WINGED WORLD

THE COMING OF THE AIR AGE

By

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"OUR FIRST AIRWAYS"
"THE ROMANCE OF THE FLYING MAIL" and
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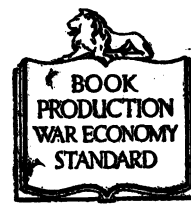

THIS BOOK IS PRODUCED IN COMPLETE CONFORMITY
WITH THE AUTHORISED ECONOMY STANDARDS.

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DEDICATION

To all the great pioneers of flight, wishing that more of them could have been with us, here to-day, to see the dawn of that air age which their work did so much to bring about.

H.H.

AUTHOR'S NOTE

I WANT you to put yourself in the place of the traveller I picture in these pages, setting forth on air voyages which bring him many fascinating experiences.

To paint the kind of word-picture I wanted to paint here, I have taken the liberty of putting the clock on to those coming days when we shall reap the first real fruits of the aerial conquest—days when giant jet-propelled flying-wing craft pass high above oceans in immensely rapid flight; when great multi-motored lorry-planes speed with their cargoes across the world's skywards; when neat revolving-wing air-taxis pick up and set down their fares at great air-stages rising above the heart of cities; when big aerial motor-coaches bring business folk and shoppers up to town; when new communities, served entirely by air, are being established in all sorts of remote parts of the globe; days, too, when far-seeing enthusiasts are studying the problems of interplanetary flight, and of space-ships in which, ultimately, men may fly from earth to Moon, Mars, and Venus, perhaps using atomic energy as their source of power.

It is, in fact, a word-picture of an air age in actual being that I have attempted here, making you see it all through the eyes of an ordinary traveller, and through the talks which he has with experts of all kinds.

Had I not spent a lifetime studying aviation, I should never have attempted such a task as this; and even now I am well enough aware of its shortcomings. But should it entertain you, in reading it, as much as it has entertained me, in writing it, should it convey to you something of the wonders which universal flying will bring, then I shall feel I have attained at least some measure of success.

HARRY HARPER.

Epsom, 1945.

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WINGED WORLD

I

CITIES OF THE SKY

"A REST and a little change are what you want," says your doctor.

"But not the ordinary kind of thing. Oh, no! I can prescribe something better than that now—something that will stimulate your mind as well as benefit your body."

"What will meet the case with you, my boy, is a nice little trip to one of the new ocean air-stations right out in the Atlantic. You know the things I mean—artificial islands I saw them called the other day. Several are now moored out on the sea route between Britain and North America.

"Enormous things they are. Huge landing-stage as big as any full-sized aerodrome. Fine hotel, restaurant, and all the other things to amuse you—bands, dancing, swimming-pools; even cinemas and shops."

"All out there, floating in the middle of the Atlantic. Novel surroundingss, magnificent ocean air—the whole thing something intriguingly new. That's what you want, and so run away and fix things up."

"But mightn't one of these things roll about rather uncomfortably in an Atlantic gale?" you venture to ask. "And suppose it broke from its moorings and just went drifting away?"

Your doctor shakes his head at you reprovingly.

"They're far too big, and they go down too deep into the water, to be affected by rough seas," he tells you.

"Rock steady, they are, under any conditions.

"As for any risk of breaking adrift, this just doesn't exist. Their deep-water anchorage system takes care of that."

On your way home you drop in at a West-end travel agency and emerge with a magnificent pictorial brochure bearing the alluring title of "Our New Cities of the Sky."

This tells you everything you want to know about spending a week-end, or longer if you can spare the time, right out in the healthful breezes of mid-Atlantic, enjoying all the amenities of a wonderful "island" created not by Nature but by men.

Among the things you learn is that although these ocean air-halts cater so admirably for visitors who may drop in at them casually, on health or pleasure bent, their purpose is really a very practical and serious one.

They now play, in fact, an essential part in the operation of big commercial flying machines—and also of smaller craft—to and fro across that busy route between Great Britain and the United States.

The idea, briefly, is this. Any big commercial aircraft —or any privately-owned machine for the matter of that —which sets out to fly the Atlantic non-stop, has to take aboard such a heavy petrol load that the sheer weight of this fuel militates against the amount of useful load the machine can carry in the shape, say, of passengers, mails, or cargo.

But if you anchor these floating islands here and there across the ocean route, and make them big enough for the largest air-liner to alight on, and get away from their special runways, then a machine, making a trans-ocean journey need only, on starting, take on board enough petrol to get it to the first of these intermediate stations.

Once this is reached it can fill up with enough petrol to take it on the next of the air-halts; and so on till the ocean journey is completed. Which means, more particu-

larly with big commercial machines, that their pay-load capacity is greatly increased on every flight they make.

Thus, although these artificial islands cost a lot of money to construct and operate, they pay for themselves in the long run owing to the better business aspect they put on trans-ocean flying with commercial loads.

But such somewhat prosaic details do not interest you as much as the glowing word-pictures of all the novelty, and exhilaration, of a stay out in mid-Atlantic on one of these fascinating, newly-created artificial islands.

It is only a morning or so later that you find yourself going up in the lift, in your big block of flats, to an overhead stage which has been built above the chimney-pots; and here, in response to a 'phone call from your head-porter, a little revolving-wing air-taxi comes floating down to pick you up, with your luggage, and flip across to the big main air station of the long distance trans-ocean service.

Neat and extremely handy are these London air-taxis. The pilot sits out in front in a little driving-compartment. Just behind him is a comfortable saloon for four passengers, with ample space in the rear for any luggage that may be forthcoming. Above the machine, mounted on a short metal column, are the revolving vanes which bear it aloft; while at the rear is a smaller rotating wing for stabilising purposes.

By using one or two simple controls, the driver can make his flying taxi do anything he wants it to do. It will go straight up and down, either quickly or slowly. It will move forward or backward through the air, or from side to side. He can make it sink down gently and pull up just behind a row of others at one of the big air-stations, or he can manœuvre into any quite restricted space on a rank of waiting machines.

None of these new taximen of the air would be in the least surprised if, instead of asking him to fly you to one

of the big main air-stations, or to the roof-stage of any popular restaurant or hotel, you told him you wanted to take a quick flip up to Birmingham, Manchester, or Liverpool.

It would be all in the day's work for him.

Many London business men now think nothing of darting off by air, at a moment's notice, to one or other of the big provincial cities, settling some deal there by personal discussion, and then speeding back again to their city offices in time for other interviews and the signing of their letters in the evening. After which many of them, using their own private air-cars, fly off home for dinner to some snug, pleasant retreat deep in the heart of the country.

Your little air-taxi is rock-steady as it rises from the roof-stage above your block of flats. You hear nothing more than a hum from its well-silenced engine, and a whir from the vanes which are revolving above your head. It is rather like going up in a lift.

After he has risen a short distance vertically, your air taximan inclines his revolving wings so that his machine begins to move swiftly in a horizontal direction. You notice that he keeps quite low, just skimming above roofs and chimneys.

This is in accordance with the air traffic control of London.

The authorities have profited by the fact that flying traffic need not move just on one level, as does that of land and sea. With many thousands of feet of air space available, from ground level upwards, they have ruled that certain classes of winged traffic shall move only at certain specified levels. Air-taxis and small private machines, for example, keep in the lowest zone, close to the city roofs.

A higher level is reserved for the big air-buses which cross London from north to south and east to west, bring-

ing in fares from the outlying suburbs to special central air-halts.

In the early morning and evening this fleet of machines is full of city workers. In the later morning and afternoon they are made extensive use of by shoppers from outer London and the home counties, who, in a matter of minutes, can fly in to the big West End Stores.

On the same air level as the buses fly big cargo-carrying craft, or lorry-planes, which carry urgent freight between the metropolis and a network of provincial centres. Yet another and higher zone is reserved for the fast passenger planes and air expresses which maintain rapid and frequent services to all parts of the British Isles, and to the continent as well. Here, too, at this higher level, move the swift craft of the express postal services; while higher still, in a zone of their own, are the big incoming and outgoing machines of the long-distance ocean services.

The only aircraft allowed to pass at will from zone to zone are the fast-flying planes of the aerial traffic police, while the whole above-city air system is under control from special short-wave wireless stations which are located at the main London air-ports. When, for example, a giant ocean 'plane is coming in to land, the wireless traffic control, aided by the flying police, quickly clears a special air-lane through which the big machine can move.

Each main class of winged traffic is allocated a special wireless wave-length and call signal, while individual machines can be picked out and called up, when necessary, by means of their identifying letters and numbers.

One interesting feature concerns the use of air-taxis.

Along the main and arterial roads, leading in and out of the metropolis, special strips have been cleared which are sufficiently large for helicopter machines to use for alighting or ascending.

To facilitate the general use of flying taxis, most streets are provided with a special wireless telephone call-box which is tuned-in on the wave-length allocated to the flying taximen.

Entering one of these boxes, you give the name of and special air number of your street, and say you want a taxiplane. To help the taxiplane pilots to pick out any particular street, it has not only its name, but a prominent identifying number, painted clearly on some convenient roof; and this is illuminated at night. The pilot of the nearest helicopter cruising in the neighbourhood picks up your call, and soon guides his machine down on to the landing-strip in your road; whereupon you can board the machine and fly wherever you want to go.

Apart from the wireless control, and the operations of the winged police actually up in the air, the movement of machines above the metropolis is facilitated by a system of extremely brilliant signal-lights which all public service and private craft are called upon to carry.

These small coloured lights are arranged so as to be easily visible by day as well as by night, and as machines ascend or descend, and manœuvre here and there, their pilots indicate their intentions by flashing these light signals —which also govern the ascent and descent of aircraft at the big public air-stations. And, of course, radio location, or "radar," developed so remarkably during World War No. 2, plays a vital part in almost every aspect of peace flying.

By now your taxiplane pilot is sinking down to alight at the giant overhead air-station from which operate the day-and-night express planes between London and New York. As he descends he swings round and takes his place in a stream of incoming traffic, making a circuit of the landing-stage before touching down beside a long arrival platform. It is a slogan of the flying services that the

time saved up in the air, by the speed of their winged transports, must not be wasted by any slow or tedious handling of traffic on the ground. Hence, as you step from your air-taxi, you find the scene one of well-ordered hustle. All formalities are reduced to a minimum and, as you have obtained your ticket in advance from your travel agent, you are quickly escorted to one of the waiting expresses of the ocean service.

These giant craft represent a further and important stage in the evolution of the flying machine. They are the fruit of a ceaseless quest of designers to lighten the structure weight of commercial aircraft, to reduce the head-resistance which they offer to their own movement through the air, and to render still more efficient their methods of propulsion. In these ocean-planes any form of external body or hull has vanished. The machine has become just one huge flying wing. This hollow wing is so big that everything the machine need carry—fuel, crew, passengers, mails, and freight—can all be carried inside it, the only external surfaces being certain rear control-planes.

The motive plant of the machine, in common with everything else, is tucked away inside the wing under the charge of skilled engineers, and this internal engine-room is employed not to turn revolving air-crews, as hitherto, but to operate jet propulsion, the system in which streams of air drawn in through openings in the front of the machine, are heated and compressed as they pass through the internal mechanism and are then discharged rearward through special nozzles, the effect being to send the great craft rushing across the sky like some gigantic rocket.

This type of construction and propulsion is a big stride forward aerodynamically. Wing and hull are amalgamated in one structure, forming a single, scientifically-streamlined surface; while the jets replacing air-screws ensure greater average speeds in long-distance high-altitude flying.

One of your first impressions, on actually entering the air-liner, is of the spaciousness of the interior of this huge flying wing, and more particularly of the size of its wide-windowed promenade, up and down which passengers can stroll while the machine is in flight, or in which they can sit together in comfortable armchairs to enjoy a friendly chat.

Behind this promenade, or lounge, is a cocktail bar and smoking-room; also a snug little room which is set aside for the use of lady passengers. And then at the rear of these one finds the roomy restaurant; while in the machines which operate the ocean night air services there are comfortably-equipped sleeping berths.

As you stand by one of the outlook windows of the promenade, looking out across the huge, unobstructed departure platforms you become conscious, suddenly, of a very faint, hardly perceptible vibration and of a deep, smooth hum of power from somewhere behind you in the big machine.

It is the interior engine-room which has come to life, and a minute or so later you see a flash of signals from the control-tower at one side of the huge landing-stage.

This is the signal for your machine to take off.

The hum of the engines deepens. Glancing sideways, you see that the air-station buildings are beginning to slide away out of sight. But you yourself have practically no sensation of any movement as your great machine surges forward and begins to speed smoothly across the departure stage.

Now objects seem to be racing past your outlook windows, and in another moment a gentle tilting movement in the floor beneath your feet tells you your machine has left the surface of the departure stage, and is now air-borne. Below, growing rapidly smaller and fainter, as you look down on them, lie the roofs and streets of London, drawn away as though by some magician's hand.

Soon packed streets give place to open spaces as London's suburbs lie ahead. Smoothly, swiftly, without a tremor, your great flying wing cleaves upward and outward.

More remote still, as you climb, appears the surface of mother earth, and you turn presently from the windows to stroll across to the inviting-looking cocktail-bar. Here, an alert, grey-haired, elderly man—a club acquaintance of yours in town—is one of the first to greet you.

You are not surprised to see him in the air-liner, because you know his reputation as an ardent and experienced traveller by air. The director of a very big British engineer-firm, you remember him as a pioneer, in the years before the War, in the use of air transport for dashing here and there about Europe and the Empire when on urgent work in connection with docks, bridges, and other important enterprises. The two of you take your drinks over to a small table in a snug corner, and your friend begins to talk, from his own personal experience, of the amazing growth in air travel as he himself has seen it.

"It wasn't long after the last war," he recalls, "that I was astonishing business colleagues in the city by taking out one of the first air season tickets for my regular air trips to and from the capitals of Europe. But what a difference, old man, between air travel then and now! Take, for example, this great machine we're sitting in, and contrast it with the first tiny 'plane in which, one day away back as the summer of 1919, I can remember making a special-charter trip over to Ireland on a bit of urgent business.

"In comparison with a big engine-room, such as provides the motive-plant of a machine like this, that tiny 'plane in which I crossed the Irish Sea was driven just by one small motor developing not more than 350 h.p.; and unlike the luxurious accommodation we have here, all I had in that pioneer 'plane was a little cramped cabin in

which, once you had taken your seat, it was impossible to get up or move about while you were in the air.

"Here, in an air-liner like this, we just sit and talk with practically no noise reaching our ears; but in that first 'plane in which I flew the din was so terrific it nearly deafened you."

You each of you decide to have another cocktail, and as you sit drinking them, your friend draws further on his recollections of those early days of air travel.

"What you got then," he says, "was speed minus comfort. Now-a-days you get speed plus comfort—and speed, mark you, which is far greater than anything we had in those early days.

"The first little passenger 'planes I flew in pottered along at 90 or 100 miles-an-hour. And very fine going we thought it, too. But now, of course, you have these ocean services scheduled to fly thousands of miles at 300 miles an hour or more.

"Mind you, I'm ever so glad I went through all those pioneer days—uncomfortable and more than a bit risky though they were. It makes you appreciate all the more the wonders of present-day flying with our silenced saloons and luxurious catering.

"When we wanted anything to eat up in the air, in our first days of air travel, we had to provide our own biscuits or sandwiches. Well do I remember what an advance we thought it when, at some of the main aerodromes, they began to give us small luncheon-baskets to take up with us.

"It was on one of my trips over to Paris that I flew in the first passenger 'plane that had a small buffet fitted up at the end of the saloon; and here a little man, in a white coat, who had been picked out because he was so small and light, served us with drinks and light refreshments.

"That was reckoned a big step forward. Then not long afterwards came the day of those four-motored machines which had kitchen equipment sufficient for the serving of regular meals up in the air.

"What appetites we had! I suppose it was the sheer novelty of it all that made us enjoy so hugely those first meals we ate while we were thousands of feet above the English Channel."

It is perhaps only natural, after such gastronomic recollections, that you should presently find yourselves strolling in the direction of the air-liner's spacious restaurant.

Here a luncheon is now being served which is in every way as good as anything you could enjoy in a first-class hotel. For all your sensations tell you, as you sit at your table for two, you might actually be in some popular hotel or restaurant down solidly at earth level.

By this time your air-liner, climbing high, has risen above a big bank of clouds, and there is nothing to tell you, as you glance outward or downwardly, that, at a speed of five miles a minute, you are rushing far above the surface of the Atlantic.

Up here, well above wind bumps or other air disturbances, your great machine is steady as a rock as it cleaves the air. The only indication that you are in motion comes from the pulsation from the engine-room, which is so faint that it is felt rather than heard.

When, having done justice to a mid-air meal which is admirably cooked and served, you are making your way back to the smoking-room for coffee, your friend is greeted by one of the smartly-uniformed air liner officers. They have, it appears, met before during the course of previous flights.

This officer is off-duty for the moment, and he accepts your invitation to join you at your coffee.

Naturally the talk turns on flying, which leads your companion to remark with a smile:

"Of course it's all right for us to take credit for such a development as this cleaned-up flying wing we're using now, but we mustn't forget that old Mother Nature was cashing in on this air game right away back in the dim and distant past."

You ask him what he means by that.

"Actually, what I'm doing at the moment," he answers, "is to let my mind go back a little matter of a hundred million years, so that I can conjure up a picture of the first of all world's gliders.

"I mean, of course, that old friend the Pterodactyl, who was part lizard and part bird. What that wily old fellow was doing, all that vast time ago, was what man himself had to do when at length he came to grips with this flying problem.

"That ancient winged reptile was, to all intents and purposes, a flying machine without an engine. He had a rudder. He had a wing-span of 18 or 20 feet.

"What he did, when he wanted to fly, was to climb laboriously to the top of some convenient hill, face into wind, and then take off in a gliding flight which, if the air currents at the moment happened to be favourable, might enable him to fly, or glide, for miles before alighting.

"So, you see, we needn't pat ourselves on the back too much when we talk of flying as a modern idea. Nature knew about it millions of years ago, and man himself would have conquered the air many years sooner if only he could have put his hands on a suitably light power-plant."

This strikes you as being very interesting, and you are just about to ask some more questions, when you hear bells ringing here and there throughout the air-liner.

Your officer friend tells you this means that the ocean

air-halt at which you are to alight has now come into view ahead.

You finish your coffee quickly and hurry through to one of the wide windows of the main promenade. The air-liner officer comes with you and, after a quick look downward, points to a queer, unfamiliar-looking object, far below, which is growing rapidly bigger to the eye as your aircraft sinks in a smooth, steady glide towards the surface of the ocean.

"Looks rather like some part of a seaside pier that's got out here into the Atlantic, doesn't it?" says the air-liner officer with a smile.

"It doesn't seem much of a size from up here, but you just wait till you're down closer to it.

"Simply huge things these Atlantic air-halts really are—just like self-contained towns or cities raised up on stilts and floating in the air high above the water.

"But look! Now you can begin to see the immense metal columns on which the structure is carried. They raise the main stage nearly 100 feet above the Atlantic, and they go down so deep below water—forming part of the special flotation system—that even the heaviest Atlantic seas can't make the structure pitch or roll.

"We're beginning to lose height pretty quickly now," he continues, "and you can get a better idea of the sheer size of the thing.

"Facing towards us, as we come in, is the huge platform—an artificial aerodrome, really—on which we shall be landing in a minute or so.

"Then we shall taxi across it towards that group of buildings you can now see up there at the end. The big central block, with the flag flying over it, is the air-halt hotel. And can you see that glint of water in the semi-circular space just in front of it? You can?

"Well, that's a big sea-water swimming pool. Oh, yes!

You'll find everything you want down there. There's a fine arcade of shops along one side—just like a street in the West End—and I expect you'll find your bank, whichever one it is, has a branch up at the end where the offices are.

"But now I must be off. There'll be a spot of work for me as soon as we begin refuelling down there."

You and your friend continue standing together at the outlook window.

There is, you find, something fascinating in watching this wonderful artificial island which now lies in full view below.

Your impression, somehow, is that it is this great structure which is rising towards you, while the big machine in which you are standing appears to be hovering motionless. Yet actually, of course, it is you who are sinking rapidly towards the landing stage.

"Why these ocean air-halts are so queer to look at," says your companion, "is because we've never seen anything like them before.

"They're man's first attempt to do what Nature has failed to do—that is to say, to put an island out here in the ocean just where it is wanted from a flying point of view."

You nod your agreement.

It is the very strangeness of this great floating structure, unlike anything you have ever seen before, which stirs the imagination and holds the eye.

Standing out there in mid-ocean on its great metal columns, and with its cluster of buildings and vast landing-stage, it looks more like a figment of some fantastic dream than an actual triumph of modern airway engineering.

"Look!" says your friend, "they're signalling us to come in."

From a tower-like structure on one side of the "island"

bright lights are now flashing. These are responded to promptly from your machine.

It swings round, losing further height, and straightens out to make a perfect run-in on to the great cleared platform.

You can barely feel the contact as your great pneumatic-tyred wheels touch down. Then, a moment or so later, you are taxying up towards the air-halt buildings.

Everything is bustle, now, both inside and outside the air-liner, it being the one idea of the officials to get the great machine refuelled as quickly as possible, and in the air again on its further flight to New York.

It is here that your friend, the director of the engineering company, gives you a farewell handshake.

He is flying right on to America.

"I now make these little runs across to New York," he says with a parting smile, "just as easily as I used to take one of my frequent trips up to our big works in the north of England.

"What it amounts to is that one can travel thousands of miles now, by air, in the same time it used to take to cover hundreds, with the further advantage that flying journeys are far more comfortable."

II

OCEAN AIR ISLAND

FROM the air-liner arrival stage you follow your airway porter through a spacious arcade in which, you notice, most of the well-known airway companies and air tourists agencies have their offices.

This arcade leads into the big main hall of the air-station hotel. Here, at the bureau, you register and get

the number of the bedroom and sitting-room suite which you reserved before leaving London.

At the same time you take the opportunity of asking the receptionist to hand to the manager of the hotel the letter which you now pass across the counter.

This letter has been very kindly written for you by a friend of yours in London—a man of some importance in the catering trade—who happens to know, personally, the manager of this ocean air hotel at which you will be staying.

The letter introduces you to the air-hotel manager, and commends you to his kind offices.

After ascending in the lift, you find you have been allocated a really delightful little suite, the French windows of your cosy sitting-room opening on to a small balcony from which you find yourself gazing out over a magnificent panorama of sea and sky.

As you stand, enjoying the exhilarating mid-ocean air, you hear a deep-toned hum from somewhere just overhead. Looking up, you see the air-liner from which you have just alighted speeding away again through the sky on its way to New York.

At the same time you catch sight of a dark speck away in the distant sky. Fetching your field-glasses, you focus them on it. They show you that it is a big multi-motored monoplane, heading directly towards the ocean air-halt.

"One of the freighters of the New York-London express air services," says a pleasant voice just behind you.

Turning, you find yourself greeted by a slim, smiling, up-to-the-minute young man who introduces himself as the air-hotel manager.

He has, he says, just been handed the letter from your friend in town, and he seems only too willing to sit down and have a chat with you over a cigarette. Extremely interesting, too, are some of the things he can tell you.

His company, he says, now control a great chain of luxury air-hotels, stretching round the globe via the Atlantic and Pacific.

"In the Pacific," he explains, "we don't have to trouble so much about providing these big artificial seadromes.

"In that ocean we usually find, more or less where we want it, some little island that Nature has provided, and which we can turn into one of our air halts.

"Quite a romantic business this, I assure you. We descend on some tiny little uninhabitated South Sea island, thousands of miles from anywhere, and convert it into a regular hive of industry, with fine air harbour, hotel, and all the other amenities our flying patrons now expect.

"This universal growth of air travel," he adds enthusiastically, "is making the world a paradise for tourists and others who travel for health or pleasure.

"Just now, as I was coming up to see you, I was talking to one of our clients in the lounge. He's a London business man, and his hobby, when he can get a vacation, is to climb hills and mountains.

"What he was telling me was this. Before our present era of long-distance air travel he had to be content, as a rule, to go to the Welsh mountains to enjoy his climbing. But this year he's flying across the Atlantic and on over America in order to visit the Rocky Mountains. And he won't have to be away any longer than would have been the case had he just made his previous trip to Wales and back."

"That shows to you the sort of opportunities there are now. Actually, it's a complete revolution in travel. Not just one district, or one country, are open now to the holiday-maker. He can roam the world by air, enjoying a vacation on a lovely South Sea island with just as much ease as, formerly, he'd have to be satisfied with some seaside resort in his own or an adjacent country.

" It's not so many years ago that this would have seemed fantastic. To-day it's all an accepted fact.

" Why, we're even beginning to get regular scheduled services over that trans-Polar airway which enables you to fly in a matter of a few hours from Moscow direct to New York.

" What air travel is doing, really, is just to annihilate distance. You can have your breakfast in the morning in London. You can dine that same evening in New York, and then if you like to board an air-sleeper of the night express service, you can spend your next day in Moscow.

" Actually the world is shrinking in a way that puts a new face on everything. And no matter where you fly, to any part of the world, you'll find one of these air hotels of ours with its luxury service—here out in mid-Atlantic, or far away in the Pacific, or in Russia, China, or anywhere else.

" Pretty good, don't you think? "

You agree that it certainly is good. Very good.

You agree that it is making life so much more interesting.

It is opening up fresh vistas every day.

It is breaking down barriers and artificial restrictions. It is widening men's minds and making them more tolerant and understanding.

It is quickening trade and enabling men to live and work in comfort in far-off zones where they have never been able to live before. In fact this long-promised air age is beginning to do, already, all that its advocates used to claim it would do.

" By the way," says the young manager, as he gets up to go, " there's a most interesting chap who blew in on us this morning.

" Harman, his name is. You may have heard of him. He's one of the executives of that big American air research organisation which has been spending money like water,

the last year or so, in developing the helicopter until it's a cheap, simple, fool-proof little machine that can go into really big-scale production for sale in world markets.

"The one in which he landed here this morning is the latest built by their research plant. He's flying it himself to London, and other big cities, in order to demonstrate it personally to their agents and others.

"You ought to get a chat with him. Big, jovial sort of chap. Horn-rimmed spectacles. Cigar in the corner of his mouth. A real go-getter, I can tell you. And, if you asked him, he'd show you this latest machine of theirs. It's in one of our small hangars near the big main runway."

After the young manager has bustled off, you unpack your things and have a little rest.

Then, going down into the big sun lounge, facing a vast expanse of ocean which glitters in the warmth of the afternoon sun, you find a table that takes your fancy, and enjoy a very pleasant and leisurely tea. This artificial island, with its magnificent ocean air, seems to be doing you good already. While finishing your tea, you glance around here and there, and it does not take you long to pick out the burly figure of Mr. Harman, the American helicopter expert whom the manager has already described to you.

There he is in the corner of the lounge, sitting by himself with a lot of papers on the table in front of him.

Presently he pushes these aside and leans back to enjoy his cigar.

You take this opportunity of walking across to him. A word of introduction, and Mr. Harman surveys you benevolently through his big spectacles.

"Sit right down," he says, cordially, "and have a cigar.

"When I'm not flying one of these darned things of ours, or reading or writing about it, it's up to me to be talking about it.

"Yes, sir. It's my job and a pretty tough job too. We've the biggest proposition any organisation in the world has ever tackled in making people realise that the coming of the flying motor-car is going to make more of a difference to you, and me, and all of us, than did old man Ford, when he was scouting around out there in the States with that world-shaker of a notion for his first small mass-produced motor-car.

"That meant doing something people had been saying could never be done—taking an expensive, complicated bag of tricks like the early motor-car, and simplifying it into something to be turned out easily and cheaply, and sold not in twos and threes but in hundreds, thousands, and even millions."

Mr. Harman rolls his cigar to the other corner of his mouth, and leans over towards you impressively.

"The popular motor-car meant a great new era of wheels for the world at large. We just rode about everywhere. It affected modern life in a thousand different ways.

"Now let me tell you this. What's dawning in popular flying will be something a thousand times bigger, a thousand times more important, than was the coming of wheels. We're going just to begin flying about everywhere.

"Yes, sir. What the world will be lining up for soon is the age not of wheels but of wings.

"The whole tempo of our lives is going to be speeded up. We're going to get to places quicker. We're going to see more. We're going to do more. The world wants speed. More now than it ever did. And it's going to get it.

"Away back in the past man just plodded about on his own feet. Then he began to ride elephants and horses. Then he took to coaches and trains, and after that to cars.

"Now, believe me, he's going to take his biggest step of

all. Something he's been promised often enough, but which is now really coming true.

"He's going to leave old terra-firma, just wherever he likes, and go whisking about through the air in his own little flying-car."

"And this helicopter of yours?" you venture to remark.

"Is the winged equivalent of Ford's first flivver that ran about on wheels," says Mr. Harman emphatically.

"It means that, for the first time, we're really getting down to something in the shape of a little popular air-car that can be mass-produced just like you mass-produce a motor-car.

"Of course, as you know, there has been more than one attempt before to get down to this business of what's called the peoples' air-car. But all sorts of snags have kept cropping up. It's been a question of time and money, but we're smoothing 'em out now. And what it all means is something simply terrific. Something even those film-writing boys won't be able to find adjectives for.

"But look. I'm just going down to the hangars right now. And if you'd like to come with me I'll show you this little machine the world's waiting for. That suit you?"

Suit you? Would it not? You hasten to express your pleasure at such a chance.

Mr. Harman nods energetically, gathers together his papers and stuffs them into a big leather despatch case, and then strides off, out of the lounge, at a pace which makes you almost run to keep pace with him.

No dilly-dallying for Mr. Harman. He has the gait of the real go-getter!

Hurrying out with him on to the fringe of the aircraft alighting platform, you gain a fresh impression of its vast extent.

A clear runway of practically a mile is what it provides,

Mr. Harman tells you. And he reels off other technical facts about the enormous petrol storage tanks underneath the platform, and also about the way in which, though the "island" is moored securely enough in its present position, it can "up-anchor" when necessary and, propelled by its own machinery, move away to any other location that may be indicated.

Not only a floating island, this, but also one you can shift about here and there just according to air traffic demands. A mobile artificial island is certainly "one up" on Mother Nature.

"I reckon I'll buy one of these things when I can afford it," remarks Mr. Harman with a grin, "and turn it into a sort of movable marine amusement park, taking it all round the coasts in the summer and doing a sort of Coney Island stunt just a few miles off shore.

"All the pleasures of ship and shore in one and the same machine. Some proposition, eh?"

You agree. But then further conversation is cut short, at any rate, for the moment, as a great wide-winged Atlantic freighter comes thundering overhead to alight.

By now you have reached the line of hangars reserved for the use of private owners who may be crossing the Atlantic, via the refuelling "air islands," in their own winged yachts or touring 'planes.

One of these hangars Mr. Harman unlocks, pushing open the sliding doors.

"You've certainly got something here, Mr. Harman," you find yourself saying in admiration, as your eyes rest on the small, gleaming craft which stands just inside.

Beautifully finished it is, in its polished paintwork and glittering metal.

The deftly streamlined body reminds you of that of a car, except that there is no bonnet, the seats for the two occupants being set right out forward, side by side, behind

large sloping windows that give a clear outlook forward, upward, sideways, and down.

There is no propeller in front of the machine, but just above the roof of the saloon is a two-bladed rotor on its metal column.

Mr. Harman points to this rotor as he says:

"If I told you how much we've spent on experimental work with that lifting screw, you'd never believe me.

"You notice how small and compact it is, compared with any others you may have seen.

"What we wanted was to get something which, when at rest as you see it now, lying fore and aft above the body, would occupy the smallest amount of space when the machine was run into any ordinary garage. And we've sure done it. Yes, sir! There you see the smallest rotor, for the weight it will lift, anybody has ever turned out so far. And we're hoping to get them even smaller in our next experimental machines."

Mr. Harman's eyes gleam behind his big spectacles as he points here and there, talking with the buoyant enthusiasm of the real salesman.

"Just look at this rear stabilising rotor. We've been getting down the size of that, too. And we've been getting this rear control closer up to the body, so as to reduce still further the fore-and-aft length of the machine.

"Of course this two-wheeled undercarriage retracts when you're in the air, as does the rear wheel used for steering when you're on the ground.

"Actually what our designers are busy with now is the evolution of a first real flying motor-car.

"We shall get the body of the machine even more compact—more like that of an ordinary car.

"Then this overhead rotor is to be built so that it can be lowered and housed in a compartment in the roof.

"At the same time the rear stabiliser will move inward to fit into a compartment at the back.

"That will leave you with a machine you can drive about on the roads exactly like an ordinary car. And when you want to fly you'll simply raise your main rotor and move out your rear stabiliser and, just by switching over your engine from your road wheels to these air rotors, change your machine from a car into a flying machine.

"What about that for a sale's proposition?"

"It's Jules Verne and all the others coming true at last," you say as you open one of the side doors of the saloon, and look in at the controls in front of the pilot's seat.

"We've simplified the flying of this model to such an extent," explains Mr. Harman, "that I'll guarantee to teach anybody to handle it in two or three hours.

"It's as easy, and in some ways easier, than handling a car.

"Switch on your engine, engage your main rotor, climb at any rate you like, then fly forward, backward, or sideways, just by movements of the column which controls the inclination or tilting at different angles of the rotor overhead."

"And suppose," you query, "the motor packs up suddenly when you're in the air?"

"No need to get hot and bothered," answers Mr. Harman.

"All you do is simply declutch your main rotor so that it spins freely. It then acts like a parachute, bringing you down so slowly that your under-carriage absorbs the actual contact with the ground.

"It really looks," you admit, "as though you've got most of the answers in this machine."

Mr. Harman nods vigorously.

"And you must understand," he adds, "that this is not an actual production model. We've still some improve-

ments up our sleeve before we start real mass assembly.

"But even so," and as he is speaking he turns on you with one of his benevolent smiles—"I reckon I've done enough of the high-pressure sales stuff to make you want us to put you down on the list for an early production model."

You are explaining that this will have to depend on the state of your bank balance when there is a sudden diversion in the arrival of a little page-boy from the hotel, very much out of breath.

Mr. Harman is wanted on the radio-phone—a long-distance call from his office and factory in Detroit. At which the portly Mr. Harman, moving with a rapidity which is astonishing in view of his bulk—vanishes in the direction of the hotel buildings.

You follow at a decidedly more leisurely pace, and presently find yourself gravitating towards the elegantly-equipped cocktail bar.

Here it is not long before the obiquitous Mr. Harman rejoins you. He has not only dealt with that telephone call but has, in the meantime, acquired some fresh acquaintances—these being three lean, athletic, terse-spoken young men with tanned faces and with that watchful look in their eyes which one associates with either seamen or airmen.

You guess they are flying men, and you are right, for by the time you are enjoying your cocktail you find that they have all been U.S. Army air pilots.

It is a very interesting story that you manage to extract from them, bit by bit, though they have all the instinctive reticence, and dislike of talking about themselves, which mark our modern men of the air—men whose watchword is action rather than words, and who still follow the example of that pioneer airman, the great Wilbur Wright. It was he, one may recall, who used to say that the only

bird that talks is the parrot, adding that the parrot happens to be the bird that flies least.

Fortunately these three youngsters are not quite so taciturn as was the great Wilbur, and under the mellowing influence of their cocktails they talk tersely of how they have been among the first to pool their financial resources and embark on just the sort of air adventure which has made a strong appeal to them.

What they have actually done, they explain, is to pool their finance, and buy a big, capacious long-range aircraft of the purely cargo carrying type.

In this machine—acting as their own crew—they roam cheerfully here and there along the world's skyways, being ready to fly anywhere at a moment's notice to pick up a load, and to carry it to any point that may be indicated, no matter if it is on the other side of an ocean or continent.

"Call this big bus of ours, if you like, a trampship of the air," remarks one of them with a smile.

"Not only do we pick up special cargoes when we drop in at one or other of the big air-ports, but we are often called up by wireless while in the air with messages instructing us to fly somewhere to take aboard something that people are ready to pay urgent rates to have transported by air rather than by land or sea."

"It's really a new kind of game—this air tramp business," says the brisk, quick-spoken youngster who is not only captain of their aircraft, but also manager of their enterprise.

"Of course the big established flying freight lines deal with all the bulk stuff going by air.

"We're what you might call specialists. What we get are the out-of-the-way jobs. Quite interesting some of 'em are, too. For instance, we may be asked to carry across the Atlantic a number of valuable paintings or works of

art—something that needs extremely careful handling in addition to our actual flying.

"D'you remember the consignment of performing animals we had for that big circus?" chimes in one of the others.

"We were something like a flying menagerie, that trip!"

It certainly appears, from all these young flyers tell you, that an independent "air tramp," plying along no regular route but just flying here, there, and everywhere, can find new and lucrative work on the world's skyways.

"Not too many of us at it yet," explains the Captain.

"That means the rates we can get are good, and we've nothing to complain of. Have we, boys?"

The other two agree emphatically that they have not.

One of them adds that, even if the air tramp business gets a bit too crowded, they have one or two other propositions up their sleeves.

There is something you are told about a certain small island far out on one of the great oceans where, according to a story which seems well-established enough, a grim pirate of old hid a treasure that is still believed to be there, and which has, so far, defied all attempts to get at it by land or sea.

Now-a-days, however, there is the medium of the air that can be evoked, and you gather that, as soon as time and opportunity serve, these three young flyers with whom you are chatting have a scheme for a new kind of treasure hunt which will, they believe, solve problems that have baffled the seekers after hidden wealth hitherto.

It is, you realise, a new life of roving adventure that these youngsters, and many others, now see unfolding before them—a life of zest and achievement, in which the whole globe lies temptingly before them, and in which they have the power to reach far-off places, and probe previously un-

explored sources of wealth, in a way impossible were it not for this power of long-range flying.

You find yourself wishing you were young enough to join them. But, failing that—and it is a young man's game if there ever was one—the next best thing obviously, is to enjoy their crisp, keen talk on aviation and all it is beginning to imply.

In this way, time passes very pleasantly, and you feel the least you can do, after enjoying yourself so much, is to invite these three young air buccaneers—not forgetting genial Mr. Harman—to join you at dinner in the main saloon.

A very enjoyable meal it turns out to be, too, and equally pleasant subsequently, is the stroll you all take on the great promenade which stretches along one side of the artificial island, with all the vastness of the Atlantic shimmering before you in the moonlight.

Before you turn in you make up your mind to drop a line to that doctor of yours in London, thanking him very cordially for recommending an " air island " holiday.

III

THE " BRAIN " OF THE AIRWAY

THERE is a knock at your door before you are up next morning.

Slipping on your dressing-gown, you find that it is the irrepressible Mr. Harman, his portly form seeming to radiate more energy than ever.

He is off right away, he tells you, on another " hop " in his helicopter across the chain of air islands on his way to Europe.

Before leaving, he says, he thought you might like to

have a personal introduction from him to a friend of his who is one of the chief officials at the huge New York marine and land air-port which has just been established as a terminal not only for United States air-lines but also for those great trunk routes crossing continents and oceans, and now throwing their girdle completely round the globe.

"You mustn't miss this, whatever you do," says Mr. Harman, enthusiastically.

"It's the greatest wonder this air business can show you. Until you've spent a day at this air-port you don't know what air transport means. It's colossal! Immense!

"After you've had a day or so out here, and feel loosened-up a bit more, just take a flip on to this New York air-port in one of the big 'planes that stop here to refuel, and if on alighting you give this note I'm now handing you to my friend Maloney, you can count on him to show you all there is to be seen—and that's some, I'm telling you."

Almost before you can thank him for this fresh favour, he has gone striding away down the corridor, and it is not long afterwards, looking from your window, that you see his helicopter—its revolving blades glinting in the early morning sun—go sailing vertically above the sheds, and then heading oceanwards till it vanishes in the distance.

Down at breakfast you meet those three young air adventurers who proved so entertaining the night before.

They, like Mr. Harman, seem to be in a tremendous hurry, and are beginning to apologise for dashing away almost before you can order your meal.

It seems characteristic of all these flying men, you tell yourself, that none of them ever seem to have a minute to spare.

They save so much time when up in the air that they are naturally reluctant to waste any of it when they are down on terra-firma.

Actually, however, as these three young airmen tell you, there are very good reasons for their being in a hurry this morning. They have, it appears, just had a wireless 'phone call telling them that if they come on right away to London they may get a very nice little freight job there in the shape of a flight out to a medical centre in the East with a consignment of urgent-needed serums and other drugs.

So, after hasty hand-shakes and a last cup of coffee, they hurry away to get their big freighter ready for the air.

As for yourself, now being left more or less on your own resources, you remember the advice of your doctor to really take things lazily. And this prescription—thanks largely to the restorative effect of the mid-ocean air—begins to work wonders after a day or so.

You are, in fact, beginning to feel so much yourself again that the urge comes upon you to do what the energetic Mr. Harman had advised, and to fly on from your "island" for a day's sightseeing at the great New York air-port—junction and terminus of far-flung routes.

A courteous official, in one of the booking offices in the arcade, soon fixes you up with a seat in one of the giant 'planes which will be stopping at the "island" to refuel on its way from Europe to New York.

This great machine, when you board it, you find even larger and more luxurious than the one in which you flew out from London to the "island."

Its power-plant has been so effectually silenced that you hear practically nothing as it soars swiftly upward. Its softly-carpeted floors are rock-steady under your feet as you stroll here and there on a tour of inspection, and the motion of the great machine is in fact so smooth and vibrationless that it is difficult to realise that many thousands of feet of empty air are already between you and the surface of the ocean far below.

You discover, behind one of the main saloons, an extremely quiet and attractive little writing-room, and here you sit to work off some arrears in your neglected correspondence—actually writing the first letters you have ever penned while high up in the air.

It is while you are writing that you recall an incident from a flying book you had been reading only a night or so before in the library on the air island.

This described how, on a winter's day as far back as the year 1784, the first letter any man had ever written up in the air in any kind of flying craft had been penned by a certain Dr. Jeffries while floating just above the London chimney-pots in the first balloon to fly across the metropolis.

The learned Doctor, while writing this first of all air letters, had been perched precariously in the open basket of the slowly-drifting balloon. Rather different, you tell yourself, from the luxury in which you are now penning your first air letters in the writing room of a giant multi-motored clipper of the clouds.

Your letters finished, you stroll back into the main promenade with its stretch of outlook windows along one side.

Tucked neatly in a corner of the promenade, you come upon a small kiosk which sells newspapers and magazines. After buying one or two of the latter, you sink into a comfortable armchair near one of the windows and settle yourself for a little mid-air reading. But fiction stories seem rather flat, somehow, when contrasted with all the wonders clamouring for your attention, here and now, in this winged giant which is rushing through the upper air.

Your eyes stray from which you are reading, and you glance out of the big window near you over a vast expanse of cloud.

Nothing else is to be seen in any direction below; but this strange, impalpable cloud-scape seems to take a ghostly resemblance to some real landscape on the earth below, with hills and valleys and even—so your imagination tries to tell you—with broad highways winding here and there amid the cloud mountains, and with what might be castles and gleaming buildings on some of the higher summits.

It all has an odd appearance of being solid and quite substantial, this shining world above the clouds, and yet even as you watch it you see that parts of it are gradually changing shape, with the fleecy mountains sinking back into the valleys.

It is while looking over this strange panorama you remember a young painter friend of yours who is always searching for fresh subjects for his brush.

You make a mental note to suggest to him that he could not do better than seek new pictorial material by studying these wonderful and beautiful cloud-scapes as seen not from our usual viewpoint down on the ground but from the saloon of a high-flying 'plane up in the sub-stratosphere.

It strikes you, as you sit here in your mid-air saloon, that there is a sensation hard to define in this new high-speed, sub-stratosphere flying. Poised thus between earth and sky, you have a restful, utterly detached feeling such as you have never remembered experiencing before in any other kind of travel.

It is as though the world with all its cares and worries had sunk so far beneath, and was now so completely remote, that such mundane troubles concerned you no longer.

You feel your mind becoming as clear and undisturbed as are the vast air spaces all around you, and you tell yourself that you can foresee how an increasing number of doctors will probably be recommending patients with "nerves" to book a passage in some great sky-ship that

will waft them smoothly, in stages, on a recuperative, mind-resting journey completely round the world.

"Fly and forget things" might be the slogan of such tours.

Your ruminations are interrupted at this point by a white-coated steward who bends over to ask you if there is anything he can bring you.

A coffee is what you order and, after he has set down the brimming cup on the little table just beside you, it interests you to note that the great machine in which you are sitting is so perfectly steady in its super-speed flight that not a drop of the liquid is being spilt.

Meals come as extremely pleasant interludes in this placid life high in the air and, after keenly enjoying several of them, you feel quite ready to agree with that friend of yours who, you remember, told you there is something about flying that gives one a specially good appetite—some particular kind of zest about being up in the air which makes one enjoy a lunch or dinner, in the saloon of a flying craft, more than one would a similar meal in a ship, train, or hotel down at earth level.

Twilight is coming on as your air-liner nears the great New York air-port, and a magnificent sight this vast station appears, as you look down on it from one of the forward observation windows.

On one side of it lies a wide stretch of open water used by the marine aircraft, and on the other there is the immense stretch of flat, unobstructed ground, with its many smooth runways, which is set aside for passenger 'planes, freighters, mail-carriers and other craft of the landplane type.

Set between the two is the group of central buildings which include waiting-rooms, restaurants, air-line offices, and a fine hotel, while dominating the whole gigantic air-port, and rising above these central buildings, is the

illuminated control-tower which acts as the "brain" of a great network of converging routes.

On the side of the main buildings, facing the water, are the slipways used by the big ships with wings, while on the other are the long arrival and departure platforms for the landplane machines, these two marine and land-'plane stations being connected by corridors with a great central traffic office and booking-hall.

As you fly still nearer, in the now rapidly gathering dusk, losing height as you prepare to land, powerful flood-lights are switched on which make the great aeroplane alighting space as light as day.

Down into this immense pool of light your big machine glides smoothly, making its contact with one of the long runways without the slightest shock or jar.

Smartly-uniformed airway porters come hurrying out on to the arrival platform as your machine taxies up alongside, and in a moment or so you are disembarking.

With a porter carrying your bag, you pass from the platform into an inner hall where, you are pleased to find, Customs and other Official formalities have been greatly simplified, it being the aim of the airway authorities, here as elsewhere, to save you as much time as they can on the ground as well as up in the air. These landing formalities over, you go on through to the hotel reception bureau, so as to make sure that you have a room for the night.

After this, making your way back into all the bustle of the great main hall, you seek the nearest information desk, presenting there the letter which Mr. Harman has given you for his friend the air-port official, Mr. Maloney.

After the information clerk has done some quick telephoning here and there, he then hands you over to a messenger who leads you through several doors into the inner recesses of the building.

Then, arriving at the gates of a lift, he, in his turn,

hands you over to another messanger, who explains as you are going up in the lift that Mr. Maloney is at the moment up in the control tower, and has asked for you to be brought up there to him.

Your express lift takes you up swiftly past floor after floor, and when at length it stops and the gates are opened, a tall, broad-shouldered young man with a friendly smile is standing outside to greet you.

It is Mr. Maloney himself.

His easy, pleasant manner, free completely from any formality, soon puts you on excellent terms with him, and he brushes aside quickly any apologies on your part for intruding yourself on him.

Anyone his old friend Harman sends to him to have a look round is only too welcome, he declares. Actually, he adds, they are all so proud of their new wonder air-port that it is a pleasure to them to show it to any interested visitor—and more particularly to anyone coming from the other side of the Atlantic.

Mr. Maloney's own special work, it appears, lies in supervising all the intricate radio and electrical equipment of the air-port.

While you have been talking, Mr. Maloney has been conducting you from the lift to his room—a glass-windowed compartment in one corner of a very much bigger and longer room, down one side of which sit a row of operators with headphones to their ears, facing an elaborate array of wireless equipment of all kinds.

"You might," explains Mr. Maloney, "call this the 'brain' of the whole air-port. It is from this room that our wireless keeps us in touch with every aircraft approaching or leaving the air-port—and our traffic has already grown to such an extent that every minute or so, during the whole of the twenty-four hours, we have a machine of one sort or another either landing or taking off."

Here you mention to Mr. Maloney that business friend of yours who remembers civil aviation in its first and crudest stages, with a few draughty sheds representing a terminal aerodrome—a vivid enough contrast to such a great ultra-modern air-port as this. And you go on to ask what Mr. Maloney himself considers have been the most important trends in all this wonderful tale of air transport progress.

He leans back in his chair and half-closes his eyes, thoughtfully. Then he says:

"Well, I guess there are three things, more perhaps than any others, that are making possible all we're doing here to-day.

"One is the combination of lightness and power we're getting in our latest types of aero-engines and jet propulsion plants. When all's said and done your motive plant is the heart of the flying machine. And that's what makes so intriguing the posibilities that now lie ahead in the development of atomic power.

"Then, of course, there's wireless, and more especially all such developments as radiolocation, or 'radar.'

"Thirdly one has the advances made in meteorology—in the scientific study of all those weather problems which affect all-the-year-round commercial flying. Many other things are of importance—some of them of great importance; but the three I've mentioned seem to me, personally, to stand out most clearly.

"But, of course," he adds, "it's difficult to generalize. You can put a lot of it down to science and engineering, but at the same time you mustn't forget the skill and experience of the crews we have up in our machines to-day.

"They do things, just as part of their everyday jobs, that would have been thought almost impossible not so many years ago. But there's no doubt that when you get down to real, intensive all-round-the-clock flying, like we're getting

here now, you rely more and more on your wireless and weather services."

"More especially of course in bad weather," you remark.

Mr. Maloney nods emphatically.

"To-night," he says, "it happens we're O.K. so far as weather is concerned. Visibility good. Nothing to worry about. All services flying to schedule.

"But when things get really bad, with visibility right down to almost nothing, then it's our system of wireless control that we've got to rely on to see us through. And see us through it does.

"But, say, don't let me sit here doing all the talking. Come right out and meet some of the other boys."

The next hours or so are among the most interesting you have ever spent.

Each of the other "boys" at the air-port to whom Mr. Maloney introduces you is an expert in his particular field, and from what they tell you, and from what they show you, it becomes possible for you to form a fascinating mental picture of just what it means to keep a great air-traffic terminal going through all the hours of the twenty-four.

More intriguing almost than anything else is that huge illuminated map occupying most of one side of the busy traffic room, which provides, from moment to moment, a complete visual record of the state of the air traffic on any and all of the lines that converge on the air-port.

Each aircraft in flight, either outward or inward-bound, is reporting its position by wireless at frequent intervals. All these signals, which come streaming into the wireless room, are communicated immediately to the traffic staff and plotted out on the big map.

The Traffic Controller, with this information at his disposal, is in complete command of all aircraft movements by means of his wireless 'phone. He can ring any machine

up, just as required, and give its pilot any special instructions that the traffic conditions of the moment may demand.

This wireless traffic control is seen to best advantage at times of heavy traffic pressure, or when bad visibility has to be combated.

Sometimes it may happen that, in addition to the normal flow of passenger-'planes and freighters, there may be air specials and extra services converging on the air-port. But the Traffic Controller always has the situation well in hand.

Ringing up certain machines, he may order them to circle outside the immediate radius of the air-port until he is in a position to deal with them, and in the meantime he calls other craft and brings them in one by one to their landing.

Science as applied to aviation is most effective when fog closes down, and artificial vision has to replace ordinary human vision in the handling of aerial traffic.

In flying's early days, when fog blanketed aerodromes, and pilots could rely on nothing but their own unaided eyesight, there was nothing for it but to cancel services, and cease all operations for the time being.

Now, of course, things are very different. The miracle of modern wireless has seen to that. And these present-day wizards of the airway tell you something of the triumphs achieved in perfecting the short-wave wireless "beam" method of getting 'planes in safely to their landing even when fog blots out, completely, all normal landmarks.

Once having been guided into the right position, and with his machine in the direct path of the beam which is being radiated up from the air-port, a pilot is brought in to a normal contact with the surface of one or other of the runways, even though the fog may be of that pea-soup kind which reduces visibility to a matter just of yards. As the machine comes in down the guiding beam, losing height slowly, its exact height above the ground, from moment to

moment is indicated to the pilot by special short-wave vertical beams which actuate receivers in the aircraft.

Nor is this all, because along the centre of the runway, just where the machine touches down, powerful fog-piercing lights are sunk beneath thick glass covers, so that they lie flush with the surface.

These lights aid the pilot at the moment of his actual contact with the runway and, after he is on the ground, they guide him as he taxies up through the fog to the arrival platform.

It is in this, and other ways, that the air way triumphs over transport's greatest enemy—the prevalence of dense, obstinate, widespread fog.

Now you find yourself asking a question which has been forming in your mind.

"How about machines in the fog which are manœuvring here and there in the neighbourhood of the aerodrome, waiting to be called in?

"Isn't there a risk of collision between them under such conditions?

By way of reply Mr. Maloney takes you into a nearby room and introduces you to yet another of his "boys" who knows all there is to know about a further marvel of wireless which is under active development. This is an apparatus in the shape of a small compact wireless installation emitting a special short-wave "feeler" ray of quite limited range.

This equipment, when fitted in an aircraft, confers on its pilot an ability to "see" through a fog, artificially, by means of the ray he sends out from his machine.

Impinging on any other aircraft in the vicinity, this ray or beam indicates immediately the presence of this other machine, thereby warning the pilot in time for course to be altered to avoid any risk of collision.

This wireless "eye," coupled with the steps taken by the

air-port traffic controller to keep different machines at varying heights, enables incoming and outgoing traffic to be handled in times of fog with a minimum of collision risk. And there are other things you hear about, such as developments with infra-red rays, and other devices giving an airman an artificial form of vision to "see" through cloud or fog.

The more Mr. Maloney and his "boys" tell you, the more it becomes clear to you what a vital part science plays in all these triumphs of the dawning air age.

It is, for example, through the labours of teams of research-workers that wireless now guides air traffic through any kind of weather, even the very worst.

It is through the patient work of other experts that meteorology has been so developed that it can tell an air-captain, before he ascends, the sort of atmospheric conditions he will encounter when crossing continents or oceans, and advise him as to the height and course to be steered in order to make the best of the prevailing wind and weather; while yet another wonder is to be found in the perfection of that system of gyroscopic control which, when fitted in an aircraft and brought into operation as required, will fly a machine automatically, balancing it and holding it on its course with just as much precision as though human hands were at the levers.

What with wireless guidance from the ground, and automatic control up in the air, the possibilities opening up are almost illimitable. You are told, for example, that if it was thought worth while it would be possible to send up a pilotless machine from one side of the Atlantic, control and guide it by wireless on a trans-ocean crossing, and then bring it down to its landing by wireless, the whole flight being carried out without anyone in the machine touching its controls.

Less spectacular, but of the utmost practical importance, is the work you hear about in the improvement of heavy-oil engines for use on airways. Fuel costs loom largely on the expenditure-sheets of regular air-lines, and if comparatively cheap crude-oil can be used, instead of expensive aviation petrol, it makes a very considerable difference, financially, at the end of the year.

What Mr. Maloney and his "boys" seek to impress upon you, more than anything else, is that all these wonders of a modern air-port are not the fruit of any sudden brain-wave, or of the inspiration of any single individual or group of individuals.

They are the fruit of ceaseless, long-continued, experiment and research. Here, in fact, you have the keynote of the whole great story of aviation. The aeroplane itself, and the engine driving it, and all methods of equilibrium and control, together with those many ground services which make all the difference between regular and interrupted flying when the weather is adverse, have been worked upon and developed year after year.

Certainly there has been no short-cut to success—no easy solving of any of the problems.

It has been, rather, a case of one research-worker taking things so far, and then handing on his task to be carried a stage further by others.

In this way, and in this way alone, has link after link been forged in the great chain of the aerial conquest—a conquest stretching from kites and balloons to tiny power-driven airships and man-carrying gliders, and from our first small low-powered 'planes to the giant sky-ships which now go rushing across the world.

You recognise it as an admirable trait in the characters of our present-day masters of the air that they should pay, as they do, such prompt and generous tribute to the work of all those pioneers who have preceded them.

Their tributes are all the more sincere because they realise—none better—that had it not been for the work of all the pioneers, many of whom risked and lost their lives, the placing of the flying machine at the service of the world might still be a dream instead of a reality.

Lower down in the big tower, as you continue your tour, you find the spacious offices of the Traffic Director and his experts.

It is the task of those busy folk to fill, with loads of passengers, mails, and freight, the fleet of aircraft placed at their disposal by the technicians and engineers.

It is here, in the Traffic Director's room, that you hear all about the essentially practical aspects of aerial transport —such questions as those of routes and fares, of the comfort of airway passengers, of the inter-change facilities that have to be provided between one flying route and another, and of the handling and rapid distribution of the ever-growing freight loads.

The Traffic Director sits with a battery of telephones in front of him, but like other executives dealing only with vital questions, and leaving all minor problems to be wrestled with by their assistants, he betrays no sign of fluster or over-work, being, in fact, perfectly ready to sit back in his chair for a minute or so, and chat about the general progress of air transport.

One of the most significant things he says is that business men, not only Americans but those of other countries also, are now taking to flying just like ducks to water.

There had been a time, in air transport's early days, when "big business" fought a bit shy of making aerial journeys. That was in the phase when bad weather so often interrupted services, and when machines were still comparatively small and noisy, and when airway catering services were in a decidedly primitive stage.

Business men did not want to arrive at the end of a

journey tired and hungry. They wanted to be fresh enough to plunge immediately into any urgent affairs that were awaiting their attention. But those drawbacks, of course, are things of the past. Now-a-days, more and more business men are flying not only because it is so much the fastest way of getting from place to place, but also because it had become in many ways the most comfortable.

"Only those of us who are actually behind the scenes," adds the Traffic Director, "can realize the tremendous stimulus to world-wide trade that is now resulting from an increasing use of air transport, and more particularly of our fast, long-distance routes.

"It is enabling men in key positions in industry, not only in the United States but in Europe and elsewhere, to leave their desks and get about in a way that would be impracticable were it not for the great network of highly-organised air routes.

"Men at the head of the biggest export concerns, who could not find time, formerly, for more than a quite occasional trip overseas to make personal contacts with far-off branches and depots, can now complete in a matter of days trips which used to take months.

"Letters, cables, telephone, and wireless—all those are well enough.

"But as was proved in war, so in peace, there is nothing like great military leaders, or our leaders of industry, getting together personally in a huddle when it comes to thrashing out any really important question. And flying enables them to do this without having to be away too long from their headquarters."

Here the Traffic Director invites one of his men to carry on the tale by telling you something of the special aspect of air transport to which he devotes himself, and which turns out to be night-flying.

Astonishing strides are, it appears, being made in this particular direction.

Great "sleeping-cars of the air" now rush right across the American continent between dusk and dawn.

Others, starting either from New York or London, span the Atlantic in the course of a single night.

"What we are finding," this night-flying expert tells you, "is that more and more business men are becoming habitual air travellers by night.

"The big specially designed machines we are now using, climbing to a high altitude on long night flights, and with their pressure cabins maintaining air and temperature just as at ground level, provide a form of night travel which proves to be ideal in smoothness, silence, and absence of vibration.

"The power-plants of our 'air-sleepers' are specially silenced to reduce noise to a minimum, while we insulate the sleeping-berths against all extraneous noise.

"You can go to bed in one of these machines, enjoy a night's sleep which is sound and undisturbed, and wake up next morning to find yourself on the other side of an ocean or continent.

"There is nothing to remind you that you are sleeping high in the night sky. Everything is as normal and comfortable as if you were in your own bed at home, or in an hotel or sleeping-car train. Yet all the time you are asleep this 'flying bedroom' of yours is wafting you like a magic carpet at five miles a minute or more. It is a super-swift de-luxe travel of a kind which it would be impossible to provide in any other medium save the air. And of course it makes just all the difference in the world to any traveller, such as a departmental chief, who may be on some long and important inspection tour.

"He can spend a busy day in one city or country and then, boarding one of our 'sleepers,' can make a giant

'hop' of several thousand miles during the hours of darkness, awaking fresh and keen at his destination to start on another busy day of interviews and inspections.

"High-speed day-and-night flying is the solution of their problem for big 'captain of industry' who have so much to do, and so many places to visit, that they have never had, hitherto, time enough for all the calls that were always being made on them.

"Now, however, they can do in a week what used to take them months, and in a month what might formerly have occupied something like a year.

"What all this means, in the case of really highly-paid executives, you can easily imagine. It means adding almost immeasurably to his active working life, and to his value to whatever organisation he may be associated with.

"That old grey-bearded saying that 'time is money' is becoming truer every day now, and there is no vehicle that can save time to such an extent as the modern flying machine."

Here the Traffic Director thinks fit to add a few further remarks, by way of general explanation.

"One of the chief things we want the world at large to understand," he says, "is that transport by air, as it exists and is being developed to-day, is not out to enter into any sort of fierce competition with the other and older forms of transport.

"In our great commercial fields of the present and of the future there is, and will be, ample and profitable scope for any and every kind of well-organised transport.

"The air, as has been said truly enough, supplements but does not supplant those other methods of transport by sea and land. It is simply a new method of moving all sorts of loads very considerably faster than they could be moved by any other means. But there are always any number of travellers to whom the time-factor is not urgent,

and who do not want to go by any of the super-express routes. And of course the same applies to vast masses of second-class mail matter and non-urgent freight.

"What it really all boils down to is that what we need, and what we are already beginning to shape, is a world-encircling system in which our three great methods of transport—air, land, and sea—become dovetailed into a single all-embracing scheme; each transport system dealing with the particular loads it is best fitted to handle, and the entire plan being devised to give the public, everywhere. the fullest advantages from all three elements."

It is now that the Traffic Director's secretary comes in to remind him of a conference he is due to attend.

Before he leaves for the big conference room lower down in the tower, he introduces you to a couple more of his lieutenants whose work is of outstanding interest.

One of them is the expert who controls all air-mail traffic in and out of the air-port.

The other specialises in the handling of air-borne freight of all kinds.

The former takes you down with him to the big air-mail hall lying at the base of the control-tower, and which has corridors connecting it with the land-'planes arrival platforms and on one side of the air-port and the flying-boat slipways on the other.

Your chats with members of the air-mail staff bring to light facts which are of very great interest.

One which emerges is that the combined speed and frequency of a vast network of air-mail services is bringing about, already, a virtual revolution in the habits of the world in dealing with its correspondence, and more particularly with the way in which great commercial houses handle their incoming and outgoing mail.

There is for example no longer any question of waiting

till a quantity of letters has accumulated, and then sitting down and dictating a big batch of replies.

Apart from the giant machines of the night air-mails, there are smaller special express day-'planes leaving and arriving at frequent intervals.

To take advantage of these fast day air-posts, business men now get off letters at any time in the morning or afternoon that it is found possible to deal with urgent matters; and so rapid are these services, both in actual transit and in delivery, that letters are often sent out, and replies received from a distance, all within the hours of an ordinary business day.

It is here, incidentally, that you hear of an interesting development in the use of helicopters. It seems that Post Offices lying some distance off main trunk routes are already being equipped with flat roof stages from and to which helicopter mail-carriers operate regularly, carrying urgent correspondence between these branch post offices and the nearest main depot.

Apart from the immense time savings now obtainable in the air transport of business and private correspondence, there are also valuable accelerations in the carriage of official deeds and documents, of urgent specifications, and of banking papers of all kinds.

"To put things in a nutshell," says one of your informants, "what it all really comes down to, is this. What with mail-matter going so much more quickly by air, and what with business men making a regular habit of travelling by 'plane, every wheel in the great commercial machine is beginning to turn faster and faster.

"Transactions which formerly took weeks or months are now being settled in just a matter of days or hours. And don't think it means any additional strain or fatigue, because it does not.

"Things go just as smoothly, even though they are being so accelerated.

"In fact, thanks to the all-round time-saving made possible by a regular use of the air, business men now tell us they are finding they have more leisure than was formerly the case for any of the recreations that appeal to them."

While you stand chatting with these air-mail experts, your eye is caught by a series of pictures and exhibits which have been staged at one end of the big hall.

These you find have been arranged so as to tell, in a truly fascinating way, the whole history of the transport of mails not only by air, but also by land and sea.

There are, for example, momentoes of those far-off days of the pony post, when one rider galloped a certain number of miles and then handed over his mail-bags to another horseman, the service thus proceeding in a series of relays over long distances.

From the carriage of letters by ponies and horses, the story goes on to the lumbering mail-coach, and from that to the era of railway transport; while on the sea the stately old sailing vessels give place, in their turn, to the era of the steamship.

After which there is the newer and even greater phase in the first tentative experiments with balloons and crude early-type airships, followed by the use of aeroplanes and flying-boats, and the development, within a comparatively short period of years, of air-mail networks stretching thousands of miles.

While you are studying some scale-models of early aircraft employed in mail-carrying, somebody suggests moving through for a look round a big adjoining department which, you are told, concerns itself solely with aerial freight transport.

Organised for constant round-the-clock working, this

goods department has become one of the busiest in the whole air-port.

The reason for this, as the expert who is showing you round explains, is not only the speed now attained in goods' carriage by air, and in rapid collections and deliveries by special ground services, but also the far cheaper rates it has become possible to charge for express air transport.

In the early days of civil flying the charges for air dispatch had to be heavy, and only specially urgent loads were attracted to the air. But now they have come down to very definitely economic levels, thus attracting a constantly-growing volume of traffic. These lowered charges have been due, largely, to the development of special aircraft for the transport of goods.

"Flying box-cars," one of your informants calls them.

Such big machines, turned out in increasing numbers on a mass-production basis, are designed to use power-plants of the diesel type, burning cheap crude-oil instead of expensive aviation petrol. Not only this, but you learn that a considerable use is also being made of the "flying train" idea.

Here a big power-'plane acts as an aerial tug, towing behind it a number of gliders which have their holds adapted specially for the carriage of merchandise of all kinds.

These flying goods trains are now arriving or departing at all hours of the day and night, and as they pass along their prescribed routes one glider after another is detached, according to its load and destination, and is guided down by its pilot to whatever flying-ground may be indicated, the aerial train itself continuing on in flight until it reaches some terminal point.

"What it all means," says your guide "is that we're getting air-goods transport right down to a strictly business

proposition, giving the world the speed of flight at the lowest rates at which it is possible for any enterprise to operate commercially."

Apart from its purely business aspects, there are any number of interesting points that arise in the running of a big air-goods department.

Among the cargoes carried, for example, are rapidly ripening tropical fruits.

These, formerly, could not stand the time occupied in their carriage over long distances by surface transport. Now, however, they can be air-borne from many far-off localities and delivered at great centres of population while in a prime condition and without having suffered in any way during the period of their transport.

Fish from distant sources of supply can also be put aboard special cargo-'planes and flown long distances for sale in big cities and other centres of population.

The same, too, applies to flowers and other perishable articles of many different kinds. Instead of having only a comparatively limited sale in areas immediately adjacent to the localities where they are produced, they can now enjoy a market which is more or less unlimited, being flown long distances if necessary to points where there will be a demand for them at prices which make it worth while for those dispatching them to pay the rates for express air-carriage.

What all this implies, of course, is a far better and more scientific distribution and enjoyment of all the choicest products of the globe, perishable articles which are exclusive to any one area being air-borne to other distant zones where they can be enjoyed just as regularly as in the neighbourhood of their origin, such swift air exchanges being of a constantly reciprocal nature, one part of the world sending the rare fruits and other delicacies which it produces to another, and receiving in return, by express

cargo-'plane services, articles which it would be impracticable to send by any slower form of surface transport.

Apart from the sheer speed of air transport, there is this further point that one needs to bear in mind.

There are many fragile articles, and easily damaged goods, which need to be packed with very special care before they can be entrusted for carriage by any form of surface transport.

Air dispatch, with its absence of jolting or vibration, and elimination of the need to tranship loads at docks from ships to trains, and vice-versa, proves the ideal method in such cases as these, it being possible to carry by aeroplane any such fragile consignments as choice and expensive flowers, and to do so without it being necessary to pack the flowers in any specially protective way.

These and other aspects of air transport mean that the flying routes not only handle already existing express traffic on which the time factor is important, but also create and develop all sorts of special traffic of their own.

There is one feature of all this air-borne merchandise which you find particularly interesting.

This is the development, already referred to briefly, of what has been called "the flying train"; or, put in other words, of the application to civil aviation of the ability of a powerful engine-driven aeroplane to tow along through the air behind it a string of motorless gliders. This idea, which was being tried out, experimentally, prior to the outbreak of World War No. 2, saw many fresh developments under the urgent demand of military operations.

We saw the increasing use of motor-towed gliders for the transport of all sorts of urgently needed military supplies, and there was in addition an ever-growing employment of such methods of air-towing for rushing up special troops to any threatened position—these air-borne troops becoming a new factor with which commanders had to

reckon. Larger and very much more efficient gliders were developed for all this special military work.

Great improvements were also made in the technique of aerial towing as between the powerful motored-'plane, or "tug," and the string of aerial "barges" it had behind it. And there was an aspect of this which was permanently valuable—an aspect which relieved one of some of the feeling that all such technical progress was being accelerated simply to serve the destructive aims of war. Because these purely military developments of glider-towing also have very considerable significance when employed in commercial rather than in war-like operations.

The "glider-train" system, once looked on as more or less a freak development in aeronautics, can be employed most advantageously by civil air-lines for the carriage of all sorts of urgent freight.

How important this "flying train" method of transport has already become, in airway operation, is now explained to you more fully by the experts with whom you are talking.

They reinforce their verbal explanations by showing you models and designs of the latest ideas in commercial air-towing as employed on long-distance established routes—routes, that is to say, on which there is an appreciable and regular volume of express goods with which to deal.

Technicians have, you gather, been collaborating with air traffic experts in evolving big, staunchly-constructed, streamlined gliders which, while offering a minimum of resistance to their own forward movement when towed behind an engined 'plane, will at the same time carry quite considerable loads of urgent merchandise of all kinds.

From the purely economic viewpoint of low operating costs, this glider-train scheme benefits from the fact that the winged tug towing the gliders is engined by a powerful motor working on crude-oil fuel.

Here you come across another decidedly interesting point. These experts go on to tell you of the encouraging progress now being made in adapting lightweight steam-turbine plants for use as the motive-power of big commercial aircraft.

Thanks to the many developments which have been taking place with featherweight metal alloys, and to the solving of certain other problems in the use of steam-power in flying, this whole question is, you are assured, now entering on a new and extremely important phase.

Steam-power, once it can be applied aerially in a really practical and reliable fashion, holds out many advantages for designers of large transport-'planes, not only as regards high-altitude commercial flying, but also in the important matter of reducing still further the operating costs of big passenger and goods craft.

Undergoing tests, you learn, are "flying steam-tugs" which, when used as the motive-power for glider towing, are already looked upon with growing favour by those whose job it is to get right down to the bedrock of the £ s. d. of air-goods transport on everyday commercial lines.

There is, these airwaymen remind you, one unusually intriguing aspect of all this new work that is being done to make steam-power available for the propulsion of modern aeroplanes.

It is one of those cases in which you see history repeating itself.

Years ago, right back in the very infancy of flying, inventors who could not then obtain any form of petrol-driven engine suitable for their purpose, turned to steam as the power for their first experimental craft. And, as a matter of fact, some of the first brief "hops" were made possible by doing the best that could be done at the time with steam, much ingenuity being shown in lightening and

adapting special plants for installation in certain of the pioneer heavier-than-air machines.

But the difficulties then confronting experimenters were so formidable that only a quite limited success was possible, and it was not in fact until air pioneers could turn to the internal combustion motors as used in early motor-cars, and evolve lightweight versions for installing in aeroplanes developed from motorless gliders, that the goal of sustained heavier-than-air flying was finally reached.

Though the years that followed were a triumph for the petrol aero-engine, research work was still in progress with specialised forms of steam propulsion.

Presently high-speed steam turbines began to appear which gave an astonishing power for a small amount of weight, and which could also be tucked away most conveniently in any quite small space.

It was this and other developments which, in due course, brought aerial steam-power into the picture again, and enabled this method of propulsion to achieve a remarkable "come-back" in the world of flight.

After telling you these and other things, the officials in the goods department take you across to one of the walls in their big main office, and call your attention to a couple of pictures hanging there which, they say, they never fail to show to visitors touring the air-port.

It is your energetic young friend Mr. Maloney who, with a smile, points to one of the two pictures and says:

"As of course you'll gather, this is a reproduction of one of those quaint old cartoons in which artists of years ago who had the topical touch—the forerunners of our highly paid specialists of to-day—used to poke their fun at anything that happened to be the talk of the hour.

"This particular drawing goes back to the time when that English engineer of yours who was so far ahead of his day, Henson, had caused public astonishment, and not a

little ridicule, by coming forward with a plan for a large steam-driven flying machine.

"A really big passenger job it was to have been, and Henson's specification was so clever that, in many respects, it anticipated the constructional features of modern aeroplanes. But poor Henson had the misfortune of being too early on the scene. He shared the fate of many another pioneer.

"Hardly anybody would take him seriously. And when someone who did happen to have faith in him brought forward a Bill in your House of Commons to establish a company for operating 'aerial steam carriages,' the whole idea was greeted with roars of incredulous laughter.

"The spirit of ridicule which existed at that time towards any plan for conquering the air provides the inspiration this artist drew upon for the picture you see here.

"His way of poking fun at the whole thing was to show a comic sort of railway steam-engine with wings that was supposed to be towing along through the air a string of equally comic railway carriages—each of which, as you see, has its own set of wings sprouting out from the sides of it near the roof.

"The artist gave a finishing touch to this humourous creation of a train that would leave its rails and fly through the air by making the passengers sitting in the coaches wear worried expressions which clearly indicated their wish to be back again on terra-firma as quickly as possible.

"People were laughing heartily at this picture years ago.

"They cut it out and pasted it in their scrap-books.

"The flying train! It became one of the jokes of the day!

"But those who poke fun at inventors sometimes find their jokes rather in the nature of a boomerang. They are

apt to recoil on their perpetrators and, in the end, make them and not their victims appear foolish.

"It was certainly so in this particular case. Because those who, years ago, were laughing so heartily at the mere idea of an engine pulling a train through the air, would not be laughing quite so much if they were standing here with us to-day.

"What seemed so absurd then has become a matter of practical reality with us now. It would be no good, nowadays, to joke about flying trains and say they are just the freak ideas of a few wild inventors. Because all you need to do is to look up and there you see one of these air-trains actually passing through the sky before your very eyes.

"Just take a glance at this second picture here on our wall. We've put it next that old-time print so as to get as vivid a contrast as possible.

"Good, isn't it?

"There, on the one hand, you've those old, die-hard sceptics of long ago trying to kill by ridicule an idea they reckoned so preposterous.

"Now in this second and up-to-date picture, done for us by an artist here at the air-port not so long ago, you see how utterly the joke has turned against those scoffers of old.

"Here, in this picture of ours of to-day, the artist has shown how in the march of air progress that once-ridiculed flying train idea has begun to take practical, every-day shape.

"Not only that, but here's something else that'll amuse you. This artist of old thought he'd reached the height of absurdity when he drew such a thing as a steam-engine leaving the ground and flying through the air.

"But here again progress has managed to turn the tables on him. For with wonderful light-weight steam

turbines now becoming available for our big, heavy-duty 'planes, engineers are already finding that they can use steam-operated 'tugs' for towing their cargo-carrying gliders. It is such an up-to-date steam-train of the air that our artist has shown in this present-day picture—the streamlined turbine-driven 'tug' drawing behind it a string of motorless gliders of the type which are now being designed specially for regular express goods transport.

"So you see how these two pictures—one old and one new—tell their story.

"I think myself it's a pretty convincing one.

"From being just a laughing-stock, as it was when that first cartoon was being drawn, aviation has triumphed over all its critics, and has grown year by year into one of the greatest of all forces ever placed in the hands of man."

It is while you still stand looking at these two pictures that one of the officials of the goods' department asks you whether you would like, as personal momentoes, a couple of small reproductions of them.

You answer, very promptly, that nothing would please you better. Whereupon this expert says he will see that these reproductions are sent along to you at the hotel in which you will be stopping while you are in New York.

It is this official, too, who is good enough to supplement what Mr. Maloney has just been saying by telling you some further interesting things about the actual uses now being made at the air-port of commercial-type gliders towed by special engined 'planes.

These winged trains, you learn, are being marshalled and made up very like goods trains on a railway.

All the express goods intended to be air-borne to any given town along a long-distance route are, if possible, packed into the hold of one particular glider. Then, as the flying train proceeds on its aerial way, and as the city in question appears below, it is not necessary for the entire

"train" to come down and waste time by making any intermediate halt. All that happens, as has been indicated briefly before, is that when the time comes the pilot at the controls of the glider carrying goods for the station below proceeds to unhitch or "slip" his craft from the main "train," and then steers it down in a descent on to the aerodrome lying beneath, the rest of the "train" flying on its course at undiminished speed.

This unhooking process can be repeated as often as required, as the various stations along an airway appear below.

Another of the facts your informant mentions to you is that this very convenient method of "slipping" a glider, just as a slip-coach is detached from a train in motion, is being made an increasing use of in dealing with mail-loads, as well as with freight, on some of the busy air routes.

There seems no doubt that the winged train—once such a joke with our forefathers—is earmarked already to play a big part not only in giving the world the benefit of air speed in the transport of its really urgent goods, but also in doing so at rates which are definitely value for money in view of all the time that can be saved by air dispatch.

After all the things you have been told while in the air-goods section, it seems to you hardly possible that this air-port—fascinating place though it is—could have anything still more interesting with which to intrigue its visitors.

But here you are wrong. Because it has.

Your indefatigable guides now take you down lower in the tower and escort you into an extremely cosy lounge, with its own buffet and white-coated steward, which you learn is reserved exclusively for air-line pilots who are off duty, or for those who are awaiting their turn to fly some big machine across continent or ocean.

What this room reminds you of, at once, is that other

famous room, away over at Lloyd's in the city of London. which is set apart for those captains who come ashore from seafaring craft.

As soon as you have glanced round this snug pilots' room, you find yourself—thanks to the easy informality of all concerned—joining a group of friendly air-skippers who, sitting together in a corner in their comfortable chairs, are yarning about wind and weather, and the behaviour of the different craft they have had under their control, just as might any group of captains who navigate the sea rather than the air.

One of those who is describing in terse, graphic words, a navigational problem with which he had to cope while on a recent flight in "absolutely poisonous weather," turns out to be the captain of a big, multi-engined flying-boat—a veritable "ship with wings."

As you listen to what he is saying, and to the brief comments of one or two of his fellow pilots, you begin to realise how very much there is in common between the men who are in charge of large marine-type aircraft and their opposite numbers who may be on the bridges of our ocean-going steamers.

The flying-boat captain, just as is the case with the sea-captain, must learn to have an intimate knowledge of the run of tides in harbours and rivers, and of the trick of manœuvring his craft when it is on the water and when it is taxying in and out, or picking up or casting off its moorings.

Then, apart from such purely marine knowledge, the skipper of a flying-boat has to have all the additional skill and experience necessary for navigating his big craft for long distances through the quickly-moving currents of the aerial ocean.

He is what one might call a "two-element" man. He is a sailor as well as an airman.

One might regard the commercial air-line pilot as something more even than that. Because when he comes to handle big aeroplanes, as well as flying-boats, he has to be expert in manœuvring here and there on the ground a great land-'plane which may weigh many tons.

Which means that one could go farther and describe him as a "three-element man"—a man familiar with the handling of big transport machines on the surface of land and water, as well as up in the air.

There is one thing, particularly, which strikes you about these air-line skippers, sitting at their leisure in their own comfortable pilots' room. This is how extremely young many of them seem to be, in charge, as they are when on duty, of giant high-speed craft carrying numbers of passengers.

You mention this to one of the traffic staff who has accompanied you into the pilots' room.

"Well," answers this expert with a smile, "what we like to do, if we can, is to catch 'em young.

"The right sort, that is.

"This business of air transport is essentially a young man's game. But all these pilots of ours, young though a lot of them are, have old heads on their shoulders, I can assure you.

"They know their business from 'A' to 'Z.'

"They get a long and intensive period of training before they are reckoned competent to take charge of any machine on our regular commercial air routes, and during their period of training, and during all the preliminary flying they have to do, it is not difficult for us, as a rule, to weed out any youngster who may not be quite suitable, temperamentally or otherwise, for the very responsible job of an air-line pilot.

"Of course," he goes on, "this whole flying game is a very different one to-day, from what it used to be.

"You remember the popular idea of an airman in the early days. He was supposed to be a wild, irresponsible fellow, ready to risk his life every time he went up, and living a 'here-to-day-and-gone-to-morrow' sort of existence.

"All that's over and done with. It's just a thing of the past. Our commercial pilots of to-day do their steady job of work like all the rest of us.

"They're what you might call systematic, scientific flyers now-a-days, relying more and more on their instruments and on their wireless. They do not want to be made heroes of, or to have people thinking that there's a whole lot of drama or romance in the work of a modern air-line pilot.

"All they want to do is to get through each time on schedule, and to give the passengers who may be in their charge a quick and comfortable trip.

"Which reminds me," adds this official, "of a typical little story.

"One pilot who had just finished a long trans-continental flight was walking from his machine into the air-port buildings when someone who was visiting the aerodrome ran up to him and asked him, rather foolishly of course, whether he had met with any special adventures during his flight.

The pilot stared at this questioner in astonishment.

"Adventures?" he repeated. "What do you mean? Why should I have had any adventures? You wouldn't go up to the driver of a long-distance train, would you, and expect him to have had any particular adventures during one of his regular runs?

"So why come and ask me?

"We fly to accurate time-tables on our routes nowadays just like trains or ships operate to their regular schedules.

"It's all routine now. Nothing else. And if anything

unexpected does happen—and it's a hundred to one it doesn't—it shows that there's something not quite right with the organisation somewhere.

"So just take this from me. Flying isn't an adventure any longer. It's a regular cut-and-dried business."

It is just as your companion finishes telling you this tale that a slim, dapper young man in the uniform of an air-liner captain comes briskly into the pilots' room.

Your companion beckons him over, and introduces him to you.

He is, you find, the chief pilot of one of the biggest express trans-ocean 'planes operating between the United States and Europe, and he has just come off his machine after bringing it across on one of its trips from England.

It seems that he is more than a little pleased, this young air-skipper, by the fact that he has brought his big machine through this time quite a little ahead of schedule, thanks to a following wind on the last part of his flight which had been stronger than the meteorological people had calculated.

Such quick trips as these, he says, always please any business men he may have among his passengers.

If they are ahead of schedule they feel they have extra time in hand which they had not previously reckoned on, and which they can use to advantage immediately they get going on their business conferences, interviews, and calls.

This young pilot, as you continue chatting with him, impresses you with the efficiency, clear-headedness, and cool self-confidence of these new captains of the air age.

He is a complete master of his art, this airman.

He talks quietly and easily, without the faintest inclination to "shoot a line" or to hand himself any bouquet.

As he talks you seem to be getting a fuller and much

clearer idea of all those mighty strides that have been made in the navigation of the air.

A picture flashes into your mind of how Bleriot, years ago now, risked his life in making that first aeroplane flight across the Channel in a tiny one-man 'plane.

You recall Alcock and Brown, and of how the former had to struggle hour after hour at the controls of the bi-'plane which was first to cross the Atlantic in non-stop flight.

Now here is this modern air-skipper, talking quite unconcernedly of how, just as a part of his ordinary day's work, he has brought his great commercial cloud clipper across above the ocean in its swift, unflagging flight. No life-and-death struggle against the elements nowadays. No clinging to the controls of some frail and pitching craft.

The work of a modern air-skipper, so far as you can gather from what this young pilot is saying, is growing more and more like that of the Captain of a big sea-going liner.

The air Captain is in personal charge of his craft when it is taking off, or when it is coming in to land; but at other times, during an air voyage, there is no need for him to be constantly at the controls.

Whenever he feels like doing so, in fact he can leave the control-cabin under the charge of his First Officer and —emulating the Captain of any seagoing liner—stroll through into the passengers' quarters to see that all those travellers who happen to be in his charge are being made really comfortable.

Some regular air voyagers he probably knows personally, and will no doubt stop to have a little chat with them.

Habitual travellers by air are no different from those who find it necessary to make frequent sea voyages. They enjoy, that is to say, a personal chat with the skipper who may be in charge of their craft.

These little social duties duly fulfilled, the air captain may quite likely go on through to the compact, electrically equipped kitchen of the air-liner, so as to make sure, by a word with the chef, that the meals served during the flight will be all that any fastidious traveller could desire.

While the air-liner captain is thus going his rounds, the big machine continues to fly swiftly and steadily on its course. Away out forward in the control-room the First Officer will quite likely have switched on the automatic gyroscopic control which, immediately it comes into action, will keep the air-liner on its course, flying smoothly on an even keel, just as though it was under human control.

When a machine is on a long trans-ocean or continental flight, this switching-over occasionally from human to automatic control is found to be a very great convenience.

The pilot, leaving his machine for the time being to fly itself, can check up unhindered on his position, or navigation, or devote his whole attention to any special wireless messages that may be coming in.

What a different business ocean flying has become from what it was when the first air adventurers took their lives in their hands in spanning the Atlantic and Pacific!

Then, in those early days, they had to fly off into the void with very sketchy weather forecasts, and often without anything in the shape of wireless equipment in their machines.

To-day, however, science and specialised engineering have transformed all that—have taken the peril out of trans-ocean flying.

Before he takes off on one of his long-distance voyages, the air captain of to-day goes into a huddle with the experts in the meteorological department.

He and these weather wizards pore over maps and charts. All the latest reports as to wind and weather, as they exist at that particular moment right along the aircraft's route,

are scanned with critical, calculating eyes. Presently agreement is reached as to what sort of course the captain shall steer, so as to make the best of the weather conditions along various sections of his route, and also as to the most suitable heights at which to fly.

The entire course of the machine is plotted out in every detail before it leaves the surface of land or water; and then after that, while it is actually in flight, it becomes merely a case of adhering faithfully to that pre-arranged course, or perhaps of modifying it in certain minor respects according to news of any last minute changes in weather conditions ahead that may be coming in over the wireless.

It is in all such ways as these, says the young air-captain with whom you are chatting, that flying is safer and more systematised.

"People hop into my 'plane," he says, "like they would into a ship or train.

"It's just transportation to them now—just a very fast and very convenient way of getting about.

"It doesn't seem strange to them any longer, to find themselves up in the air.

"They take all that for granted, like they've learned to take other ways of travelling for granted.

"Many years ago, one's got to remember, it was an adventure for anyone to ride a bicycle. Later still it was an even bigger adventure to drive one of the pioneer motor-cars. But both those machines grew to be looked upon as just ordinary, everyday ways of getting about.

"It's the same story over again with the flying machine.

"It's just progress, that's all. You can't stop it, even if you want to. We've either got to go forward or backward, and who wants to turn the hands of the clock back?

"We've managed to get this flying game taped, just like we've got down to bedrock with other problems in engineering and transport.

"If people want speed—and that seems to be what they do want nowadays—and if they're ready to pay for it, then speed is what we give 'em, speed and still more speed."

In one corner of the pilots' room you notice that there is a large and ingeniously-constructed sectional model showing the control-cabin and various instrument panels of a typical air-liner.

One or two of the air-captains stroll across with you to explain some of the special features of this model.

You venture, as a somewhat bewildered layman, to express the opinion that there seem to be so many dials, levers, and gauges that the whole business must have become more than a little complicated.

With that, you discover, these Captains are not prepared to agree; although they admit that until you have got a grasp of it, and have become accustomed to it, the general lay-out is apt to look a bit intimidating.

Then they go on to assure you that, once anyone has become thoroughly familiar with modern instrumental flying, the general effect is definitely to simplify, rather than to complicate, the whole business of the handling of aircraft, and to render the navigation of any big machine an easier and much more routine affair. And, of course, as air-liners grow bigger they need to carry larger crews, with each expert on board allocated to his own particular job, whatever it may be.

The navigating officer has his own little "office" adjoining the control cabin, with all that he needs ready to his hand.

The power-plant of the aircraft is under the charge of skilled engineers who have nothing to do but tend and nurse their battery of powerful motors.

It is the same with the wireless operator and his special task. All this has the effect of leaving the Captain and

his First Officer—together with any other assistants who may be on the control-room according to the size of the air-liner concerned—free to concentrate solely on the actual handling of their craft, and to make any strictly piloting decisions that may be necessary according to conditions along the route, or when approaching any port of call.

This means that although the Captain, or chief pilot, is still personally responsible for the proper handling and safety of his craft, he is relieved of a lot of subsidiary duties while actually in flight.

Every man aboard the aircraft knows his own particular job and, generally speaking, the whole control system, from the Captain out forward to the chef and his assistants in the air-liner's kitchen, is dovetailed in a thoroughly efficient, smooth-working fashion.

There are two things, you find, to which these experienced air-captains like to pay warm tribute.

One is to the splendid help given them by "radar," by the wizardry of radiolocation.

The other is to the efficiency and swiftness with which the meteorological organisation obtains all its information and distributes this by wireless along the airways.

With aircraft now operating with such an all-round mechanical dependability, the modern air-captain need not be worrying himself much about mechanical troubles.

What this means is that his chief concern in routine, every-day flying along commercial routes, is the sort of weather he will have to deal with while in flight. Therefore the work of the meteorological people, with the forecasts and warnings they can provide, is of capital importance from his point of view.

One of the air-captains standing with you summarises this while aspect tersely enough.

"Of course our job to-day is responsible enough," he

says, "with a big machine full of passengers under our charge when we make an ocean flight.

"But just recall what it meant to some of those pioneers on their first Atlantic crossings. Often enough they'd only one engine, and were listening anxiously all the time to make sure it was running properly.

"To-day, in contrast to that, we have our powerful multi-motored plants under the care of flying engineers, and even if one or other of these units does give trouble when we are up in the air, it is simply cut out of the series for the time being, and any repairs that may be necessary effected while we are in flight, the machine carrying on in the meantime quite comfortably under the power of its other motors.

"What one can say, in fact, is that the old bugbear of the pilot, that of a forced landing through mechanical trouble, is practically eliminated to-day.

"When you bear that in mind, and remember also that we've such a splendid weather service to help us, to say nothing of what wireless does for us, you can understand why some pilots say modern flying is 'a piece of cake' compared with what it was when those pioneer flyers were blazing their aerial trails."

If there is one thing, more than any other, which these present-day air-skippers seem to agree about, it is in a warm admiration for those predecessors of theirs who, in the infancy of aviation, were risking life and limb in their frail pioneer 'planes.

"Talk about nerves!" says one of these air-line pilots of to-day.

"Why, you've got to hand it to those early birds every time.

"Those crates of wood and wire they went up in were little better than death-traps.

"Wings fell off sometimes when they were up in the air.

"Engines had a habit of dropping bodily out of their mountings.

"If he flew five minutes without something happening, the pilot thought himself lucky. Those were the tough guys, right enough!

"Even when they crashed—and assuming they were not killed or seriously injured—they just set about designing and building some equally dangerous contraption.

"Yes, sir: it's hats off to the pioneers every time."

IV.

WINGED MOTOR-CARS, JET-PLANES, AND ROCKET CRAFT

AFTER you have finished your sight-seeing on the air-port tower, those who have been taking so much trouble in showing you round insist on your coming down for a snack with them in the private supper-room, adjoining the main restaurant, which is set aside for air-line officials and their friends.

Here you feel lucky again in the fact that you find in this snug supper-room a friendly gathering which includes not only quite a number of airway folk, but also, among others, a breezy American oil magnate, an up-to-the-minute New York commercial traveller, and several of the experts from the designing staff of one of the big United States aircraft companies.

These visitors, you ascertain, are all friends of one or other of the executive staff at the air-port, and it seems that this supper-room is a pleasant and convenient meeting-place for exchanges of views between those who are either

in the air-line world or who may be constant and enthusiastic users of modern air facilities.

It does not take you long to discover that the oil magnate and the commercial traveller are well-known and popular visitors to this air-line supper-room.

Both are, it is clear, almost fanatical in their advocacy of air transport, and both of them, it also transpires, own and fly their own aeroplanes, using these winged craft for business purposes just as, previously, they have been using their motor-cars.

It is the oil magnate who mentions, incidentally, that he has his own personal pilot to fly his aircraft for him —this machine being a big, luxuriously-appointed air limousine in which he is often accompanied by a man secretary and assistant who is also an expert wireless operator and who can, whenever necessary, keep his employer in touch, while they are in flight, with one or other of his offices in various cities throughout the United States.

This machine of his, you are given to understand, is not so much a transport-'plane as a sort of flying " office."

In it, while he is speeding from one part of America to another, he can sit down and carry on business just as he would in his own private office down somewhere at earth level.

As you hear this oil magnate talk, you get a still clearer idea of what air transport now means to modern big business.

All his visits to the different oil-fields operated by the Corporation with which he is associated are, he tells you, now made by air in his own machine. Of course, he adds, it is still pretty expensive to run a big private aeroplane of your own and employ your own skilled pilot to fly it for you.

Actually this outlay, appreciable though it may be, is

he points out insignificant when judged from the viewpoint of the time flying saves any really highly-paid executive when on regular business journeys over long distances.

All the time he is in transit, travelling here and there, he is, if he is one of the really big-salary men, costing his company or corporation a considerable sum from day to day. But that money is wasted so long as he is sitting about doing nothing in a ship or long-distance train. Put him in a fast-flying 'plane, however, and he is here and there in no time, getting right down to important business without wasting days or weeks merely in the process of journeying from place to place, and being able to pull his full weight as a key man during all the period of years he is at the height of his powers. But even now, adds this advocate of air transport, there seem to be people who do not realise what it means to be in a world of wings as well as wheels.

It means that flying speed is reaching a stage when no part of the earth's surface, however remote it may be, is more than about sixty hours distant.

"Turn that over in your mind, my boy," says this air-minded magnate.

"Just compare our world of yesterday with our world of to-day.

"Think of what travel used to be like, away back early in the world's history, when men journeying from point to point had to make their way on their own feet. They might cover say thirty miles a day. When the time came for them to take to horseback they increased this distance to round about sixty miles a day.

"Then when mechanical progress gave us our motor-cars—well, we could cover say 300 miles in a day.

"Now see what an absolute revolution in transport flying has been bringing about. From 30 we have gone to 60,

from 60 to 300, and now to-day in one of our great high-altitude 'planes a day's rush through the upper air may take us 3,000, 4,000, or perhaps even 6,000 miles.

"You've got to clear your mind of all previous notions of time and distance. The world's just growing smaller and smaller every day."

This enthusiast goes on to draw again upon his own personal experiences.

He tells you how, prior to these wonderful days of long-distance air transport, he and his fellow-directors in associated companies had to be content with rare and infrequent meetings to discuss all sorts of matters of joint policy.

Now, using either the great trunk air-lines or their own private 'planes, they meet regularly at least once a month, in one or other of the great cities of the world, getting together round a conference table and settling important matters in half the time that was formerly required.

Just as, in a time of war crisis, great war leaders like Churchill, Roosevelt, and Stalin sped by air from Britain, America, and Russia to meet together in conference in Central Asia, so the great business leaders of our post-war world invoke the magic carpet of the flying machine to span the world for personal, man-to-man talks which solve in an hour knotty problems that might hang fire for weeks or months, if handled by letter, cable, telephone, or wireless.

These, your friend the oil magnate insists, are above all else what he calls "the get-together" days.

You do not write to anyone, or ring them up. You just jump into your 'plane and fly to see them personally. Which clears up misunderstandings, and saves arguments and unnecessary waste of time.

It is here that the young New York salesman, a real

100 per cent. advocate of air travel, joins briskly in the conversation.

Flying, he declares, is "the answer to a commercial traveller's prayer."

It solves his particular problems for him in a way nothing else could. It allows him to exercise all his art of salesmanship, and all his own personal initiative, on a practically unlimited scale.

He can go here, there, everywhere, being tied down no longer to road or rail. Towns, villages, tiny hamlets, remote farmsteads and stations—the go-getting flying salesman now has them all within easy reach.

He explains how he has had his own personal 'plane fitted up with a special type of body to enable him to carry with him, as he flies, the widest possible assortment of the goods it is his business to sell.

And he goes on to point out, incidentally, what a boon the coming of the air age is proving to women buyers everywhere, and more particularly to those women who live—as so many do—at places which are a considerable distance from any central source of supply.

Formerly such women out in "the back blocks" felt cut off from many of the amenities enjoyed by their more fortunate sisters living in the big towns and cities. But now, just as though by the wave of some magic wand, flying has altered all that.

Aerial salesmen can bring them, with a minimum of delay, samples of the latest in fashions, household equipment, books, and all those other "newest things" which can mean so much in the relieving of monotony and the easing of the domestic round. And there is no weary waiting, nowadays, for any special article the out-of-the-way housewife may find she wants urgently.

An aerial delivery van will bring it to her, in next to no time, post haste from one of the nearest centres

of supply. All of which means that no woman in this age of the air, no matter how remotely situated her home may be, need feel herself out of it in regard to such personally interesting matters as the latest vogues in hats and costumes.

Any intriguing new creation in the way of a hat, after crossing an ocean in the course of a night, can for example be duplicated and issued far and wide in a way which would have seemed fantastic in pre-flying days.

All of which, as the young salesman points out, is of course mighty good for trade. In fact he goes on to emphasise strongly something you have heard before, and this is that this new business of air transport not only accelerates existing traffic: it is constantly creating new traffic of its own, owing to the fact that it can provide so many facilities which never existed before.

One novelty which the young commercial traveller describes is the advent of what he himself calls "the flying shop."

At one time, he recalls, itinerant salesmen making their way into all sorts of out-of-the-way places throughout the United States, had to content themselves, from the viewpoint of transport, with a slow-moving horsed waggon. Then after this they took to motor-vans.

Now, it appears, they have already abandoned the earth and taken to the air. And they have also had special aircraft built for them. These machines have big, roomy bodies, and after gliding down in a field near some remote village, or hamlet, the flying salesman can let down a flap on one side of his aircraft. Whereupon the machine becomes, to all intents and purposes, a well-stocked shop with a counter and other facilities.

By the time people from the nearby village have come streaming out, the aerial salesman is ready for a rapid, brisk spell of trade. After which, wasting no time, he closes his flying shop and is soon on the wing again, head-

ing for some other little community which may lie off the beaten track.

Actually what this era of the air means is that instead of rural folk having to go in to the shops, as they used to do, the shops now come out to them—winged shops carrying an extraordinarily varied assortment of goods.

There are flying libraries which take round all the latest books and magazines. There are aerial chemist's shops. Tradesmen such as butchers and grocers all have their air delivery vans, most of these being neat little helicopter craft which can get in and out of any quite restricted landing space, and which can be seen darting here, there and everywhere, delivering the family joints and groceries.

Both the air enthusiasts to whom you sit listening—the oil magnate and the commercial traveller—are in cordial agreement on one thing.

This is that the coming of age of wings is already bringing about a revolution in the lives of everyday people everywhere.

The doctor flies on his rounds so quickly that there is no longer any anxious waiting for him to arrive.

Family reunions are now much more frequent than they used to be. Aerial week-ends bring friends together in a way that has been impossible hitherto. And children as well as grown-ups benefit too, because big aerial motor-coaches now pick them up from outlying farms and homesteads, and fly them to and from some big central school in the nearest town or city.

There is another point on which the oil magnate and the commercial traveller find themselves in agreement.

This is in their admiration for all the elaborate ground organisation which has already grown up to serve those who fly.

On all the aerodromes adjoining towns and cities there are magnificently-equipped aerial garages.

Nor is this all.

Out in areas far from such central depots there are now chains of intermediate landing-grounds which cater for the flying traveller just as do the roadside garages for those who go by car. And even at the loneliest of these aerial pull-ups you will find petrol supplies, shed accommodation, and mechanics ready to carry out any adjustment or repair.

It is while such essential ground facilities are under review that the young commercial traveller raises a question which brings up a most interesting discussion.

He points out how, after having brought his 'plane down in some air-field just outside any town he may be visiting, he has then to hire a taxicab, or any other car available, to drive him into the town itself.

"Now what I should like," he says, "and what would be ideal for a good many more like me, is an aeroplane that is a motor-car as well.

"I know there's nothing particularly new in this as an idea, but it would be a real boon to people doing my sort of daily work if we could get a machine combining 'plane and car—one in which you could fly whenever you had any considerable distance to cover, and one in which, on reaching the outskirts of the town or city which was your destination, you could leave the air and motor straight in through the streets to the hotel at which you were stopping."

The suggestion for some hybrid machine of this kind proves very intriguing to the oil magnate, who promptly carries the idea a stage further.

"I'm perfectly certain," he declares, "that the use of one machine for one purpose, and some entirely different kind of vehicle for another, will give way eventually to a form of composite apparatus which will run along the roads, fly through the air, and even when required move about on the surface of the water.

"Probably it will have a body which is part boat and part car, while for flying purposes it will have either telescopic metal wings or some form of revolving screw on the helicopter principle.

"It will be a sort of aerial yacht, plus car, and as soon as something like it is on the market, you'll find me putting in an order for one.

"Just imagine the fun you could have on a holiday tour in a machine like that—flying just whenever you wanted to, and then varying this by a spell of driving on the roads, or a cruise across a lake or up some river.

"I've heard more than a few people complain of the monotony of flying, and nothing but flying. But if you could get an all-purpose craft like this—a real 'three-element' machine—you'd never need fear any boredom when out on your travels."

Then the two of them—oil magnate and commercial traveller—proceed to elaborate this fascinating idea, the latter pointing out that whereas any ordinary individual might find it rather a strain, financially, to run both a motor-car and an aeroplane, he might be able to budget much more satisfactorily for a single vehicle which would, in one and the same machine, give him the pleasures of both flying and motoring.

The production of any such machine ought, he adds, to be a really sound proposition commercially.

It is at this point that you yourself venture to ask the aircraft designers who are your fellow-guests in the supper-room what their views are on this particular problem. You do not forget to mention, incidentally, how the astute Mr. Harman had, while you were chatting with him on the air island, referred to certain experimental work actually in hand to make small helicopters fulfil the dual rôles of 'plane and car.

These aircraft designers, you soon perceive, being the

essentially practical men they are, do not regard the scheme with very much enthusiasm.

Not that they have any wish to dodge awkward problems. Far from it.

One of them tells you of the motto displayed in the offices of one big aircraft organisation, and which is to the effect that, although they can now do the impossible fairly quickly, the accomplishment of a miracle still takes them rather longer!

No, it is not the difficulties of any hybrid machine which intimidate them. They are only too willing to get their teeth into anything and worry it out by sheer concentrated team work.

What does make them fight somewhat shy of the "boat-car-'plane" proposition is that it runs contrary to a fundamental axiom of engineering design and construction.

This axiom is to the effect that any machine which may be evolved, no matter what its purpose, should be as simple as possible. Working parts wear out. Therefore, granted of course that any machine which is in question is made to fulfil its purpose efficiently, there should be as few of them as possible.

Not only this, but elaborate and complicated structures prove difficult and costly to build, and do not lend themselves to production on anything like a quantity basis; while any complicated piece of apparatus, full of all sorts of pieces, usually takes quite a lot of maintenance and repair to keep it in running order. Hence, as can be readily imagined, the ideal of designers and constructors is simplification—the reduction to a minimum of essential moving parts. As one of these experts puts it:

"You can build a very nice boat. You can turn out a thoroughly good car. You can produce a first-class aeroplane. They are all single, individual, straightforward propositions. But try and combine the features of

all three in one and the same design and you find yourself coming up against it in more ways than one.

"Even if you assume that the job can be done, the risk you have to face is that your finished product won't be a particularly good boat, that it won't shape any too well as a car, and that it may be something of a "wash-out' as an aeroplane. And that when you get down to bedrock, is the trouble with most of these hybrid pieces of apparatus.

"They are neither fish, flesh, nor good red herring.

"They may do several different things just moderately well, but they won't do any one of them particularly well."

These remarks give rise to an amusing discussion in which the oil magnate chides the technical men for not giving enough rein to their imagination.

Seizing a piece of paper, he roughs out his idea of a three-element machine which will, he declares, solve the world's transport problems once and for all.

First he sketches a streamlined body which is to be fashioned out of lightweight metal alloy, and which must, he says be so built and equipped as to serve the threefold purpose of boat hull, car body, and aeroplane fuselage.

Inside this body, he continues, there will need to be a power-plant which, through gearing, will drive a rear under-water screw when the vehicle is moving on the surface say of a lake or river; and which can also, when a wheeled under-carriage is lowered, provide the necessary motive power when the machine is running on the roads.

Not only this, but this same engine or engines will also be needed, through a further system of gearing, to operate an external air-screw whenever this three-purpose machine leaves road or water and takes to the sky.

Along the side of the body will be telescopic metal wings which can be retracted into suitable casings when not

in use; and a similar method is employed with the rear control-surfaces that are required when flying.

An indulgent smile comes over the face of one of the aircraft designers as he looks over this rough outline.

"Why not go one better still?" he asks.

"Why not add a few more gadgets and make this land-sea-air machine of yours act as a submarine as well?"

Some of the others laugh at this, but the oil magnate is quite equal to the occasion.

"Sure," he says, quickly. "Why not?

"That's an idea already at the back of my mind.

"Just make your boat hull submersible, that's all, and then you've got everything.

"You've a machine that will take you anywhere and everywhere—over the land and across the sea, and up in the air and under the water. What more do you want?

"When we can actually set a machine like that, boys, it'll be something that will really make fact look a darned side stranger than fiction."

The talk takes a more immediately practical turn when somebody suggests that, even should technical snags arise, the building of some sort of hybrid machine capable of operating on land and water, as well as in the air, might be extremely useful for exploration and survey—enabling explorers to travel quickly across stretches of desert, penetrate far up tropical rivers and, when necessary, fly above otherwise impenetrable areas of virgin forest.

The technical men get into a huddle at this, and appear to take the idea rather more seriously.

It is, as one of them says, a somewhat different proposition to construct a particular machine for a quite special job, than it is to try to produce something capable of being put into quantity production on a commercial basis.

If, for example, those organising some world-wide

exploration scheme were to come to these designers, and say they wanted a quite specialised apparatus to suit their own specific purpose—some kind of flying machine that would, say, alight on lakes or rivers and also manœuvre on land—the proposition could then be developed not on anything like commercial lines but just as a piece of individual experiment and research.

This might mean that the machine as eventually produced would be costly, that it would probably be a complicated bag of tricks, and that it might develop unexpected faults when actually in use.

If the explorers did not mind this, and if they had skilled engineers with them, capable of dealing with any teething troubles their machine might develop, they might certainly get something which would serve their particular purpose over a limited period of time.

This carries the talk further into a particularly interesting field—that of the designing of commercial aircraft for all sorts of special tasks.

One of the airwaymen who has been in Russia describes the initiative shown by the Soviet authorities in employing specially-equipped aircraft to assist the development of agriculture.

He describes, for example, how seeds can be sown over wide stretches of prepared ground by low-flying aircraft equipped with special apparatus, such seed-sowing 'planes being able, of course, to effect tremendous savings of time as compared with any other method; while among other uses of aircraft in agriculture is the employment of specially-fitted 'planes to fight any insect-pests which may be attacking crops. These machines, flying low over the crops, spray them with chemicals which exterminate the pests.

After agreeing that there is a big and ever-growing field for the design of special 'planes for all sorts of special

commercial work, the experts who are chatting together in the supper-room find themselves debating the all-important question of speed in commercial flying.

Here a point that is soon emphasised is that though the air is, of course, the world's ideal speed medium, you have to pay the price of high speed in flying just as you have in any express form of travel by land and sea, very fast 'planes needing more power, and carrying less pay-load, than do lower-powered, slower-flying craft.

Which leads both designers and airwaymen to agree that though the chief desire in flying is to save time, there are at the same time many travellers to whom a saving of minutes and hours is not really so vital, and who, though they prefer to go by air if they can, have no particular desire to hurtle across the sky at any extreme speed.

What this implies is that apart from express air travel, moving at the highest cruising speeds obtainable, there is a slower form of what may be called tourist air traffic, employing big, comfortable machines cruising at moderate speeds, and offering the public fares which are considerably lower than those charged by the express services.

It is at this point that one of the traffic experts explains that he is, at the moment, busy drawing up a programme for a series of world pleasure cruises by air which will not operate to any rigid time-schedule, but which will waft parties of tourists from place to place, enabling them to visit all sorts of beauty-spots throughout the globe, and to make stays of varying duration at their different ports of call.

For such trips the machine required is a big, roomy sort of "aerial yacht"—a machine in which ample space, and a maximum of personal comfort, are of more significance than any high cruising speed.

This expert adds that already there are clear enough indications that world air touring, in big luxury "flying

ships," is likely to rank very high in popular favour, enabling people—apart from the sightseeing they do on the ground—to obtain magnificent bird's eye views of the different countries they are flying over.

"See the world by air" is a slogan with an ever-growing appeal.

On trunk air routes, it is generally agreed, the development of traffic is calling more every day for different kinds of services operating at different speeds.

Business men in haste ask for, and willingly pay for, the fastest kind of air travel that can be provided for them. And then there is a growing demand for a slower type of service for those who are not in quite such a hurry, and who do not want to be called upon to pay special express fares; while another, and even slower, type of service is beginning to cater for tourists who want to enjoy the pleasures of flying, but who are not in any sense tied for time.

Similar trends, it is added, are also being noted in goods transport by air, in which special express services at special rates are supplemented by others carrying bigger loads of somewhat less urgent goods at rates which are not quite so high.

"What you've got to remember," says one of these experts by way of summary, "is that though speed is our shop-window selling point, and always will be, there are any number of people everywhere who want to enjoy an air trip without caring much about what actual speed they are attaining.

"The ordinary citizen who acquires his own little air-car hasn't much inclination to go streaking across the sky at any breath-taking speed.

"He probably want to enjoy a pleasant, leisurely view of any panorama that may be below him.

"Safety and ease of control are things which appeal

to him more than sheer speed. The machine he buys is one which is quiet and comfortable, and reasonably inexpensive to operate. Of course it's nice for him to have a turn of speed if he happens to be in a hurry, but what I'm getting at is that to many ordinary people who take to the air there are quite a few considerations which are as important as, and even perhaps more important than, that of the maximum speed at which any particular aircraft can fly.

"You've got to preserve a sense of proportion about this question of air speed.

"Even in these days it isn't everybody who is in a tearing hurry. Of course there are your big captains of industry, and others like them, to whom every minute saved is a minute gained.

"The same applies say to any surgeon hurrying to perform some very urgent and serious operation. But there are hosts of other people who are quite happy just to potter along through the air at what, to us, is a very moderate cruising speed indeed. And one mustn't forget that even a comparatively slow-flying aeroplane is saving lots of time over any vehicle moving on land or sea. Naturally we want all the speed we can get for certain classes of express traffic. But we don't want to let sheer speed become a sort of fetish with us."

So the talk in the cheerful supper-room goes on, switching from one aspect to another of this great and vital subject of the air.

Before the gathering breaks up one or two fresh visitors stroll in.

These, you find, are representatives of rail and shipping companies who have their offices at the air-port, and who supervise the connections which have to be made between traffic which may be making part of its journey by ship or train, and part of it by air.

There are now many passengers, you are told, particularly those who may be travelling for pleasure, who like variety when on a long-distance tour, and who will cover a certain section of a journey by rail, and then switch over from train to 'plane, perhaps finishing their trip in some luxury steamship.

Every detail of such combined land-sea-air tours, with accurately timed connections between train, ship, and 'plane, are worked out in expert collaboration between the representatives of the three systems of transport, and you feel it to be a good augury for world travel generally that there should be this spirit of active co-operation, as well as of healthy rivalry, between organisations operating rail, sea, and air routes.

That such co-operation is something very much more than perfunctory is shown by the friendly way in which these experts of the three types of service get together for discussions in the supper-room. Somewhere you remember having heard it said that air transport is destined by degrees to put all other forms of travel out of business. But here before you, as these rail, sea, and air men sit together chatting, there is no suggestion of anything of the kind. What does actually emerge, in fact, is that all three systems of transport, operating in a spirit of friendly rivalry, are out to develop a still bigger travel habit on the part of the world at large, and that it is recognised that the popularity of air transport, with the new fields it is opening up, will be beneficial rather than harmful to the two older methods of travel, seeing that the more people can be encouraged to voyage about the world, visiting new scenes and places, the more likely they are to patronise trains and ships as well as 'planes.

This, you feel, is a broad and sensible view of the situation. What it implies is that the air, opening up as it does new vistas in travel, is having a generally stimulating

influence on the whole of the world's transport, getting people afield who have previously been inclined to stay at home, and broadening everybody's knowledge of, and interest in, the globe on which they live.

The great link-up which is taking place between the transport of land, sea, and air has, all these specialists agree, immense potentialities for good in all sorts of directions, ushering in such an era of universal travel as the world has never see before. And to travel extensively is, of course, an education in itself, making as it does for a spirit of toleration and mutual understanding between the people of different lands.

One development which strikes you as being unusually interesting is the way in which certain of the chief rail and shipping organisation have gone into the air with the creation of their own flying services, thus being able themselves to offer patrons the advantage of air speed in cases where the time-factor becomes specially important.

Such air express facilitates supplement, rather than supplant, their existing surface routes, and people using them have naturally to pay special fares over and above those charged for the slower services.

These rail and shipping organisations also find it advantageous, apparently in quite a number of cases, to provide special air connections and auxiliary services in localities where, for one reason or another, surface transport has to cope with special difficulties, or factors which cause delay. None of the exclusively flying organisations view these aerial developments by the sea and land concerns with any trepidation or feelings of dismay.

Far from it.

The more the merrier is their way of looking at it, because they believe that the more people can be induced to fly, whether by their own services, or by any others, the better it will be in the long run for all concerned.

To make the world more travel conscious is the aim of all these experts—rail men, ship men, and air men.

The passenger who enjoys a boat or rail journey to-day is a potential air traveller to-morrow.

The main thing is to concentrate on popularising travel as travel and then for all methods of transport—land, sea, and air—to be dovetailed into a great scheme which encircles the whole globe.

You have a chat with one of the shipping men about marine air transport.

"It was away back just after the war of 1914-18," he recalls, "that the big steamship companies began to look into the question of operating air as well as sea routes.

"You see we have all the necessary facilities already in existence in the shape of a big organisation all over the world, with ports and local staffs, to say nothing of our experience in the handling of long-distance traffic.

"In those very early days of air transport what deterred us, more than anything else, were all the international complications which kept cropping up. One country would give permission for aircraft to pass freely above its territory. Another would refuse anything but the most limited facilities, while yet another would bar completely the movement of aircraft over the zone under its control.

"That sort of thing, as you can imagine, meant all kinds of difficulties and delays. Nowadays, however, we have a world which has grown universally 'air-minded,' with the nations agreeing to facilitate, rather than restrict, the legitimate movement of aircraft which carry commercial loads.

"Actually," goes on this expert, "it is when you come to think of it a quite natural thing for people who run surface ships also to operate flying ships.

"Our great modern flying-boats are, one can say without exaggeration, ships with wings. Do you remember,

by the way, how one of the great air pioneers, Bleriot, designed a machine which was fundamentally a marine, sea-going craft with wings added to it? And Bleriot also provided means whereby, when this machine was on the water, its wings could, if necessary, be discarded, the vessel then proceeding as a definitely surface craft.

"All that we shipping people have done, you might say, is to fit wings on some of our ships and, whenever we find it an advantage to do so, reach higher speeds in the air than we could hope to do with any of our vessels moving on the surface of the water."

It is after this that these shipping men, rail men, and airway men, become engaged in a discussion—which apparently interests them all very much—as to some of the trends now developing in the size of aircraft used for commercial purposes.

Although for certain forms of long-distance traffic the "giant" type of 'plane may be a sound enough proposition commercially, the general opinion seems to be that the most economical all-round air unit is one of fairly moderate size, and that instead of operating a comparatively few very large machines, on more or less infrequent time-schedules, it is more profitable for any operating company, and more advantageous to the air travelling public, to schedule services which are as frequent as possible, and which are flown by machines of a handy size, seating say from thirty to fifty passengers. But of course there are no hard-and-fast rules in this respect. Each route, each type of service, has to be examined from its own particular set of circumstances.

This problem of the frequency of an air service, apart from the question of its speed, is you realize an extremely important one.

Take the case of a business man who may be called upon suddenly to make an urgent journey from one big

city to another lying some distance off. If there is a really frequent as well as fast air service between these points, he can just hurry to the air-station and, within perhaps a few minutes of getting there, and without having to look up any particular departure in a time-table, can be on his aerial way.

The same will, of course, apply to his return trip as soon as his business has been completed, which means that he has lost none of the advantages of air speed by having to kick his heels waiting for one particular service. The ideal, in fact, seems to be as frequent an air service on busy routes as it is possible to schedule, such high-frequency traffic being dealt with by handy, medium-sized machines which can be filled and emptied quickly, and which can get off with full loads without any congestion of traffic developing at terminal points.

Even on a long-distance route like that between London and New York, statistics indicate the desirability of high-frequency schedules.

Here one has really something new—the idea of just "hopping" across the Atlantic and back at quite short notice, and without anything in the shape of time-wasting preliminaries. A New York business magnate may, for example, be talking to his opposite number in London on the trans-Atlantic wireless telephone.

Suddenly some problem crops up in their discussion which cannot be dealt with satisfactorily except in a personal talk.

"All right," says the man at the New York end, quite casually, "I'll be coming right over now."

Whereupon, without fuss or bother, he slips out to the air-port and if he is lucky he may catch a departing 'plane for England almost immediately. Or, in any case, by the time he has had a meal in the air-port restaurant, he will be able to get a place in an out-going service.

It is this motto of keeping things moving, not only in the air but also on the ground, and thus preventing loads hanging about at terminal points, which is applied to goods as well as passenger traffic, the urgent cargoes which flow into the freight offices at the air-port being got out to waiting 'planes, and sent aloft, with a minimum of delay, either by night or day.

There is one expert, you notice, to whom the others often turn for information or for corroboration on some point they may have been raising.

He seems a regular mine of facts, figures, and air information generally.

This—as you find when you get into conversation with him yourself—actually represents his particular business at the air-port.

He is what the others call " the figure man "—a human encyclopædia on everything that is happening in air transport everywhere.

As chief of the air-port's busy Bureau of Information, it is up to him to have the answer for any and every sort of question that may be fired at him. He explains that it is to him, in the first instance, that the aerodrome switchboard turns over calls that come in from people who want to book special aeroplanes for urgent flights in which time is the vital factor.

He also gets out statistics which analyse the volume of traffic passing in and out of the aerodrome, while another job that comes his way is to deal with enquiries from members of the Press.

Not only this, but he adds that one of his most interesting jobs is to keep in close touch with his opposite numbers at air-ports not only throughout the United States but also with those on air-lines and in aircraft factories on the other side of both the Atlantic and Pacific.

" Always remember this," says this information man.

"After Orville Wright had made the first flight in an engine-driven aeroplane more than forty years ago, he and his brother Wilbur predicted that the flying machine would be the greatest purely humanising instrument ever introduced into the world.

"Even though we've seen some pretty grim uses made of it, they'll be proved in the long run to have been right. Make no mistake of that.

"Time and again, when my telephone rings, it turns out to be a case in which aviation is a means of saving life.

"An example?

"Why, certainly.

"Only the other day a famous surgeon was ringing through to me. He had an urgent case to go to some considerable distance away. It was a matter of performing a major operation as soon as possible.

"An hour or so might make all the difference. Well, we rushed him out one of our fastest 'planes, and—as he rang me up to say afterwards—he reached that patient just in the nick of time.

"That's only one case among many.

"Even bomb-dropping, associated with such sheer destruction, can be put to constructive uses.

"Yes, that's a fact.

"Special kinds of bombs are now used to clear ice-jams in rivers, while another sort of chemical bomb can quell any outbreak of fire which air patrols may have detected in valuable forest lands.

"It's becoming more and more difficult every day," goes on this expert, "to put any sort of limit to the part flying plays in our ordinary, everyday affairs.

"The president of some great trading concern may ring me up. He wants to take a party of his business associates to inspect a number of industrial plants in widely separated areas and, as both he and his friends are

exceptionally busy men they don't want to waste any time about it. Well, that's where I come in, and I soon fix him up with a nice big, luxury 'plane, complete with an electric kitchen, stewards, and a fully-stocked buffet. What you might call a flying hotel. And in that machine he and his friends make their trip in absolute comfort, completing in a matter of days inspections which would have taken them weeks if they'd travelled in any other way.

"As a contrast to that sort of special charter, we may get a call for a 'plane to fly out with a fishing fleet, so as to detect from above the location of big shoals of fish, and report their position by wireless to the vessels of the fleet.

"Here's another thing," he continues. "Everybody agrees that one of the biggest influences on our human affairs is that of the weather.

"It has its effects on things everywhere. And one of the facts that has been emerging for some time past is that the sort of weather which may make or mar our pleasure down here at ground level is being 'manufactured' for us up in air zones at immense heights above the earth.

"It is these upper regions, and the atmospheric conditions existing in them, that specially-equipped 'planes are investigating more and more systematically every day.

"New meterological stations are being established at remote points throughout the world. Our high-flying 'planes are ascending regularly to collect up-to-the-minute data as to what is happening in these 'weather factories' at vast heights above the earth, and we now have the promise of further, and even higher, investigations by specially-designed, instrument-carrying rockets.

"All information is wirelessed frequently to central depots, where it is plotted out on special maps.

"Not only does this enable accurate weather forecasts to be prepared, but it also helps our meteorologists to issue forecasts for longer periods ahead than used to be possible.

Which is of course important, not only to us in aviation but also to agriculturists and to ordinary folk everywhere."

This busy Information Chief has, it further transpires, flown back just recently from Europe, after attending a conference at which, among other things, experts were really getting down to the question of using one form of international, universal language for use by officials and others in flashing their messages along the trunk airways of the world, and also in the exchange of documents and in general conversation between the travelling air staffs of different countries.

"If," explans this expert, "we can get agreement as to some basic form of language for our everyday airway use, it shouldn't be long before ordinary air travellers, flying constantly from one country to another, may begin to find it advantageous to acquire a working knowledge of some easily-learned universal tongue.

"In my opinion, at any rate, there's not the slightest doubt but that world-wide flying will, before long, make it essential to rid ourselves of the babel of different tongues which we have been obliged to put up with hitherto. Of course there's no reason why individual nations should not preserve their own national tongues for use within their own territories. But in our air age, with all great countries just next-door neighbours it is a needless irritation for flying travellers to be talking all these different languages."

It is at this point that one of the experts from the aircraft factory asks the information man about an aspect of the recent conference which has a special interest from a technical point of view. This concerns the latest progress in the evolution of aircraft which dispense with propellers, using instead the new method of jet propulsion. As with most other developments in the technical field, this system has had to go through various "teething troubles," but at the same time its fundamental advantages are outstanding

—conferring as it does greater speed at height, greater mechanical simplicity, and greater lifting power and manœuvrability on aircraft so equipped.

Here the Information Chief says he can throw some light on a development which has taken place as a result of recent co-operation between air transport organisations of different countries.

These trunk routes, though competing keenly in obtaining traffic, are at the same time fully conscious of the benefit not merely to any one enterprise, but to all the operating companies, of an active programme of technical research in the improvement of all aspects of airway organisation—'planes, flying equipment, ground services, and traffic control.

To give effect to this research scheme they have, it seems, set up in Europe a big technical laboratory, which has been given the task of analysing the use of aircraft commercially, not only in the interests of operating companies, but also in those of the air travelling public—the aim being to evolve machines which shall be more efficient as transport vehicles, and which shall at the same time provide still greater comfort for those who fly in them.

It is to this central airway laboratory that has, among other things, fallen the task of " ironing-out " any technical questions arising from the regular use of the " jet " system for propelling transport 'planes of different types.

" As of course you know," says the information man, " the root idea involved is one that has been on the cards for quite a time.

" It's been chiefly a question of clever, persevering people getting right down to it and converting a theory into a reality. Which is simply saying much what one might say of most other inventions.

" The notion itself is simple enough.

" What you do is to draw air in through an inlet in the

front of your 'plane. Inside that machine you have a compressor, a heating or combustion chamber, and an ejection nozzle.

"The air that's drawn in at the front, after being heated and compressed, is ejected through the rear nozzle in an enormously powerful jet, and of course it's the reaction to that jet, thrusting rearward almost like the blast of a high explosive, which drives your aeroplane forward.

"Nothing more in it than that—just at a first glance, at any rate. But, like other propositions in engineering, it is not so much the main principle as all the ensuing details which really count—all those 'snags' of various kinds which begin to crop up directly you try to make the idea work in an ordinary, everyday sort of way.

"That's why so many inventors, poor chaps, die before they ever see their idea emerge as a practical proposition.

"Often its not a matter of weeks, or months, but of years, before the last incidental problem has been solved, and the scheme is really workable.

"This jet propulsion business hasn't been any exception to the rule.

"First of all the idea is born.

"Then there are all the wearisome, heart-breaking delays before anyone is interested enough in it for things really to get moving. After which years of hard and patient work are needed before an apparatus emerges from the laboratory in a form permitting anything like a conclusive test. And even then the battle is only partly won, because any amount of further work is necessary before the goal is reached of producing the things in quantity on a definitely commercial scale.

"Incidentally," adds the Information Chief, "there's one class of worker for whom I've a greater admiration every day.

"He's the scientific research man—that back-room boy

who just works away day after day without any bouquets or spot-lights coming in his direction.

"Not that he wants any fuss made of him. On the contrary. The fascination of his work is enough for him. There were some of the experts from our central airway laboratory at this conference I've been attending on the other side of the pond, and a pretty brainy lot they were, I can tell you.

"Not that it's easy to make 'em talk. But when they do say anything, you can take it that it's something worth listening to. Just now, for instance, they're wrestling with this new way of flying that's represented by jet propulsion, and already they're getting their teeth into all its future implications and possibilities.

"Here's another of the things you notice, more than anything else, about these clever 'back-room' boys. It isn't what's happening just now in aviation that interests them so much. They just nod their heads and take all that for granted. These fellows don't seem to live in the present. It's not our flying of to-day that concerns them.

"What they're planning, in their laboratories, is the flying of to-morrow and of the day after to-morrow. And when while you're talking to them you manage to get a peep into some of the wonders aviation still has in store for us, you realise that all that's happening to-day, remarkable though so much of it is, is merely an instalment of what the air age will be really like when our scientists and research-workers have succeeded in producing, in completed machines, what is actually shaping in their laboratories at the present time.

"There was one hint I got of what may be coming, and it's been lingering in my mind ever since. Listen. It's going to be a huge, perfected jet-'plane, and from what these back-room boys now say—though they don't say much—it may turn out something like this.

"You'll have wings and control surfaces of an ordinary shape and size when you're taking off and climbing. But when you get up to your cruising height, whatever it may be, and are flying horizontally, you'll be able, so to say, to begin reefing your wings.

"They'll be telescopic.

"As you gather speed, so you'll gradually decrease your wing area. See the idea? Some of the lifting surface you want when getting your load off the ground, or while gaining height, won't be needed once you've got your altitude and are opening up your power-plant in real earnest.

"What this wing-reefing scheme will do, as I understand it, is to give us such speeds in long-distance flying as would be out of the question with any fixed-wing machine.

"You'll just telescope your wings gradually, as you work up speed, till you've got precious little surface of any kind exposed, and your machine is just flashing across the sky, eventually reaching some fantastic rate of travel which makes one dizzy even to think of it. And of course when it comes to slowing up and alighting, and you want more supporting surface again, you'll operate your telescopic mechanism in a reverse fashion, extending your wings again as required so as to contact the ground at some reasonable sort of landing speed.

"These scientific chaps told me the telescopic wing notion hasn't anything new about it.

"Inventors, they say, have been working on it a long time, just as they have on this jet propulsion scheme.

"What it's all a question of, mainly, is of being able to spend time and money on experiment and research, and also on the full-scale tests which cost so much money.

"Actually, if this wing-reefing does work in a practical way, it'll be another case of going back to Mother Nature for the root idea, because the bird, as we know, makes a

very effective use of its power to extend or contract its wings as required.

"These technical men seem pretty certain now that something on the lines I've mentioned will be evolved, and they reckon we shan't get a full flexibility in flight, or attain the highest speeds possible with this jet propulsion system, until we've the power of controlling, while in actual flight, the amount of sustaining surface we employ."

The experts from the aircraft designing department have, you notice, been listening with particular attention to what the Information Chief has been saying.

"What you've got to remember," one of them now points out, "is that there are different ways of getting at the same sort of result.

"Already, we use wing-flaps and other gadgets for combining high-flying speeds with reasonably low landing speeds, while methods have also been employed of varying the camber or cord of a wing rather than attempt any actual telescoping—remembering that in the latter method you've a good many mechanical problems to overcome. But, when all's said and done, there's no finality to experimental work. Already our technicians are examining such questions as arise in the use of rocket propulsion for the super-speed transport of passengers and mails; nor do these experts forget the vast possibilities in the harnessing of atomic energy as a future power for air transport purposes.

"What seems impossible to-day may be accomplished to-morrow. All that you want, in times of peace, is the same driving power behind your experiments as is forthcoming under the demands of war, as illustrated by the marvellous progress achieved with atomic energy research.

"Given the right man, the right laboratories, and enough money to spend, and science will provide you with almost anything you want nowadays."

The oil magnate has been looking thoughtful while this discussion has been going on.

"I reckon," he now says, "that the time will come when we shall get tired of rushing about the stratosphere in man-carrying rockets, and shall give our back-room boys the job of planning a machine in which we can reach the Moon, and perhaps even Mars."

"Odd your mentioning that," comments the Information Chief, "because that happened to be the very question I myself asked those laboratory wizards I was talking to, more particularly as atomic power now seems a possibility for inter-planetary travel."

"And what did they say?" asks the oil magnate.

"Well," comes the answer, "all one of them did was to give me a rather queer look.

"Then he said quite casually: 'Why not?'

"The tone in which he said it made me think that if you locked some of these boys up in that back room of theirs, and told them to produce a rocket-'plane in which you could fly to the Moon, it wouldn't be long before they came out with something which they said they reckoned would just about do the trick.

"Of course that makes one smile to-day," is the comment of an air traffic man, "but while we do look on it as a joke, we mustn't forget that a good many of the things we used to make fun of, not so long ago, have become actual facts to-day.

"He laughs longest who laughs last.

"Very likely in days to come, when travellers have begun to make inter-planetary flights, they'll be smiling pityingly when they recall how we, here to-day, were dismissing as merely fantastic the idea of an air journey across outer space."

"Yes, that's right," agrees the Information Chief.

"You've got to keep a pretty open mind nowadays. It

doesn't do to pooh-pooh anything. More especially now we see our way to harnessing the atom.

"As a matter of fact, as I was flying back from this recent conference, I found myself picturing how our smart airway sales fellows of the future would be able to let themselves go when—if it's ever the case—we do actually reach the era of inter-planetary travel.

"You get the idea, of course.

"Special week-end trips to the Moon, to say nothing of personally-conducted visits to Mars, perhaps in great machines operated by atomic power. That'll be something for the folk to look forward to when they get tired just of lightning air jaunts round this little old world of ours. Actually it'll grow so small, in the days of immensely fast rocket-flight, that I reckon people's thoughts will naturally turn to the possibility of bridging the vastness of outer space.

"When you think of it, there may be something more in it than that.

"I remember, for example, that it was after I'd brought up the subject that some of those scientific fellows on the other side got into a huddle; after which one of them pointed out that if we took a very long view of things, peering ahead millions of years, we could foresee when this world of ours would have grown too cold for human beings to live on it any longer.

"When that time does come," this pundit said, "it might be quite useful for us to be able to do a mass evacuation by air to some other planet where conditions were more favourable."

"Some idea that, don't you think?

"Abandoning this cold old world by rocket 'plane, and establishing a new life in some quite different part of the universe."

Having got to this point in your talk, there doesn't

seem much more to say. In any case it has now grown pretty late, and one by one the visitors are quitting the supper-room.

Presently you find yourself up in the comfortable bedroom you have booked in the air-station hotel. But your night's rest is somewhat marred by a nightmare dream in which, apparently, an atom-propelled machine in which you have set out for Mars has lost its bearings, and seems likely to be condemned to rush through space without any hope of ever reaching any particular destination—becoming in fact a sort of miniature comet which just chases blindly here and there through the vastness of the sky. It is from this decidedly unpleasant predicament that you awake to hear one of the big night transports come rumbling in to its landing on the aerodrome outside.

V

PEOPLING THE WORLD BY AIR

It had been your idea, on the following day, to leave the air-port and pay some visits which you had arranged to make in New York. But here you had not reckoned sufficiently with the fascination of this wonderful air-station, and of all the things still to be seen there.

Twice you try to tear yourself away. But each time something fresh rivets your attention and you postpone your departure.

You are reminded of those air pioneers who used to say, jokingly that they had fallen victims to a strange germ they called "airitis"—a germ which, once in your system, they declared could never be eradicated; meaning that the victim must, henceforth, devote himself exclusively to aviation and all it implied.

Be that as it may, you certainly feel you yourself have succumbed utterly, at any rate for the time being, to the lure of air transport and everything connected with it.

Your one desire is to see as much as you can, and hear as much as you can, about these wonder-'planes of the dawning air age, and of the men who design, build, and fly them, and of those who operate and control the ever-growing streams of aerial traffic.

This being your frame of mind, you reckon your lucky star must be in the ascendant when, just as you are finishing your breakfast in the air-station restaurant, the chief of the information bureau comes bustling in, asking you whether you would like to go with him on his usual morning round of the air-port.

"I have to make it a rule," he explains, "to drop into each department personally, at least once a day, and have a chat with the people in it.

"It's only in this way that I can keep myself fully informed as to everything that's going on in a huge place like this."

Naturally you are only too glad to accept this invitation.

Soon you are seeing all sorts of things that had escaped you on the previous evening.

Actually you have hardly left the restaurant, en route for the passenger department, when one of the uniformed air-port officials comes hurrying up.

"That air-special with the flying children is just being signalled in," he tells the Information Chief.

"I thought I'd better give you the tip.

"You know the flight I mean.

"It's that big world-tour 'plane there's been such a lot in the papers about."

The Information man nods with a brief word of thanks, and then turns to you.

"Now here, right away, we've struck something more

than a bit interesting," he says. "Because this is a scheme that's something more than a stunt. It really does mean something.

"You've heard the point stressed I expect, as to how important it is, for the future of aviation, that children everywhere should be made to realise, as early as possible in their lives, all that air transport means to world progress and to a better understanding between the nations.

"Such juvenile 'air-mindedness' can be fostered in all sorts of ways, of course. One can—and one does—have lectures and talks in the schools. You can arrange good wireless features. You can have plenty of attractive air books for the young. You can organise parties of school-children for visits to aerodromes and factories.

"All good ideas, these. But you can also do something even better than that and it's something that Britain, America, Russia, and China are all arranging to do to-day. After the children have had a programme of talks and lectures, and have seen aircraft being built in the factories, they are then given the task of writing a series of essays on aviation.

"For the best of such efforts something quite special in the way of prizes is offered.

"No books, model aeroplanes, or anything of that kind. What the authorities do is to form groups of the children whose essays have shown that they're the best general grasp of the whole subject.

"Then one of the biggest of the long-range passenger 'planes is chartered specially, and a number of these lucky children, under the charge of a few selected teachers, have the fascinating and highly educative experience of an air excursion in stages completely round the world, visiting famous cities and beauty-spots, and learning from their own personal experience how flying can now open up for all of us the wonders of our globe."

"And is it one of these touring-the-world 'planes that's coming in to land here now?" you ask.

"Yes," answers the Information man. "And, as it happens, it's a British party. Somewhere about fifty children, I understand.

"Their itinerary took them first to Egypt and India, and on to Australia. After this they crossed the Pacific to San Francisco, and now they've been flying in easy stages across America to New York.

"When they've done all their sightseeing here, they'll have a final flip across the Atlantic back to England. And what stories they'll be able to tell their parents and chums when they do get back! But let's get out on the arrival platform, shall we, and see them in?"

As you walk out into the sunshine which is streaming down on the alighting area, the big British air-liner—looking like some enormous bird with its widespread wings—is just circling the air-port preparatory to alighting.

As soon as it has touched down smoothly, and has taxied up near where you are standing, one of the doors in the side of its big fuselage slides open, and the youngsters who are its passengers, boys and girls, come thronging out, shouting and laughing in the happiest spirits.

Some of them have small cameras with them. Others are carrying note-books and pencils, ready to jot down on the spot anything that may attract their attention.

The teachers who are accompanying them soon collect them in orderly groups, and they are then shepherded across into the air-port restaurant.

Here, awaiting them, are a number of American children; and soon the two parties are intermingling in eager, excited groups.

The Information man and yourself, following the arrivals into the restaurant, soon find yourselves chatting with a little group of adults who include the Captain and

First Officer of this British air special, as well as a couple of the teachers who are not actually in charge of the children at the moment.

The Captain of the special-charter machine, who turns out to be an ex-R.A.F. bomber pilot, grins cheerfully.

"Talk about ducks taking to water," he says, "why these kids simply revel in flying.

"It seems as natural to them to be up in the air as it does to the young birds. And do they bombard us with questions? I should say they do.

"They want to know everything about everything. We have them in the control-room, just a few at a time, while we're in the air, and I'm certain that the flights these children are making will be something they'll remember for the rest of their lives.

"Each of these 'air-minded' youngsters is, in fact, a walking advertisement for air transport.

"You remember how it used to be the saying that pretty nearly every boy, at one time or another, felt he wanted to be an engine driver when he grew up. Well, that's become a thing of the past.

"It isn't an engine he yearns to drive to-day. No, sir! What he wants to be doing, just as soon as ever he can, is to sit at the controls of a fast-flying aeroplane. And just look at the chances that are opening-up for our youngsters nowadays!

"Apart from the trunk air routes which are carrying more and more traffic every day, there are all the auxiliary and 'feeder' services which are being pushed out here and there. Of course all the boys who come into aviation can't find work as pilots.

"Some aren't fitted for flying jobs, anyhow. But more and more of them can secure fascinating, worth-while posts in all the ground services of air transport—as engineers, for example, or as traffic experts, wireless men, or as members

of the meteorological staffs. And taking one of these ground jobs doesn't mean just sticking in any one place. Not a bit. The whole world is open to them now.

"Skilled young airwaymen of all grades are wanted in every quarter of the globe. There was a time, you'll recollect, when some people said they were afraid the fine spirit of adventure which inspired our pioneers of old was beginning to die out in a world which was becoming too matter-of-fact. But they needn't have worried.

"Aviation is now giving us a new field of adventure which is all that the most adventurous could wish for."

Next you find yourself chatting with the two teachers who are in this little group and they, like the air-special captain, have interesting things to say.

Both of them agree that it is a wonderful world that the coming of the air age is bringing to young folks, as well as to their elders; and one fact you glean, incidentally, concerns those children at schools in England whose parents may be stationed in remote parts of the Empire.

Prior to the era of rapid air transport, and when holiday time came round, many of these youngsters were, it seems, unable to go out to enjoy their holidays with their parents, seeing that so much time would have been taken in surface transport trips to and from wherever these parents might be stationed.

Now, thanks to modern air speed, they can fly home for their holidays no matter how far away their parents may be located.

Not only this, but fast and frequent air services, linking Britain with Dominions and Colonies are, the teachers tell you, the means of bringing about a most valuable exchange of pupils between schools throughout the Empire and other similar establishments in the Homeland.

"There is no educative process that could be finer," one of the teachers declares, "than for children when at

an impressionable age to go out for a spell to some school overseas, getting a broader view of things thereby, and being made all the more ready, in later life, to develop a real spirit of kinship with those living and working in far-off lands.

"By a reverse process it is an education in itself for children from different parts of the Empire to fly to England, as they are doing, for a spell with us here in our schools.

"It's the sort of thing that is now being developed more every day.

"Instead of just reading about other countries in books, children while at their most plastic stage mentally can be carried by the magic carpet of the air to pay actual visits to other countries, and can remain long enough in them to gain impressions that will remain with them always.

"Such air exchanges between centres of education apply of course to universities as well as to schools for children. Parties of the older students now fly from one country to another, assimilating by personal contacts the view-points and aspirations of the rising generations of other lands.

"As for this particular trip we're now completing, you can imagine for yourself the stimulating effect it will have on the minds of all the children we have with us, more particularly as we shall ask them as soon as they get back to England, and while impressions are still vivid in their minds, to write us some further essays outlining the chief things that have struck them.

"The globe on which they live no longer seems a vast and mainly unfamiliar place to children who have been able to make a circuit of it by air. They realize, well enough, that long-distance flying is transforming everything, and that when they grow up all the old barriers and restrictions will have gone for ever, making this world of ours a happier place for human beings to live in."

It is here that the Captain of the children's air special joins in the conversation again to impart a fresh piece of news.

"There's one thing I've been wanting to mention," he says. "There's been another big special-charter 'plane following us in and out of some of the chief air-ports on the recent stages of this trip. The machine seems as though it's got a lot of important people aboard.

"I haven't been able quite to get the hang of the thing. But, so far as I can gather, some of the big Governments on the other side of the pond are particularly keen on developing emigration and overseas settlement by means of the air, and it seems that they've sent out a party of experts, in this special 'plane I've told you about, to investigate possibilities in all sorts of different territories and then to fly back and draft out a special report.

"And is this 'plane following you in here right now?" asks the Information Chief.

"Yes," answers the air-special captain, "I'm fairly sure it is, according to what I heard at the last place we stopped at."

"Gee! Then I must get cracking," says the Information man, briskly.

"This looks like being a real story, boys—something I've got to have the low-down on, right away."

Whereupon, leaving the party of merry children in the restaurant, he darts off in the direction of his office, calling upon you to follow.

The first thing he does, once at his own desk, is to ring up the traffic-control officials in the air-port tower. From them he is able to confirm, officially, what the Captain of the children's air special has just been saying unofficially.

There is a second big special-charter 'plane signalled as heading for the air-port, and it will not be long, now, before it is due to land.

After hearing this the Information man puts in a series of calls to people he knows in official circles in New York, and from the questions he fires at them, and from the nods he gives at what he hears in reply, you gather he is now collecting all the facts he requires.

Replacing the receiver after his last inquiry, he pushes a box of cigarettes in your direction and says:

"Of course I ought to have known about all this before, but you can't always keep track of everything, no matter how many 'contacts' you may have.

"Luckily, it's not too late, yet, for the air-port here to do its stuff, and show that it's well in the picture as usual. What we'll do is to organise a nice little lunch party for these guys in the air-special when it comes in, and as you'll probably know some of those who come from London I'd be obliged if you'd team up with us.

"They've just been telling me, by the way, that one of this party of experts is Professor Raymond Quinn.

"Does that mean anything to you?"

You are glad to be able to reply that it does.

It happens that you and Professor Quinn are fellow-members of a certain club in London, and though you and the Professor are no more than ordinary club acquaintances, you are able to tell the Information Chief that Professor Quinn, apart from his many scientific achievements, is now acknowledged to be one of the greatest authorities living on the problems of obtaining a better distribution of the world's population by the opening up of countries hitherto only sparsely populated, and by encouraging settlers in lands previously unexplored where there is scope for the development of new trades and industries.

"That's fine," says the Information Chief, patting you on the back.

"You should be able to make one of these guys feel

at home, at any rate, and that'll help me in getting a story out of him.

"As soon as the New York papers hear about this 'plane landing here, they'll be shooting their news hounds down on us in shoals. And if we can't give 'em what they want we shall be on the spot.

"What I'll do is to make it a sort of Press lunch, and then this Professor of yours can give us the works, talking 'off the record' of course, if he wants to."

Almost before he has finished speaking, the Information Chief has dashed off again with undiminished energy to interview the air-port's catering department, and to arrange details for the smart little lunch with which to entertain the travellers alighting from the incoming "special."

You yourself feel you would like to get out into the sunshine again.

Hardly have you done so when the expected "air special," flying a trifle ahead of schedule, comes droning in, and is soon rumbling up the runway to halt just near where you are sunning yourself at the traffic department entrance. And among the first of those to step out of the big machine is a figure you have no difficulty in recognising—small, grey-haired, alert, beaming at everyone short-sightedly through his horn-rimmed spectacles.

It is the famous Sir Raymond Quinn.

You step up and recall yourself to him, and he grips your hand immediately in a friendly clasp.

"Well, well," he says. "We used just to talk about the world being a small place. But now it actually is one.

"Friends just bob up everywhere, and you get to take it all for granted. This air business eats up distance. You've just got to scrap all your previous notions.

"I remember in the early days of the London-Paris air service we used to say that the French capital had been brought just within lunching distance of London. Now

add a couple of meals to that—breakfast and dinner—and you've spanned the Atlantic.

"Wonderful isn't it? And there are all sorts of further wonders still to come, particularly when we can harness atomic energy for peace-time purposes, and reach out beyond this planet to other worlds."

At this moment the Information Chief comes bustling up, and introductions all round follow.

Apart from the Professor, the party which has alighted from the air special is now seen to include some British Government officials, and technicians from British air-lines and aircraft manufacturing concerns, together with experts representing British scientific and industrial organisations.

Before lunch the Information Chief insists on showing the whole party over the air-port. Towards the end of this tour, which obviously interests the visitors keenly, newspaper men who have hurried out from New York join the party, and by the time lunch is served everybody is beginning to know everybody else, and there is an air of pleasant informality about the proceedings which brings a smile of satisfaction to the face of the Information Chief. It is, of course, just the sort of atmosphere he wants.

After an excellent meal in a private annexe adjoining the main restaurant, Sir Raymond Quinn, at the unanimous desire of his colleagues, agrees to act as spokesman in a chat with the reporters—it being understood that this is definitely "off the record" so far as he is concerned, the information to be used in a general way, without quoting it as having come from any specific source.

Once matters are on this informal footing, the Professor seems quite to be enjoying himself as, smoking a cigarette and sipping his coffee, he sits peering benevolently from one and another of the newspaper men who show no hesitation in firing questions at him.

Yes, he agrees, it would certainly be correct to say that

this aerial expedition has been organised primarily by the British Government, though other Governments are also interested, and will have made available to them all the data which the party accumulate.

What's the main idea underlying the flight?

At this leading question the Professor looks thoughtful for a moment and sits pondering.

"Well," he says at length," as the whole question is a big and complicated one, you will appreciate that it is difficult to put it in a few words.

"Suppose I express it this way.

"In our huge tasks of world reconstruction we need every resource we can mobilise, not only in lands already being exploited commercially, but also in many of those areas, in the more distant parts of the globe, where vast wealth of various kinds still lies untapped. In fact we have reached the stage when we simply can't afford to let anything potentially useful lie dormant, no matter how remote or apparently inaccessible it may be.

"Above all else, gentlemen, we are at a stage when it has become imperative to spread out our population more evenly throughout the globe. That is now of absolutely first-class importance. Entirely new communities have got to be set up, and maintained, in zones where settlers have never established themselves before.

"And, here, I guess," says one of the reporters, "is where flying comes in."

The Professor nods.

"Yes," he agrees, "it is now no exaggeration to say that our present-day civil aviation, with the ability it has of operating big transport 'planes on a quite reasonably economic basis, is already transforming all previous ideas as to what can be done, and cannot be done, in enabling people to live and work, under normal conditions, in parts of the globe where they have never lived or worked before.

"In the old days, of course, many shrank from the idea of emigration. It was a sort of last resort.

"It meant long and wearisome voyages to somewhere or other, and when emigrants eventually got there they felt cut off from their relatives away at home, and from the rest of the world as well, and often they had to fight grimly against all sorts of local difficulties. Not only this, but they were usually confronted by long and wearisome journeys if they wanted to visit the nearest town or city for a little much-needed relaxation.

"That was the story before the air became our new highway.

"To-day, of course, everything is different. Without needing to wait for the slow, costly, and laborious construction of roads or railways between the nearest supply point and any area it is proposed to open up for human occupation and enterprise, we can bring into service, without delay, fleets of big air transport which, I need hardly remind you, make nothing of mountains, forests, or any other natural obstructions, and which in a short, pleasant journey of only an hour or so, will complete journeys which might otherwise mean days or perhaps even weeks of tiring travel."

"Emigration, by air, eh?" comments one of the reporters, making notes in his book. "And on a pretty big scale, too, I guess."

"Of course you'll appreciate," says the Professor, "that there's nothing particularly new in this idea.

"The ability to maintain regular air communication between remote settlements, and the nearest supply centres, has already been well demonstrated by our friends the Russians, and also in gold-mining in New Guinea.

"Most interesting these experiments have been. They've pointed the way plainly enough. But what's been done, so far, hasn't of course more than touched on the fringe

of a great new phase—one of the most important of all in the rehabilitation of our battered world.

"Instead of having masses of population dumped together in over-crowded areas where it is difficult, if not impossible, to ensure any real happiness in daily life, we are going to see a great aerial emigration of such close-packed humanity, just as we see the migration of our birds, with entire communities flying north, south, east, or west, as the case may be, to establish themselves in far-off zones with all they want around them and being kept closely linked with other centres by the fast, frequent flights of passenger-'planes, lorry-'planes, air-taxis, and privately-owned machines of all kinds.

"If there is one thing more than another the world will have to thank aviation for, it will be for enabling us not only to visit, but actually to live, in localities in distant parts of the globe which have been lying dormant throughout previous centuries.

"You must understand that it's not just the migration of a few people here and there that I'm thinking of," went on the Professor.

"It's the setting up of entirely new communities, and of great new producing industries in parts of the globe where Nature has a profusion of good things only awaiting exploitation by modern science and technical skill.

"Break down the previous barriers of distance, as flying is now doing, and things become possible which have been utterly neglected hitherto. With the globe girdled by air in hours, it is no longer a drawback of emigration that it breaks peoples' links with all previous associations.

"No matter where they go to live, even in areas previously so remote, a quick and easy journey will, whenever they feel so inclined, take them back for a spell to their previous haunts."

"Can you, Professor," asks one of the reporters, "tell

us anything definite about this flight of investigation you are making now?"

"I'm afraid not," answers the Professor shaking his head regretfully.

"You see, we haven't put in any Government report yet, and, of course, it wouldn't do at all to anticipate in detail anything we are going to say in this report.

"Generally speaking, you can take it that I and my colleagues have had a free hand to tour the world by air and investigate, right on the spot, zones to which it seems desirable to direct air-borne migration on a really comprehensive scale.

"We have been considering such things as local climatic conditions, and the development of industries which will enable new air-borne communities to be self-supporting.

"Some potentially suitable air migration zones happen to lie in parts of the world over which great trunk air routes already pass. In which cases, by establishing new intermediate air-stations, and by getting settlers to fly and make their homes within easy reach of these stations, we shall realize the ambition not only of making these great trunk air routes accelerate existing traffic, but also develop all kinds of new trade.

"In other cases, where migration zones may lie still farther afield, it will be necessary to link them up by special feeder air-lines with the nearest junction or terminal on one or other of the round-the-world airways."

"What it really looks like, sir," comments one of the newspaper-men, "is that by starting these fresh towns and cities where they never existed before, in regions difficult to serve by any kind of earth transport, we shall not only solve the problem of over-population, but also accelerate world reconstruction by developing all sorts of new areas rich in mineral and other resources."

"That's perfectly right," agrees the Professor.

"Actually we've been visiting, and studying closely, many localities where there are immense potentialities in developing mines and other industrial projects, but which have been more or less unworkable, so far, on anything like a practical scale, owing to local transport problems. In such cases we propose that the problem shall be solved first of all by flying to the chosen spot, in sections, everything that is needed in the way of machinery and equipment, then by taking workers and others to the scene, also by air; and after that by establishing complete new townships to live and work in the area, their chief means of transport being provided by aircraft.

"If you picture that sort of thing going on in any number of new areas, all over the world, you can see what the air is going to mean to us in our post-war age.

"It will be the keynote of future world progress, and with the air now at our service we shall have a great new speed-travel era which will stimulate progress everywhere, and which will make every corner of the globe contribute something to our general well-being."

It is at this point that the Professor decides to call on one of the aircraft construction experts of his party.

This technician gives the reporters a quite non-technical description of the sort of "heavy-duty" aircraft which, apart from passenger-carrying machines, will be needed to maintain communications between new townships "out in the wilds" and the nearest centres of supply. Such load-carrying aircraft will, it appears, be really big machines of staunch yet simple construction, their engines giving ample power but being economical in fuel, and each machine being capable of a long working life.

"The main idea," says this expert, "is that these air lorries shall be as easy to operate and maintain as any big motor-lorry running on the roads, and, bearing as they will the brunt of the traffic on these 'feeder' air routes, they'll

prove so economical in service that they'll put a new aspect on heavy haulage by air."

Now the Professor eyes the group around him with a look of mild inquiry, as though to suggest that, if there are no further questions, the sitting might perhaps be regarded as at an end.

This, however, does not seem to meet the views of some of the newspaper men.

Having brought such a celebrity as this within close-questioning range, they do not want to let him go until they have extracted every ounce of information from him.

One of them, you notice, has been waiting for some time to ask a question, and now in the momentary lull he hastens to fire this off.

"There's a matter, sir," he says, "which though not actually on what might be called our agenda here, is one which is very much bound up in the future of flight. And it happens to be one on which I believe you yourself have spoken more than once when lecturing to scientific bodies."

"What is it?" asks the Professor, leaning forward with polite attention.

The reporter looks down quickly at some notes he has been making. Then he says:

"What we'd like, sir, if you could oblige us, is your opinion as to the possibility of any machine being developed in which it may become possible for men, at some future date, to travel across space and reach the Moon or Mars, or any other of the planets."

Across the Professor's face, you note, there comes a look of almost comical dismay.

"Oh, dear!" says he in mock distress. "I was afraid of this cat jumping out of the bag.

"It pursues me everywhere, all round the world, and it's all a retribution on me for making what I'm afraid were

some rather incautious remarks at one of our astronomical meetings in London."

He pauses for a moment as he lights another cigarette.

"Really, gentlemen" he goes on, "you've got me with my back to the wall here. But speaking just for myself and without involving any of my scientific colleagues, what I feel is this.

"Just as daring men have risked their lives in trying to reach the summit of some hitherto unconquered mountain, or have faced death in pioneer flights across great oceans, so I believe the day may come when there will be heroic men who, even while realising their extreme peril, will none the less embark in some special machine and try, as a first experiment in space flight, to traverse the 240,000 miles which separate us from the Moon."

"And will they succeed, do you think, Professor?" asks someone.

The Professor does not answer for a moment. Then he says:

"It's quite on the cards, I'm afraid, that we may never hear anything more of those first travellers across space.

"Remember how pioneer airmen flew off into the void, and were never heard of again, when they first tried conquring oceans. But there were other airmen willing to make further attempts. And probably there will be others who'll risk everything in further attempts to reach the Moon or Mars.

"It's the same spirit which made men risk their lives in reaching the Poles. It is the lure of discovery—of going where none have ever gone before.

"Inter-planetary flying!

"A will o' the wisp, of course, is what it appears now. But so, as one time or another, have achievements which science now has to its credit. After conquering land and sea, man now reaches high into the sky; and some day, I

myself feel pretty certain, he'll reach out farther still, and make the great experiment of trying to land on one of the other worlds."

"And so it's really your view, sir, asks a reporter, "that one of these days an attempt will be made for earth-folk to reach the Moon?"

The Professor shrugs.

"There are so many problems to be solved," he says, "before one can visualise such an attempt actually being made, that it would be foolish to suggest that anything of the sort is likely in the immediate future."

"What do you think is the chief obstacle?" comes another question.

"Ah! that's something I can tell you," answers the Professor briskly.

"It's an obstacle we scientific workers are always up against.

"It's summarised in the one word—money!

"Money for researches. Money for the construction of costly apparatus. Money for preliminary tests. From time to time great benefactors come forward to assist in the attainment of some specific goal, and perhaps ere long there'll be someone who'll write his or her name on history by financing a first test in inter-planetary flying. But it'll cost a lot of money, and, for all we know, success may never be attained."

"A certain amount of preliminary investigation work has already been done, hasn't it?" queries another reporter.

"Certainly," answers the Professor. "One can say that many clever people have been, and are, going into this question very seriously. Not only scientific people, but also some of those connected with the design and construction of aircraft.

"They've been probing some of the root problems that

will have to be solved before one can begin building any sort of apparatus in which to voyage through space."

"How do the plans actually shape so far as they've gone?" asks one of the news sleuths who has been busy making notes.

This inter-planetary flying story is, he knows, just the stuff the readers of his paper will devour.

The Professor shrugs his shoulders again.

"If I attempted to go into all the scientific and technical details involved," he says, "I'm afraid it would keep us all here for hours, and none of us have time for that.

"Just briefly, you can picture to yourself a space-machine as being rather like a huge streamlined shell or projectile, with an interior chamber accommodating perhaps three occupants.

"This machine is shot out from the surface of the earth at immense speed, rushing up under the propulsion of a power-plant which may quite likely be some adaptation of atomic energy for this special purpose. To get the best results, with any such system of propulsion, a good deal more research-work is necessary. And that's one of the directions in which money will need to be spent.

"The main idea," goes on the Professor, "is that the space-ship shall be driven outward from the earth by an immensely powerful discharge, till it has reached a point beyond the gravitational attraction of the earth—after which it will 'coast' through space until it reaches the lunar orbit. To avoid a too violent contact with the Moon there will now be a reverse discharge of power which will have the effect of slowing the machine up as it nears the Moon's surface; while it is also proposed that there should be a special shock-absorbing device for use at the actual moment of contact.

"Having arrived on the Moon, the occupants of the space-ship or sphere will emerge from their pressure cabin

through air-locks. Each will be wearing a special kind of helmeted suit, rather like a diving suit, which will ensure a normal supply of air to breathe as they move about outside their ship, thus compensating for lack of atmosphere on the lunar surface.

"What is it these moon voyagers will have to do outside their ship?" somebody asks.

"Plenty," answers the Professor promptly.

"From a scientific point of view, if this lunar expedition is to be of any real value, they'd have, in fact, to be pretty busy.

"They will have spades, geological hammers, and other equipment, and one of their tasks will be to collect all sorts of specimens from the Moon's surface to bring back to the earth with them."

"And how will they make their get-away from the Moon when the time comes?" is a further question.

"Here," answers the Professor, "the idea so far as it's been worked out at present will be as follows:

"There will probably be an external part of the space-ship which can be detached from it after it has reached the Moon's surface, and this detachable portion will be constructed so that it can be used as a form of cradle or platform from which the space-ship can be launched for its flight back to the earth. Then after it has made its return voyage across space, and when nearing the earth, means will be provided for slowing-up its projectile-like rush; while its occupants may at the last moment make their actual contact with the ground by parachute. Naturally, during the period such an idea as this is being transformed from plans and early designs to anything like a completed apparatus, all sorts of changes and modifications may become necessary, while we hope of course that further valuable progress will be made in the great research connected with the use of atomic power. So you'll appreciate

that all I have sketched out for you, here, is just a sort of preliminary outline of the general scheme."

"And do you really think, Professor," asks the reporter who had first raised the question, "that when the time comes men will be willing to risk their lives in such a simply tremendous adventure?"

The Professor peers at his questioner with puckered eyes.

"I do," he says, quietly. "I most certainly do."

With that the gathering breaks up, the reporters hurrying away to the nearest telephones to rush through to their papers "top-of-the-column" stories about the plans that are being made for man's greatest of all adventures—a flight to the Moon, perhaps under the influence of atomic power.

VI

THE EMPIRE IN THE FLYING AGE

AFTER the very successful aerodrome luncheon, and the illuminating conference with the journalists, you motor into New York with Professor Quinn and his party.

As you are all staying at the same hotel there, you see quite a lot of them during the next few days, when the Professor and his experts are having meetings with United States Government departments.

Then one morning a cable reaches you from London. It appears that one or two things are cropping up in the metropolis that are now calling for your fairly immediate attention, and as you feel considerably benefited already by your aerial holiday, you decide to return to England without delay.

When you mention this to the Professor in the lounge of your hotel, he pats you on the shoulder with one of his most benevolent smiles.

"Excellent, my boy," he says. "That just fits in right.

"We ourselves have just finished our talks here in New York, and when you came up to me I was just going to the 'phone to ask the Captain of our air special to get ready for a flight back to England at once. As it happens there's plenty of room in this big machine of ours—plenty.

"So what's to prevent you from packing your bag right away and doing the trip back across the Atlantic with us?"

What indeed? This is another chance not to be missed.

Hurrying to your room, you soon have your things together, and are back in the lounge again, waiting, by the time the Professor and his party are ready to motor out to the air-port.

Here last-minute formalities are completed quickly, and after thanking Mr. Maloney and those of his "boys" who have been so informative, you follow the Professor into one of the most spacious air-liners you have ever entered.

You liken it in your mind, as you look around you, to some great pleasure yacht with wings. Apart from snug sleeping berths, and a sumptuous central saloon, it has private cabins so luxuriously-equipped that they are like small aerial drawing-rooms; and as the great machine climbs, outward-bound from New York, you are struck by the almost uncanny silence and smoothness of its swift passage through the air.

You lunch with the Professor and one or two of his chief colleagues in the scientist's own cabin.

The air-liner has now climbed until just beneath you, in whichever direction the eye turns, lies a vast white expanse which is the top of a widespread cloud-bank.

The impression you gain is that you might be in some sea-going liner, skimming just above the waves of the ocean. Yet, of course, in actual fact, the surface of the Atlantic now lies somewhere very far beneath.

"For a couple of thousand years or so," observes the

Professor, "man has been striving to improve his methods of travel.

"Now at last, as we are experiencing it here and now, he's evolved a perfect method of transporting himself swiftly above land or sea.

"Here we are, sitting together in absolute comfort, high above the fogs or storms of lower zones, doing our five miles or more a minute with such a complete absence of noise or vibration that we don't realise we're moving at all."

"To my mind the most remarkable thing," adds the Professor, "is that this mighty new power should have been placed in our hands just at that phase in human history when it is most urgently needed. With a world striving to regain its lost prosperity, here is the very instrument we require.

"Not only that, but with the need for nations to bury the hatchet, once and for all and to turn their backs on all the senseless brutality of war, here is that same instrument which spells the death-knell of the isolationism that paves the way for war.

"Men who are friends don't fight each other as a rule, and flying is making all of us friends.

"And," cuts in one of the Professor's colleagues, with a twinkle in his eye, "perhaps in the end it'll make us friends with the Man in the Moon and the people of Mars, if there are any."

At this the Professor himself laughs.

"No, no," he says, "I'm not going to be drawn on that subject again.

"Those reporter men were bad enough. I tremble to think of the stuff they'll be printing in their papers.

"I shall hear about it, never fear, from some of the more dignified of my scientific friends in London. But

in the meantime I'm going to have my little after-lunch nap."

And at this he settles himself in a comfortable armchair and closes his eyes.

This after-lunch nap of his, either up in the air or down on the ground, is it appears a daily institution with the Professor.

While he is having it you make a tour of the aircraft with one of the scientist's technical advisers—an expert who mentions, incidentally, that he is connected with the designing department of the great British firm which actually built this particular "clipper of the clouds."

"During the world tour we've just been making," he says, "this machine has been a fine piece of propaganda for British design and construction.

"You'll remember how, years ago, big nations used to build specially fast and luxurious ocean liners to enhance the prestige of the countries concerned. Well, it's the same sort of thing that's now happening in the air.

"To put in our shop window, as you might say, we've machines which have just that little bit extra in speed, general performance, and equipment, that the others haven't got. And such super-'planes say more for our design and construction that we could say ourselves.

"This job we're in now is one of these flying advertisements.

"Luckily for us, in British aviation, we got away with a flying start in jet propulsion. This machine, for example, has a jet power-plant of the latest and best type, and when we want to show our paces on some special flight, our speed is round about the 500 miles an hour mark.

"Not so bad, eh?"

You agree that it is not, and then you ask:

"How is Britain really shaping, do you think, now we're

actually at the beginning of this great era of world air travel?"

"Not so badly," is the reply. "Though we're not patting ourselves on the back yet.

"It's a fair field and no favour in world aviation to-day. With all irritable restrictions now gone by the board, and with freedom to fly anywhere on legitimate commercial business, you can go ahead on constructive programmes, without fear of being tied up in official red-tape."

"And I suppose," you ask, "really big competition is already developing in the air markets of the world?"

"It is," he answers. "And it's all to the good that it should be so.

"You yourself have seen what sportsmen these American air folk are. And that's the spirit right through air transport world. We're a great brotherhood of the air. And yet at the same time, when it comes down to brass tacks, we're all animated by a keen spirit of rivalry. But there isn't any of the old, sinister, cut-throat, drive-you-out-of-business stuff.

"It's a clean, healthy rivalry to produce good machines and get a fair share of the trade.

"Our American friends have of course," he goes on, "an advantage in the fact that they've such a big home market for their machines. This gives them a jumping-off ground when they go for export trade in world markets.

"While they've got this market right at their own doors, we in our turn have a big Empire as our happy hunting-ground, and I am glad to say it's an Empire that's a hundred per cent. 'air-minded.'

"What we've to remember is that there are a good many different sides to this business of building and selling aircraft. There are the machines needed by the air-lines. That's one aspect.

"Then there are all sorts of other machines for com-

mercial purposes other than regular airway operation—all the lorry-'planes, I mean, and the heavy-duty machines for miscellaneous transport jobs in all quarters of the globe.

"Then of course there are the machines that private buyers want, just like they want motor-cars.

"That's how it's all developing now, and these are the markets we're after.

"We have to take off our hats to the Americans for their high-pressure salesmanship. You'll recall how they went out into world markets to sell their motor-cars. Well, they've learned some more tricks since then, and it's a formidable proposition, I can tell you, that our publicity and sales' staffs have to face. But we ourselves have not been standing still. We've learned a bit in this field since the days when we were up against the big American car selling organisations.

"We've a pull, and a big pull, in the reputation gained throughout the world by British military aeroplanes. If they can build machines like that for war, they ought to be pretty good at building 'em for peace—that's the sort of thing people in potential commercial markets have been saying, and it has helped us a lot."

"I suppose," you venture, "that one of our problems has been to get our prices down on a really competitive basis when selling in rivalry with machines built in other countries."

"Yes," is the reply. "We've certainly had to keep an eye on that.

"There isn't much, now, that anybody can teach us when it comes to turning out aircraft, or anything else for that matter, on a really quantity production scale.

"If we can only get our raw materials at reasonable prices, and if we can only be assured of the right people—and enough of them—we're ready to face up to anybody

or anything. There's no inferiority complex, I can assure you, in the British aircraft industry.

"This great industry of the air is, first and foremost, a technical and engineering proposition.

"Its very life-blood is to be found in its highly-skilled technical personnel.

"America has realized this well enough in her establishment of splendidly-equipped laboratories, research stations, and aeronautical engineering institutions.

"We, I'm glad to say, have been making up previous leeway by seeing to it that any youngster who has leanings towards the air can now get a first-class college training in aeronautics, and can then be drafted, without any beating about the bush, into whatever branch of the industry he shews himself best fitted to settle down in.

"This business of flying is developing into the biggest thing the world has so far seen.

"Even now we're only at the threshold of the universal air age. If we're to keep abreast of progress, and hold our place in the air as we have on the sea, we want the best brains Britain and the Empire can produce, and the owners of those brains must have every kind of specialised training that scientists and technicians can provide for them. There mustn't be any suggestion of stinting or cheeseparing.

"Either we go ahead or we fall back.

"The touchstone of progress to-day is the way in which any great country shapes up to this vital business of the air. One cannot emphasise too strongly the slogan that 'trade follows the 'plane.' It is literally true. The country which has a comprehensive, really first-class system of air transport can attract visitors of all kinds from every part of the world—business man, tourists, private air travellers.

"It becomes a vital, bustling centre of human activity.

"Traders come to do business with it. Sightseers come to spend their money in it. It is to the fore in everything spelling enterprise, prosperity, and progress."

It is at this point in your tour of the aircraft that you are joined by another member of the Professor's party, who mentions that he is a sales' executive in one of the big British air concerns.

He soon joins in the general talk, and has interesting things to say from his own personal experience in selling aircraft in world markets.

"There's no question," he tells you, "of aeroplanes supplanting motor-cars.

"A man uses his car for one sort of travel, and his aeroplane for another. Take the case of any fellow whose job is to manage some big ranch or station overseas.

"He still uses his car for short-distance runs just round about where he lives. But when he wants to pay one of his routine visits of inspection, going right out over some wide area, then he fetches out his air-car and does the trip in that.

"That's where our export trade lies. In all sorts of jobs like that. And you can't put any sort of limit to it. We're all out after this world air trade. So are the big American firms. And so are others, too.

"All over the world, in every corner of it, if you've the right 'planes at the right prices, you can sell them to people who've got big distances to cover in the course of their work, often over territory difficult for any form of surface transport.

"Here's a point," he adds, "that one needs to bear in mind.

"Our friend here from the designing side of the business stresses strongly, and quite rightly too, the need for the best possible technical training for young men coming into aviation.

"I myself, from my own particular view-point, lay stress on another equally vital aspect. And that's for the need to train absolutely tip-top aerial salesmen.

"There's not the slightest doubt but that this has been one of our weak spots in the past. We've turned out magnificent things for sale, but haven't troubled half enough about having absolutely the best men we could obtain, and train, to go out into the world and sell these things for us.

"The days are gone when good things sell themselves.

"There's much more to it that that, now. You've got to talk about your stuff. You've got to send out the right people with it.

"Let me take our own case. We've spent any amount of time and money in building up an absolutely crack corps of flying salesmen.

"Each of these fellows is a first-class pilot. He can demonstrate every good point in his machine in an aerial display before any prospective customer. Not only that, but he's been through a school which teaches him every trick of the trade in persuasive, convincing salesmanship.

"Yes, you've got to do more than build aeroplanes, nowadays. You've got to sell them. And the second job is as important as the first."

He goes on to give you some idea of actual sales potentialities in the world's markets.

A newspaper organisation overseas, covering a big, scattered territory decides to form its own regular corps of flying reporters for the rapid collection of the latest news. That offers a chance for the sale of a number of machines. An important oil concern makes up its mind to put all its inspectors into the air in their own machines.

Another chance here for a very nice order.

Then there is the big engineering concern, with contracts being arranged or in progress in all sorts of far-off zones,

which requires a number of fast, long-range machines for the use of its technicians.

And so on.

"With big reconstruction jobs going on all over the world," adds the air sales man, "the speed with which some contracting firm goes into action may make all the difference between gaining or losing a valuable contract.

"That's where the aeroplane comes in. Several different firms may, of course, be asked to tender for important work overseas. Whereupon they all get down to the job. And then after that its a case of someone going out with these tenders and other necessary information.

"This is where, as often as not, it develops into an air race between the representatives of say a couple of the big firms. Both these concerns may have rushed through their tenders in about the same time, and then one or two of their best men, getting aboard the fastest 'planes they can lay their hands on, make a dash for it to be first on the spot where the actual work is to be done.

"That's why organisations like these want really first-class machines—powerful, long-range jobs which can cruise at high speeds and keep on doing it."

A point this expert makes is that a quite important aspect of overseas air trade is the selling of machines of different types to Government departments. It seems that more and more inspectors and travelling officials are taking to the air when on official tours, or when making occasional visits to lonely outposts.

"One of the things we've got to look out for," he adds, "is the visits paid to England by heads of big concerns overseas who decide to come over personally and have a look round here, and also in America, before they place orders for perhaps a number of 'planes for transport work of various kinds.

"Naturally, it's up to us to get such orders, and to

put up propositions which are just a little bit more attractive than those offered by rivals on the other side of the pond. Of course speed is a good shop window attraction, always, in this air game. But it isn't everything—not at any rate in every case.

"Let me put it this way.

"A man who wants to buy a good reliable motor-lorry doesn't want such a machine to emulate the speed of a racing car. By the same token, people who come to us to buy a fleet of big air transports—machines easy to operate and maintain, and economical in their fuel consumption—only want machines which show what they reckon a sufficient time saving over other forms of transport.

"Sheer speed in flight wouldn't appeal to them if it was gained at the expense of load-capacity, reliability, and general simplicity and a long working life when on really heavy-duty work.

"That's where we have to arrive at some sort of suitable compromise. You want a machine which, while being reasonably fast, is a really first-class proposition from the view-point of anyone who's going in for air transport on absolutely commercial lines, and who's got to think—all the time—of every item in his annual balance sheet. Spectacular performances don't appeal to people like that. It's a good all-round efficiency they're after.

"What we've got to remember is that it's a long time, now, since flying was an adventure. To-day, my boy, it's just a business—and a pretty important one at that."

That there is no longer anything reckless or adventurous about ocean air voyages is borne in on you pretty clearly when, in the course of your tour through the air-liner, you reach the forward control-room.

Here everything is functioning with its usual smooth, quiet efficiency.

The great machine is adhering accurately to the course

plotted out for it before leaving the ground. The Captain, his navigator at his elbow, is leaning over the chart-table, and while he does so the wireless man comes through from his compartment and hands over a message which has just come through.

This gives the latest news as to wind and weather on the final stages of the flight, and enables the Captain and his navigator to work out, and wireless ahead, their estimated time of landing.

The actual descent, which will be a night one, will you now gather be made at an aerodrome adjoining the big aircraft works in which the air-liner in which you are flying was actually built.

"Our people," explains the technical expert of this firm who has just been making the rounds with you, "want this machine back in the shops for a bit, so that they can fit it out for some new long-range flight.

"If you can spare the time," he adds, "I suggest you stop overnight at the hotel on this aerodrome where we shall be landing and then in the morning, before you go on up to town, you can have a look round these works of ours.

"Our chief designer, I'm sure, would be only too glad to show you a few things. As a matter of fact, Professor Quinn says he himself is going to give us a look over before he goes on in a smaller machine up to town. And I've no doubt he'd give you a lift in this machine so that you can reach London all the sooner.

"What d'you say?"

You answer, promptly enough, that you feel sure such a visit would be a most interesting climax to what has been a really wonderful aerial holiday.

So it is arranged. As soon as your big machine lands, punctually at its estimated time, you snatch a few hours sleep and then—after a 'phone call to your partner in

London to let him know you'll be joining him later that day—you spend several fascinating hours in the great air works which are turning out 'planes of all kinds to supply the world's needs in civil aircraft.

The little party, of which you form one, is received by the chief designer himself.

He takes you first of all into a hall in which there is a truly remarkable collection of beautifully-constructed model aircraft, representing every phase in the evolution of the flying machine, from the days of its infancy right up to the present time.

"Our particular organisation," the chief designer explains, "happened to be one of the first to turn seriously to the building of aeroplanes as anything like a commercial proposition.

"The founders of our firm were laughed at when they predicted that the air industry would in course of time grow into one of, if not the, largest in the world. But already, of course, that prediction has been well enough fulfilled. And here, so to say in miniature, in this air museum of ours in which we take a good deal of pride, one can follow in detail each phase in the art of aviation.

"We've taken a lot of trouble, from year to year, in adding to this museum, and I think it has repaid us well. At any rate, people from all over the world come here specially to see it."

"I'm not surprised to hear that," says the Professor.

"I myself, if only I'd the time, could spend days just browsing about happily in this hall. But even if I can't do that, I can at least make the most of what time I can spare here."

Whereupon, he and the chief designer leading the way, you make a tour of this remarkable collection, your scrutiny of the models and other exhibits being rendered all the

more interesting by the terse, illuminating comments of your two distinguished guides.

Gathered together in this hall is material which brings home to you, in a way nothing has before, all the romance and drama of the greatest human conquest.

Back right into the dim and distant past the story goes.

You see how men of long ago, watching the flying of the birds, began to build themselves crude frameworks of wings which they could raise to their shoulders and with which they jumped, perilously, from hill-tops and towers, being lucky if they escaped with nothing worse than a broken limb.

"Brave fellows, those," observes the Professor. "No doubt about that. Brave and impulsive.

"They hadn't learned to be patient. They hadn't learned to think.

"So long as men reckoned there might be some short-cut to the conquest of the air they were doomed to disappointment. For there's no short-cut in these great conquests. We've seen that, lately, in the great quest to develop atomic power. Men have to learn to sit down and think things out, and to go on thinking and experimenting until at last, often after many weary years, they begin to see light in their darkness, and the road to success lies ahead.

"I always like to pay tribute to that legendary figure of olden times, Leonardo da Vinci, because it was he who did some pretty constructive early thinking, and in a good many of his drawings and plannings you begin to see the glimmering of an idea. But what the whole thing really wanted was some clear-thinking practical engineer to get busy on it, and it is Britain which had the distinction of producing such an engineer and thinker in the great Sir George Cayley.

"He turned what had seemed a sort of conjuring trick

into a reasonable engineering proposition. What he foreshadowed in his writings and experiments was no freak machine, full of fantastic ideas, but the kind of heavier-than-air flying machine which might actually take shape as soon as a suitably light power-plant became available.

"You agree with me, there, don't you?" queries the Professor, turning to the chief designer who stands at his elbow.

"Absolutely," replies the latter, promptly.

"Sir George Cayley was an engineer of such renown that when he began to study seriously the question of human flight, people had to take it for granted that it was now something more than just a will o' the wisp.

"Nobody could laugh at what a man like that says. His researches not only had an immense effect at the time, but they also acted as an inspiration to those following him."

The Professor nods emphatically.

"What a wonderful thing it is for us," he says, "standing as we do now at the dawn of a flying era that will transform all human activities, to see as we do here from what tiny, frail machines our present air giants have been evolved.

"Yet, right from the first, Nature has given us the key to the problem in her own flying creatures, the birds. It was of course the study of the bird, and the adaptation of the cambered wing to human flight, together with learning balance and control, and the development of the petrol engine, which put men on the path that had led to all the marvels we take for granted to-day.

"If man hadn't been able to see birds actually flying, I doubt myself whether he would have had the courage, or the perseverance, to solve his own aerial problems."

So, as they examine this and that, the Professor and

the chief designer voice views and opinion which range over every aspect of the air conquest.

Listening to them, and studying the models they are discussing, it is made clear to you how, after providing themselves with curved lifting surfaces, men began patiently to teach themselves the art of balance and control. And here again they went back to Nature, emulating those young birds which, even though provided as they are with wings, have none the less to learn to use them in short, low flights before they venture boldly forth on the highways of the air.

You realize how the motorless gliding of Lilienthal, Chanute, Pilcher, and the Wrights produced at length an engineless winged craft in which a man could soar out from a hill-top, balancing and controlling this machine as the force of gravity drew it in a gradually-descending path to the lower ground below.

Balance and control once established, the next logical step was to take the petrol engine, as developed already for early motor-cars, and adapt it for power-driven flying.

"Pretty simple it all seems," comments the Professor, "when you look at it from our view-point here to-day.

"But it didn't seem any too simple to those pioneers who were wracking their brains, and often risking their lives. Yet it's really like everything else.

"Once the right key is in your hands, the door unlocks easily enough.

"It is finding that key which is the problem."

"Yes," the chief designer agrees, "once the heavier-than-air flying machine was converted from something problematical into something which actually existed, and which could be flown in sustained flight, the rest became mainly a question of further development by scientists and engineers.

"Look at this machine we started with years ago.

"Just a glorified box-kite. See all those wires which spelt head-resistance. No wonder such machines were nicknamed 'bird-cages.'

"Look at the pilot's seat—out there exposed to all the winds that blew. It reminds one of those early open cars in which passengers, before they started for a drive, wrapped themselves up as though they were going on a Polar expedition.

"It all seems so crude, so amateurish, nowadays. Yet those slow, clumsy, engine-driven kites were the wonder of their day. And no doubt the machines we think so much of now will seem just as primitive to generations that are to come, when they have atomic power harnessed at last to the will of man."

The chief designer goes on to trace for you, in quick, explanatory phrases, how scientists and technicians set about their job of "cleaning up" early aeroplane designs, and of evolving something which, without departing radically from the first conception, should be generally more efficient.

He describes the researches which spelt more efficient lifting surfaces—wings which would not only give more lift but, at the same time, offer less "drag" or resistance to their own movement.

He outlines some of the work done on the aero-engine, such work leading to power-plants which, while being remarkably compact, develop high power for amazingly light weight factors.

He touches on to the development of steam-power, and on the outstanding value, in speed at height, of jet propulsion. He sketches, too, the evolution of the revolving-wing, helicopter type of craft.

"Of course, there's no sort of finality in a quest like this," he adds. "Science is always opening up some new

avenue, and suggesting some fresh way in which we can improve and simplify.

"Take a look at this set of models here. They show how external hulls or fuselages, in our large types of machine, have been gradually eliminated until, being able to use a hollow wing large enough, we dispense altogether with any form of separate hull, putting everything actually inside the big wing itself. And so it goes on.

"First our laboratory wizards get busy on some development which looks like being worth while. Then, after matters have been carried to a certain stage, there follows a series of full-scale tests. And then, after that, if the scheme really does work, we incorporate it in some new machine.

"Always our designs are evolving—improving. Always we are seeking to eliminate anything redundant, to get rid of anything that really can be dispensed with. The old biplane type, with its one wing above another, and all its struts and wires, has given way to the cleaner, simpler monoplane form. Under-carriages which used to hang down while in flight have been tucked up inside fuselages. All external projections have, so far as possible, been smoothed away, and even the hitherto familiar air-screw vanishes if we fit jet-propulsion plants.

"It's a long, long way from that little engined glider, in which the Wrights first flew, to one of our huge jet-propelled flying wings of to-day, and yet, as you see, you can trace the whole story, stage by stage, in this collection here."

Now you leave the museum and begin a tour through the various departments of the busy aircraft works, being joined at this stage by one of the directors of the company who is concerned chiefly with the production of machines of new types.

Entering the designing department, you see how a

machine first begins to take shape on the drawing-boards of the corps of draughtsmen.

"When we start out on the design of some machine," explains this executive who has just joined you, "it is generally for some client—Government, commercial, or private—who has actually asked us to produce it; although it may happen occasionally that we indulge in the luxury of working out some pet scheme of our own; while apart from this we often have Governments and big commercial organisations calling for tenders for aircraft of special types.

"When somebody comes to us wanting a machine, they first of all tell us exactly what they want it to do. Our client may, for example, be some aerial surveying or photographing firm. They need a quite special job for their specific purpose. Or it may be some magnate who says he wants an aerial yacht in which to tour the world on business and pleasure. Or we may get some sportsman who wants a 'plane of a very high performance type.

"Once we've grasped what's wanted in speed, weight-carrying, and range, we get down to the question of what type of power-plant we're going to employ.

"When that's settled, the machine begins to build itself up round this power-unit. I remember they used to say of some pioneers that they would rough out something in chalk on the wall of a shed, and then, if it looked all right proceed to build it, hoping for the best. But we've to be more methodical than that.

"It's a big, complicated job to produce any modern flying machine. Always our technical people are on the look-out for metal alloys that will give us a little more lightness in construction while, at the same time, maintaining fully adequate strength.

"The lower your structure weight, the more you can carry in load and fuel.

"We have to think of all sorts of things the pioneers didn't bother about. We've a special department, for example, which concerns itself solely with the interior decoration and furnishing of our machines.

"It's a very long time, now, since flying was anything like a novelty. People don't fly any longer just for the thrill of it. They fly for speed and comfort, and they expect plenty of the latter. They want comfortable beds in their aerial sleepers, and really luxurious armchairs in which to sit in the day time.

"They also want an interior decoration scheme in their cabins and day-rooms which, as they fly hour after hour, has a restful, pleasing effect on eye and nerve. Your flying machine of to-day has to look right, to fly right, and to be an up-to-the-minute job in all its fittings and comfort devices.

"We're in the really commercial era of the flying machine now. We've got to build and sell them like you build and sell ships or cars. Air-liners, cargo-'planes, air-taxis, private 'planes—they go through our shops in ever-growing numbers, and wing their way all over the globe.

"We've some pretty interesting propositions to juggle about with nowadays—jet propulsion in all its implications, the development of the helicopter machine, and other things like that; and perhaps with some form of atomic power looming in the distance.

"We've to watch our rivals in this country pretty closely, and then all of us, in the British air industry, have to keep an eye on what the fellows in other countries are doing.

"There's one thing you must bear in mind. Although air progress has been so astonishing, the world is still, one might say, wide open for further developments in aviation. Some industries have complained that they are near saturation point. But there's nothing like that with us.

"If only we've the right kind of 'planes we can sell them anywhere and everywhere. Foreign competition is a stimulus to us rather than a drawback. It puts us on our toes. It prevents us from falling into a rut.

"There are so many technical developments open in flying that we, and others, have an immense scope in the further improvements of our machines. It's a ceaseless battle of wits between ourselves here, and our rivals in other firms in this country, and then there's a great international battle of wits between this country and the aircraft industries of other countries."

"And in the commercial flying machine," comments the Professor, "the keynote of it all is to sell air speed, plus economy and reliability, at a price lower than that of your rivals."

"Yes. You have it there," agrees the director.

"One of the vital things, if Britain and the Empire are to keep well ahead, is for us to encourage all we can every form of aeronautical experiment and research, and to see that the best brains we can command are free to devote themselves to this all-important subject."

You move on through the huge works.

Here is a department in which wireless equipment of all kinds is made ready for installing in air machines.

The Professor is particularly interested in which he sees here, and presently he says:

"There are two things which have been and are, transforming life on this planet of ours. One, of course, is the flying machine.

"The other is this magic of wireless. And there's a third that may come in the future in the commercial development of atomic power.

"It always strikes me as most significant, whenever I think of it, how mighty powers should have dawned

on the world at much the same time. It makes you see the hand of Fate in these great world changes.

"The progress of air transport could not have been so rapid had it not been for the aid it has received from wireless.

"The two powers blend together so wonderfully! Wireless sends our thoughts flashing round the world for us, and then when we ourselves want to voyage swiftly across the globe, we have long-distance flying.

"Between them, wireless and the flying machine confer on us powers which would have made our forefathers think men almost super-human."

One of the most interesting departments in the works is that devoted exclusively to experiment and research. Here, as you look about you, one of the experts shows you a new type of armchair which is being evolved at the moment for the saloons of the next batch of the company's air-liners.

It looks the acme of solid comfort, and it is certainly most restful as you sit in it. But when you are invited to test the weight of this chair, by lifting it, you discover that the whole thing is almost fantastically light—a result obtained by a cunning use in its frame of featherweight metal alloys of the latest types.

Then you are shown a section of a new type of wing-spar—a massive looking affair of gleaming metal which looks as if it would need several men to shift it. Yet, when you catch hold of one end of it, you find you can raise it from the floor with an ease that is almost uncanny.

"Ours is a new kind of engineering," explains one of the research men.

"It's a specialised engineering in which we're out all the time to save every scrap of weight we can—not only in the building of our machines, but also in every item of equipment we put into them.

"In the flying machine there must be no idle metal. Every ounce that can be dispensed with must go by the board. And this applies not only, say, to one of our big monoplane wings, but also to such quite incidental items as the ash-trays in the smoking-room and the crockery and other accessories in the dining saloon.

"We are constantly seeking metals, and materials, which will give us a little more lightness without any reduction of strength. You see, the wings of any machine you send up into the air will only lift a certain load. Therefore anything you can save in structural weight, or in equipment, is so much to the good from the view-point of the useful pay-load that particular machine can carry.

"What one can say, in a word, is that one of the keynotes of air construction is to take the weight out of any structure and yet leave it with ample strength to withstand any and all the strains to which it may be subjected.

"There are, as you can imagine, any number of other researches we're busy with. Experiments are constantly in progress to give us still more efficiency in the lifting surfaces we employ, and in the further cleaning up of designs so that machines offer still less 'drag' or resistance to their own forward movement.

"All sorts of other problems are also being dealt with in regard to flying, and in the efficiency of power plants operating at greater and greater heights.

"We're always engaged, too, on schemes to give air passengers greater comfort. Noise used to be one of the bugbears in flying, you may remember. Well, we've dealt pretty effectually with that.

"The same applies to cabin heating and ventilation, and the damping down of vibration when a machine is in flight.

"All such matters are of importance in these days of competitive air transport.

"Your modern air-liner is judged not by one good feature but by its combination of any number of good features.

"It's got to be just right everywhere."

In the vast assembly shop, the chief designer and his assistants show you over the latest product of British air design and construction. It is a mamoth "flying-wing" —the largest of its kind yet produced.

The single supporting surface of this monster is of a simply enormous size, and in its great hollow central sections there is more space for power-plant, passengers, mails and freight than has been available, hitherto, in any machine of this particular type.

A small army of skilled workers are busy both on the outside and inside of the machine, which is the first of a fleet of new leviathans to go into service on the trunk air routes, and to carry British prestige to all the chief air-ports of the world.

"They'll be regular Ritz-Carltons of the clouds, these machines," declares the sales' director.

"Yet with all its elaborate equipment, the keynote of this giant is sheer simplicity of design. Just take a careful look at it.

"I myself recall the time, years ago, when artists used to draw imaginative pictures of a machine something like this, and call it 'the flying machine of the future.'

"Well, here is that machine actually in front of you— no longer a vision of the future but an actual existing structure of the present. It embodies all the best of our knowledge and experience.

"We have reduced our formula to its simplest terms. The whole art of flying is represented by a wing, and here you have it—just a wing, a single wing, carrying its power-plant and all its load in its own interior, and with nothing external save the necessary controlling surfaces.

"It is the logical development, this machine, of year after year of patient and costly development."

"But at the same time you mustn't think it's our last word," interposes the chief designer. "What this flying wing represents is a logical development of one main line of aeronautical research. We've a good many other things up our sleeve that we're not saying much about at the moment."

"Applications of the revolving wing principle ought to keep your back-room boys busy for some time ahead," suggests the Professor. "And who knows but what a combination, in one and the same machine, of an improved rotating wing, and of a still more developed jet propulsion, may give us a form of flying apparatus which, in its appearance at any rate, won't be much like anything we see in the air to-day. And then looming in the future are all the possibilities of atomic power."

The chief designer nods.

"By the time any new machine of ours has got through as far as this assembly shop," he says, "my team of fellows in the design department have lost most of their interest in it, all their thoughts and energies being concentrated already on some fresh research. And actually that's the only way in which we shall manage to hold our place in world air trade."

Before you leave the factory, to fly on up to town, the directors insist on your all having lunch with them in their spacious restaurant—which overlooks the big flying ground used by their test pilots while putting new machines through their paces before passing them out as being ready for delivery.

A constant drone of engines reaches your ears as you sit enjoying an excellent meal. Every now and then, through the wide windows of the restaurant, you see some 'plane ascending or alighting. One of them, you notice,

is a neat little saloon job, intended probably for some private owner. Next, climbing with a roar from its powerful engines, is a big cargo-'plane of an improved type. And then a moment later, gliding in to land, comes a slim, fast, postal 'plane intended for the express mail services. Here is air transport in the making, and it is certainly a stimulating sight.

Before you disperse the chairman of the company gets up to say a few words.

He says that he and his fellow directors feel honoured at having Professor Quinn and his party at their works, more particularly as the Professor has just returned from the world tour which, they all hope will be much to the advantage of British and Empire aviation.

"We all feel here," he says, "that this movement of ours has a significance greater even than the service it is rendering in accelerating transport.

"As it is developing—as we see it developing here—it is spelling a new fellowship among men.

"Our 'planes go out from here and fly over the air-lines of the world. The machines of one nation now fly without let or hindrance above the territory of another.

"To-day we work with redoubled energy to develop commercial air transport because we know that the more flying we do, and the more world-wide our operations become, the less likely is the world ever to relapse again into the anarchy of war. And there's something more in it even than this, as Professor Quinn hardly needs reminding.

"There is this vast question of making a better use, in the interests of all nations, of world wealth and resources.

"This is where our new world unity has its greatest scope. And that also is where salvation lies for our export trade. It is not enough to supply existing demands. We've got to create new ones.

"We want to see all the empty spaces on the world's may filled in. And that can be done if we use air transport as it now ought to be used. New enterprises—new industries in places where they never existed before; the colonising of fresh territories; the creation in them of additional markets.

"That's how it must go.

"The world can never be really rich and prosperous again unless we invoke, in our works of reconstruction, every means and resource that the whole globe can provide.

"In all great development projects, particularly those overseas, transport plays its vital part. Progress can either be accelerated, or retarded, according to the efficiency of the transport available. And here, of course, is the rôle of air transport. It solves problems which might otherwise prove insoluble.

"We're entering a new world now—writing fresh chapters on world history—and the nation which goes ahead aerially is the nation which will thrive and prosper."

The Professor, of course, is called up to say something, and he proves to be in unusually good form. We must all get this in our minds, he says. The age of the air does not mean just an age of faster travel, with other things remaining as they were before. This dawning power of universal flight means, as it develops, a profound change in our way of living. He emphasizes, again, his point that there is no further need for masses of people to crowd together in certain areas, and for other zones to be sparsely populated, or perhaps hardly populated at all.

"All such anomalies cease," he declares, "as air transport becomes available for you, me, and all of us.

"Already we see the process in its early stages. Population is spreading and extending. Congestion in any one zone is relieved, while isolation as we used to know it simply ceases to exist.

"Twice," continues the Professor, "has mankind woefully misused the flying machine, spreading destruction with it instead of progress.

"I'm convinced he won't be guilty of that again. If he is, and with the unleashing of atomic power, then that will mean the end of civilisation and the return of the era of the cave-man with his club.

"Everywhere I've just flown throughout the world there is a new spirit. Men want to get together, to work out new plans in unison. The air is bringing us a new spirit of adventure—the same sort of spirit that animated those old rovers and discoverers who went by way of the sea.

"Men are up and doing again.

"It is a friendly spirit that's abroad to-day. The human mind has been cleansed and purified by all it has gone through."

The Professor refers briefly to far-off areas he has visited during his tour—areas which used to be lonely but which are lonely no longer—areas in which medical or nursing aid, summoned when needed by wireless, arrives promptly by air; where household supplies are delivered by 'plane; where mails and newspapers are dropped by parachute.

"Go here and there throughout the world," he says, "and you can see what the air is doing.

"It is our new instrument of progress—the tool with which we can open up for ourselves, at last, the full riches of the world."

When the time comes for you to fly on up to town, you find several neat rotating-wing machines waiting for you out on the aerodrome.

In one of these—a luxuriously appointed little "motor-car of the air"—you embark with the Professor; while the chief-designer of the company also joins you.

"They want me up in our London office," he explains. "Nowadays, we just flip about in these little helicopter-'planes just like we used to do in cars, but of course ever so much faster.

"You pop off somewhere hundreds of miles away, just for a chat with someone, and you're back again in your office almost before anybody has missed you.

"By flying over and seeing someone, instead of relying on letters or 'phone call, I can often clear up in five minutes something that might otherwise be hanging about for weeks.

"Naturally, being as we are in the air world ourselves, we take pretty big doses of our own medicine. All our executives and sales people fly regularly when on business trips. That old saying about 'distance being no object' has a new meaning now. With us it's a case of 'by air to anywhere.'

"What I enjoy more than anything else," says the Professor, "is a trip in a small machine like this. Instead of going right up high, and losing sight of everything, as you do in those big long-range fellows, you can just flip along, as we're doing now, low enough to watch all the countryside passing away below you—towns, villages, woods, rivers. And what a luxurious way of travelling it is—quite apart from its speed. No noise now to bother one, and no vibration; nothing in fact to tire or irritate you. It has cost us something, in life and labour, to bring the flying machine to its present stage of development, but it's all been well worth while."

Your little 'plane flies right in over the heart of London, alighting on one of the big city air-stages.

Here, awaiting the Professor and his party, are Government officials and aeronautical personages, together with a host of reporters and photographers.

The Professor finds himself facing another barrage;

but never for a moment does his geniality desert him. He answers all questions with a smile. He submits to the demands of the photographers. He gives the reporters something to write about. Yet he never divulges anything really material about the world mission he has just been on.

Only once does his manner become serious.

This is when one of the reporters asks him for some specific message that can be given to the world at large.

"Tell people this," says the Professor, and his face becomes grave.

"Tell them that in this great new age of the air, and of atomic power and its attendant wonders, we've a chance to redeem all our previous faults, follies and failings—of building for ourselves a better world.

"If we fall again, if we let this last chance slip—"

It is unnecessary for the Professor to complete his sentence.

An expressive shrug of his shoulders, and a movement of his hands, suggest the chaos that awaits us if once again we misuse the powers of the air and of science.

After saying goodbye to the party, and going down in the lift to street level, you hail a taxi—one with wheels instead of wings—and drive off to your office in the city to pick up again the usual daily round.

As you go along you remember something the Information Chief told you at the big New York air-port.

He had explained that there is now an international League, which anybody can join, and which is pledged to foster the development of world aviation and also of a universal language to be used by all traversing the globe by air.

You make up your mind to join this League, and to do all you can, as a citizen, to spread the gospel of the air, and of all that it means in world happiness and progress.

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WINGED WORLD

THE COMING OF THE AIR AGE