CYLINDER WRIGHT "CYCLONE" AIR-COOLED AIRPLANE ENGINE.



THE "STRATOCRUISER," THE "CONSTELLATION," AND THE "SUPERFORTRESS" ARE EACH POWERED WITH FOUR 2,200-HP. "CYCLONES."

8,800-HORSEPOWERED LOCKHEED "CONSTELLATION"



THERE IS A GREAT DIFFERENCE BETWEEN THE 12-HORSEPOWER ENGINE USED IN THE FIRST WRIGHT BROTHERS' AIRPLANE AND THE MODERN 2,200-HORSEPOWER AIRPLANE ENGINE. THE GREATEST PROBLEM IN AIRPLANE DESIGN HAS ALWAYS BEEN TO REDUCE THE WEIGHT OF ITS ENGINES AND TO INCREASE THEIR POWER. THE FIRST WRIGHT BROTHERS ENGINE WEIGHED 12 POUNDS PER HORSEPOWER, DESIGNERS AND SCIENCE HAVE GIVEN US 2,000- AND 3,000-HORSEPOWER ENGINES TODAY THAT WEIGH ONLY ONE POUND PER HORSEPOWER.

A MODERN 65-HP LIGHT PLANE ENGINE



JUST AS AIRPLANE ENGINES HAVE IMPROVED TREMENDOUSLY IN THE YEARS SINCE THE FIRST FLIGHT OF THE WRIGHT BROTHERS, SO HAVE OUR FIGHTING PLANES SINCE WORLD WAR I. COMPARE THE SHIPS FLOWN BY CAPTAIN RICKENBACKER IN WORLD WAR I, WITH THE POWERFUL SHIPS OF WORLD WAR II.



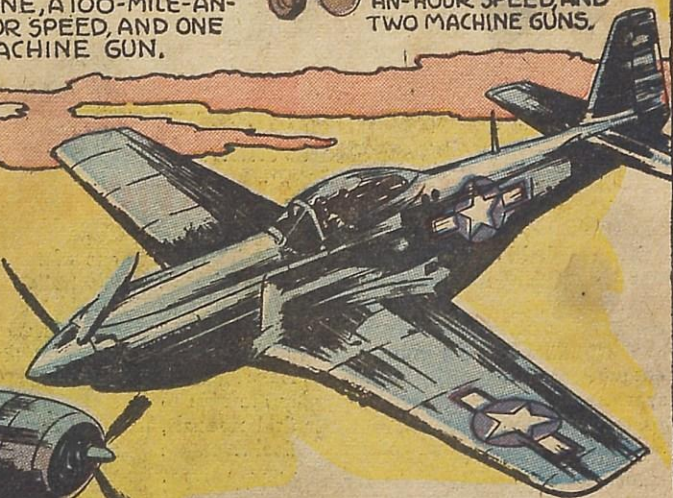
1917 NIEUPORT, WITH A 130-HP ROTARY ENGINE, A 100-MILE-AN-HOUR SPEED, AND ONE MACHINE GUN.



1917-18 SPAD, WITH A 200-HP ENGINE, A 135-MILE-AN-HOUR SPEED, AND TWO MACHINE GUNS.



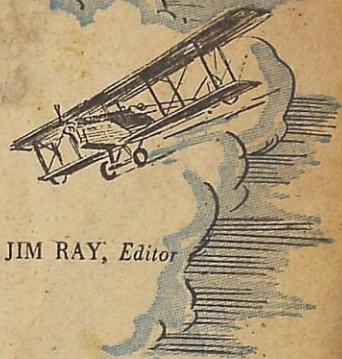
WORLD WAR II, REPUBLIC "THUNDERBOLT" 450-MILE-AN-HOUR FIGHTER ARMED WITH EIGHT MACHINE GUNS, SIX ROCKETS, AND A 1,000-POUND BOMB. IT IS POWERED WITH A 2,000-HP. RADIAL ENGINE.



WORLD WAR II, NORTH AMERICAN "MUSTANG", 450-MILE-AN-HOUR FIGHTER ARMED WITH SIX MACHINE GUNS, EIGHT ROCKETS OR BOMBS. THE "MUSTANG" IS POWERED WITH A 1,520-HP. ALLISON LIQUID-COOLED, V-TYPE ENGINE. THE FIGHTERS CARRY THE DESTRUCTIVE POWER OF A BATTERY OF WORLD WAR I ARTILLERY.



JUST AS THE WAR WAS ENDING, A NEW 500+ MILES PER HOUR FIGHTER WAS READY FOR ACTION - THE JET-PROPELLED LOCKHEED P-80 "SHOOTING STAR."



JIM RAY, Editor

Behind the Scenes of
JIM RAY'S AVIATION SKETCHBOOK

Before World War I (and even during it) there was no standard method of imparting the slightest technical information to the would-be flyers of that day. Of course, now and in World War II, thanks to the foresight of the present leaders who carried out the hope of Gen. Billy Mitchell, to make America supreme in the air, the flyers of today are able to go to classrooms supplied with technical manuals, informative, supplemental and aeronautical literature

Men such as General of the Armies, H. H. Arnold; Lt. Gen. Harold George, Chief of the Army Transport Command; Generals Carl Spaatz, Ira Eaker, Jimmy Doolittle and George Kenny; found the men of their commands learned quickly from illustrated manuals. In future issues of this Sketchbook we hope to bring you personal messages from them all as we brought you Capt. Eddie Rickenbacker in this issue and General Arnold in the next.

JIM RAY'S AVIATION SKETCHBOOK uses the authoritative government visual training course methods, but even more important to the youth of America, is the ability of our Editor to translate into simple picture and text forms the highly technical branches of commercial and military aviation so that the future flyers of America may learn quickly and easily the rudiments of air and ground work.

This present book saw the light of day almost a year before publication when Jim Ray and the undersigned (both veteran flyers) worked together with the same goal in sight, a magazine in vivid colors so crammed with authoritative air information that any boy or girl or man or woman who had any interest in flying, would be glad to read and study. This book is the result of these talks.

The combined flying experiences of both your Editor and Publisher total sixty-seven years. Jim Ray has flown practically every type of plane from

one of the first Wright pushers back in 1911 (see illustration upper left), the old Curtiss Jennys (JN 4), World War I Spads and Nieuports on into the modern planes of this air age. He has seen active service with both the American and the French Air Services, and is a member of the National Aeronautical Association, which puts him in daily contact with the leaders of American aviation. This book contains material that only someone in constant daily touch with aviation over the last three decades could know. Flying contemporary of Capt. Rickenbacker, friend of the great and near great in aviation, Jim Ray knows his subject and those interested in this subject know Jim Ray.

Your Publisher will say little about himself because this is Jim Ray's book, but he is the only surviving pilot of the original American Aces Flying Circus, Eddie Stinson's barnstorming outfit which brought flying to the hinterlands when an airplane going overhead meant work stoppage in towns and even big cities. He also was a partner of Mr. Stinson when he designed his first plane, as an old flyer, and as an instructor in aviation, he knows that whatever is in this book is right.

Besides the newest and best in aviation, we will bring you stirring, truthful tales of the past interleaved with memories of those whose motors are stilled forever, whose wings are quiet and who no more will hear slip streams whistle past their ears. This is your magazine for we know you are the future of America in the air and on the ground.

To whoever you are and wherever you are, we wish "Happy Landings".

Julian J. Proshauer
 Publisher.

JIM RAY'S
Aviation
SKETCHBOOK

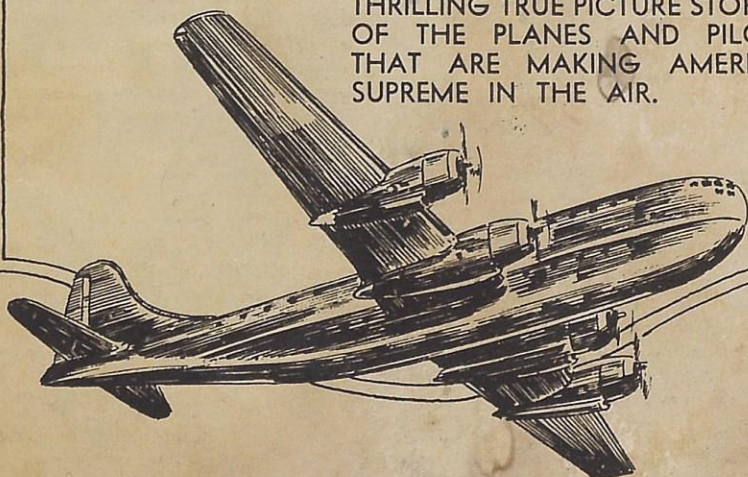
PICTURE STORIES OF PLANES AND PILOTS

**IN THE NEXT ISSUE
THE STORY OF
GENERAL "HAP" ARNOLD
AND THE
U. S. ARMY
AIR FORCES**



WITH
A MESSAGE FROM GENERAL ARNOLD TO YOU
IN THE NEXT ISSUE JIM RAY BRINGS YOU 64 PAGES
OF THRILLING TRUE AIR STORIES INCLUDING:
GHOST PLANE — FLYING FARMERS — FLYING
TRAPEZE FOR AIRPLANES — TWIN FUSELAGE
FIGHTER — MOTORCYCLE OF THE AIR — STRATO-
VISION — THE "STRATOCRUISER", GIANT AIRLINER
— STRANGE HAPPENINGS IN WAR IN THE AIR

THRILLING TRUE PICTURE STORIES
OF THE PLANES AND PILOTS
THAT ARE MAKING AMERICA
SUPREME IN THE AIR.



JIM RAY'S

Aeriation



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SKETCHBOOK

PICTURE STORIES OF PLANES AND PILOTS

FOOLPROOF PLANE



THE
AIRPLANE
THAT WILL NOT
STALL
OR
SPIN

LEARN HOW EASY
IT IS TO FLY
TWO - CONTROL
ERCOUPE